AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR, CHENNAI

&

VINAYAKA MISSION'S KIRUPANANDA VARIYAR ENGINEERING COLLEGE, SALEM

VINAYAKA MISSION'S RESEARCH FOUNDATION

(Deemed to be University under section 3 of the UGC Act 1956)

(Constituent Colleges of Vinayaka Mission's Research Foundation,Deemed to be University, Salem, Tamil Nadu, India)

(AICTE APPROVED AND NAAC ACCREDITED)

FACULTY OF ENGINEERING AND TECHNOLOGY

REGULATIONS 2021

DEPARTMENT OF COMPUER SCIENCE AND ENGINEERING

PROGRAMME:

B.E - COMPUTER SCIENCE AND ENGINEERING FULL TIME (4 YEARS)

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM (SEMESTER I TO VIII) REGULATION 2021

Dr. M. NITHYA,
Prof & Head.
Dept. of Computer Science & Engg
V.M.K.V. Engg. College, Salem.

VINAYAKA MISSION'S KIRUPANANDA VARIYAR

ENGINEERING COLLEGE, SALEM

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION

- To establish a centre of excellence in computer education and research and to create a platformfor professionals thereby reaching a pinnacle of glory.

MISSION

Computer Science and Engineering is committed

- To develop innovative , competent and quality computer engineers by imparting the state-ofthe –art technology
- To enrich the knowledge of students through value based education
- To develop consultancy activities for industrial sectors
- To endeavour for constant up gradation of technical expertise of students to cater to the needsof the society.

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PROGRAMME OUTCOMES

Engineering Graduates will be able to:

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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PROGRAMME SPECIFIC OUTCOMES (PSOS)

Graduating Students of Computer Science and Engineering programme will be able to:

PSO1	Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.
PSO2	Understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics and networking for efficient design of computer-based systems of varying complexity.
PSO3	Apply standard Software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality product for business success and to be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

PEO1	Technical Expertise: Implement fundamental domain knowledge of core courses for developing effective computing solutions by incorporating creativity and logical reasoning.
PEO2	Graduate will establish effective professionals by solving real world problems using investigative and analytical skills along with the knowledge acquired in the field of Computer Science and Engineering.
PEO3	Graduate will prove a ability to work and communicate effectively as a team member and /or leader to complete the task with minimal resources, meeting deadlines.
PEO4	Graduate will demonstrate his/her ability to adapt to rapidly changing environment in advanced areas of Computer Science and scale new height in their profession through lifelong learning.

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STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAM – REGULAR STUDENTS

Sl. No.	Category of Courses	Types of Courses		Suggested Breakup of Credits (Min – Max)
1	A. Foundation Courses	Humanities and Social Sciences including Management courses		9-12
		Basic Science courses		18 - 25
		Engineering Science courses including workshop, drawing, basics of electrical / mechanical / computer etc.		18 - 24
2	B. Professional Core Courses	Core courses		48-54
3	C. Elective Courses	Professional Electives		12
		Industry Designed/ Industry Supported/ Industry Offered/Industry Sponsored courses		6
		Open Electives	Innovation, Entrepreneurship, Skill Development etc.	6-9
			Emerging Areas like 3D Printing, Artificial Intelligence, Internet of Things ete	6-9
4	D.Courses for Presentation of technical Skills related to the specialization	Project work		8
		Mini Project		3
		Seminar		1
		Internship in industry or elsewhere		3
5	**E. Mandatory Courses	Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge, Employability Enhancement Value Added Courses, Yoga/NCC/NSS/RRC/YRC/ Sports and Games, Student Clubs, Unnat Bharat Abhiyan, Swachh Bharat etc.		Zero credit (Minimum 2 courses to be completed other than yoga and Practice)
Minimum Credits to be earned				**160**

**** The credits earned in category 'E' Courses will not be counted in CGPA calculation for awarding of the degree.**

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STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAM – LATERAL ENTRY STUDENTS

Sl. No.	Category of Courses	Types of Courses		Suggested Breakup of Credits (110 – 120)
1	A. Foundation Courses	Humanities and Social Sciences including Management courses		3 – 6
		Basic Science courses		3 – 6
		Engineering Science courses including workshop, drawing, basics of electrical / mechanical / computer etc.		5 – 9
2	B. Professional Core Courses	Core courses		48-54
3	C.Elective Courses	Professional Electives		12
		Industry Designed/ Industry Supported/ Industry Offered/ Industry Sponsored Courses		6
		Open Electives	Innovation, Entrepreneurship, Skill Development etc.	6-9
			Emerging Areas like 3D Printing, Artificial Intelligence, Internet of Things etc.	6-9
4	D. Courses for Presentation of technical Skills related to the specialization	Project work		8
		Mini Project		3
		Seminar		1
		Internship in industry or elsewhere		3
5	**E. Mandatory Courses	Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge, Employability Enhancement Value Added Courses, NCC, NSS, RRC, YRC, Sports and Games, Student Clubs, Unnat Bharat Abhiyan, Swachh Bharat etc.		Zero Credit Course (Minimum 2 courses to be completed)
Minimum Credits to be earned				**120**

** The credits earned in category 'E' Courses will not be counted in CGPA calculation for awarding of the degree.

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DEPARTMENT COMPUTER SCIENCE AND ENGINEERING
Regulation - 2021
B.E - COMPUTER SCIENCE AND ENGINEERING
CURRICULUM

A. Foundation Courses									
Humanities and Social Sciences including Management courses–Credits (9-12)									
Sl. No	**Course Code**	**Course**	**Offering Dept**	**Category**	**L**	**T**	**P**	**C**	**Pre - requisite**
1	34121H01	TECHNICAL ENGLISH	ENG	FC-HS	3	0	0	3	NIL
2	34121H04	BUSINESS ENGLISH	ENG	FC-HS	3	0	0	3	NIL
3	34121H81	ENGLISH LANGUAGE LAB	ENG	FC-HS	0	0	4	2	NIL
4	34121H82	PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOPMENTLAB	ENG	FC-HS	0	0	2	1	NIL
5	34121H02	TOTAL QUALITY MANAGEMENT	MANAG	FC-HS	3	0	0	3	NIL
6	34121H83	UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY	ENG	FC-HS	3	0	0	3	NIL
Basic Science Courses –Credits (18-25)									
Sl. No	**Course Code**	**Course**	**Offering Dept**	**Category**	**L**	**T**	**P**	**C**	**Pre - requisite**
1	34121B01	ENGINEERING MATHEMATICS	MATH	FC-BS	2	1	0	3	NIL
2	34121B10	MATHEMATICS FOR COMPUTERENGINEERS	MATH	FC-BS	2	1	0	3	NIL
3	34121B04	PHYSICAL SCIENCES	PHY &CHEM	FC-BS	4	0	0	4	NIL
4	34121B14	NUMERICAL METHODS AND NUMBER THEORY	MATH	FC-BS	2	1	0	3	NIL
5	34121B17	PROBABILITY AND QUEUING THEORY	MATH	FC-BS	2	1	0	3	NIL
6	34121B05	SMART MATERIALS AND NANO TECHNOLOGY	PHY	FC-BS	3	0	0	3	PHYSICAL SCIENCES
7	34121B21	DISCRETE MATHEMATICS	MATH	FC-BS	2	1	0	3	NIL

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8	34121B36	STATISTICAL FOUNDATION	MATH	FC-BS	2	1	0	3	NIL
9	34121B81	PHYSICAL SCIENCES LAB	PHY &CHEM	FC-BS	0	0	4	2	NIL
10	34121B19	ENVIRONMENTAL SCIENCES	CHEM	FC-BS	3	0	0	3	NIL

Engineering Science courses including Workshop, Drawing, Basics of Electrical/Mechanical/Computer etc.,Credits – (18-24)

Sl. No	Course Code	Course	Offering Dept	Category	L	T	P	C	Pre - requisite
1	35021E01	FOUNDATIONS OF COMPUTING AND PROGRAMMING (THEORY AND PRACTICALS)	CSE	FC-ES	2	0	2	3	NIL
2	34621E01	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	EEE & ECE	FC-ES	4	0	0	4	NIL
3	35021E02	PYTHON PROGRAMMING (THEORY AND PRACTICALS)	CSE	FC-ES	2	0	2	3	NIL
4	34421E01	BASICS OF CIVIL AND MECHANICAL ENGINEERING	CIVIL & MECH	FC-ES	4	0	0	4	NIL
5	34621E81	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB	EEE &ECE	FC-ES	0	0	4	2	NIL
6	34421E84	ENGINEERING SKILLS PRACTICALS LAB	CIVIL & MECH	FC-ES	0	0	4	2	NIL
7	34421E81	ENGINEERING GRAPHICS AND DESIGN	MECH	FC-ES	1	0	4	3	NIL
8	35021E03	PROGRAMMING FOR PROBLEM SOLVING	CSE	FC-ES	3	0	0	3	NIL

B. Professional Core Courses – Credits (48-54)

Sl. No	Course Code	Course	Offering Dept	Category	L	T	P	C	Pre - requisite
1.	35021C02	DATA STRUCTURES	CSE	CC	3	0	0	3	NIL
2.	35021C01	COMPUTER ARCHITECTUREAND ORGANIZATION	CSE	CC	3	0	0	3	NIL
3.	35021C18	OPERATING SYSTEM(THEORY AND PRACTICALS)	CSE	CC	3	0	2	4	NIL

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4.	35021C05	DESIGN AND ANALYSIS OF ALGORITHMS	CSE	CC	3	0	0	3	NIL
5.	35021C04	DATABASE MANAGEMENT SYSTEMS	CSE	CC	3	0	0	3	NIL
6.	35021C06	OBJECT ORIENTED PROGRAMMING	CSE	CC	3	0	0	3	NIL
7.	35021C08	COMPILER DESIGN AND AUTOMATA THEORY	CSE	CC	3	0	0	3	NIL
8.	35021C09	COMPUTER NETWORKS (THEORY AND PRACTICALS)	CSE	CC	3	0	2	4	NIL
9.	35021C13	SOFTWARE ENGINEERING	CSE	CC	3	0	0	3	NIL
10.	35021C16	JAVA PROGRAMMING	CSE	CC	3	0	0	3	NIL
11.	35021C20	WEB TECHNOLOGY (THEORY AND PRACTICALS)	CSE	CC	3	0	2	4	NIL
12.	35021C07	ARTIFICIAL INTELLIGENCE	CSE	CC	3	0	0	3	NIL
13.	35021C03	PROBLEM SOLVING USING COMPUTER	CSE	CC	3	0	0	3	NIL
14.	35021C85	ARTIFICIAL INTELLIGENCE LAB	CSE	CC	0	0	4	2	NIL
15.	35021C83	DATABASE MANAGEMENT SYSTEMS LAB	CSE	CC	0	0	4	2	NIL
16.	35021C84	OBJECT ORIENTED PROGRAMMING LAB	CSE	CC	0	0	4	2	NIL
17.	35021C88	JAVA PROGRAMMING LAB	CSE	CC	0	0	4	2	NIL
18.	35021C82	DATA STRUCTURES LAB	CSE	CC	0	0	4	2	NIL
19.	35021C14	ADVANCED JAVA PROGRAMMING	CSE	CC	3	0	0	3	JAVA PROGRA M MING
20.	35021C86	ADVANCED JAVA PROGRAMMINGLAB	CSE	CC	0	0	4	2	JAVA PROGRAM MING LAB
21.	35021C89	PYTHON FOR DATA SCIENCE LAB	CSE	CC	0	0	4	2	NIL
22.	35021C12	PROBLEM SOLVING USING PYTHON PROGRAMMING (THEORY AND PRACTICALS)	CSE	CC	3	0	2	4	NIL

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23.	35021C19	THEORY OF COMPUTATION	CSE	CC	3	0	0	3	NIL
24.	35021C81	COMPUTER PROGRAMMING LAB	CSE	CC	0	0	4	2	NIL
C. Elective Courses									
Professional Elective Courses Credits-(12)									
1.	35021P03	BIG DATA AND ANALYTICS	CSE	EC-PS	3	0	0	3	NIL
2.	35021P17	ETHICAL HACKING	CSE	EC-PS	3	0	0	3	NIL
3.	35021P24	MOBILE COMPUTING	CSE	EC-PS	3	0	0	3	NIL
4.	35021P01	UNIX INTERNALS	CSE	EC-PS	3	0	0	3	NIL
5.	35021P36	WIRELESS AND SENSOR NETWORKS	CSE	EC-PS	3	0	0	3	NIL
6.	35021P32	SOFT COMPUTING	CSE	EC-PS	3	0	0	3	NIL
7.	35021P05	C# AND .NET APPLICATION DEVELOPMENT	CSE	EC-PS	3	0	0	3	OBJECT ORIENTED PROGRAMMING
8.	35021P06	CLOUD COMPUTING	CSE	EC-PS	3	0	0	3	NIL
9.	35021P02	AGILE METHODOLOGIES	CSE	EC-PS	3	0	0	3	NIL
10.	35021P23	MACHINE LEARNING	CSE	EC-PS	3	0	0	3	NIL
11.	35021P13	DEEP LEARNING	CSE	EC-PS	3	0	0	3	NIL
12.	35021P12	DATA VIRTUALIZATION	CSE	EC-PS	3	0	0	3	NIL
13.	35021P10	DATA MINING	CSE	EC-PS	3	0	0	3	DATABASE MANAGEMENT SYSTEMS
14.	35021P08	COMPUTER GRAPHICS AND MULTIMEDIA	CSE	EC-PS	3	0	0	3	NIL
15.	35021P16	E-LEARNING TECHNIQUES	CSE	EC-PS	3	0	0	3	NIL
16.	35021P26	NETWORK DESIGN AND MANAGEMENT	CSE	EC-PS	3	0	0	3	NIL
17.	35021P34	SOFTWARE TESTING	CSE	EC-PS	3	0	0	3	NIL

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18.	35021P22	IT INFRASTRUCTURE MANAGEMENT	CSE	EC-PS	3	0	0	3	NIL
19.	35021P04	BLOCK CHAIN TECHNOLOGY	CSE	EC-PS	3	0	0	3	NIL
20.	35021P19	GO PROGRAMMING	CSE	EC-PS	3	0	0	3	NIL
21.	35021P28	R PROGRAMMING	CSE	EC-PS	3	0	0	3	NIL
22.	35021P30	RICH INTERNET APPLICATION	CSE	EC-PS	3	0	0	3	NIL
23.	35021P27	OBJECT ORIENTED ANALYSIS AND DESIGN	CSE	EC-PS	3	0	0	3	NIL
24.	35021P18	GAME THEORY	CSE	EC-PS	3	0	0	3	ENGINERRING MATHEMATICS
25.	35021P20	INFORMATION RETRIEVAL TECHNIQUES	CSE	EC-PS	3	0	0	3	NIL
26.	35021P33	SOFTWARE QUALITY MANAGEMENT	CSE	EC-PS	3	0	0	3	NIL
27.	35021P25	NATURAL LANGUAGE PROCESSING	CSE	EC-PS	3	0	0	3	NIL
28.	35021P31	SCALA PROGRAMMING	CSE	EC-PS	3	0	0	3	JAVA PROGRAM MING
29.	35021P35	THEORETICAL APPROACH FOR WEB APPLICATION DEVELOPMENT	CSE	EC-PS	3	0	0	3	NIL
30.	35021P11	DATA SCIENCE IN PYTHON	CSE	EC-PS	3	0	0	3	NIL
31.	35021P14	DIGITAL MARKETING	CSE	EC-PS	3	0	0	3	NIL
32.	35021P09	CYBER SECURITY PRINCIPLES	CSE	EC-PS	3	0	0	3	NIL
33.	35021P21	INTERNET OF THINGS AND ITS APPLICATIONS	CSE	EC-PS	3	0	0	3	NIL

Industry Designed/ Industry Supported/ Industry Offered/ Industry Sponsored courses – Credits-(6)

Sl. No	Course Code	Course	Offering Dept	Category	L	T	P	C	Pre - requisite
1	34121I07	BUSINESS INTELLIGENCE AND ITS APPLICATIONS	INFOSYS	EC-IE	3	0	0	3	NIL

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2	34121I06	BUILDING ENTERPRISE APPLICATIONS	INFOSYS	EC-IE	3	0	0	3	NIL
3	34121I15	INTERNET AND WEB TECHNOLOGY	INFOSYS	EC-IE	3	0	0	3	NIL
4	35021I01	LEARNING IT ESSENTIALS BY DOING	INFOSYS	EC-IE	3	0	0	3	NIL
5	34121I13	ESSENTIALS OF INFORMATIONTECHNOLOGY	INFOSYS	EC-IE	3	0	0	3	NIL
6	34121I16	INTRODUCTION TO MAINFRAMES	INFOSYS	EC-IE	3	0	0	3	NIL
7	34121I20	MOBILE APPLICATION DEVELOPMENT	INFOSYS	EC-IE	3	0	0	3	NIL
8	34121I10	CYBER FORENSICS	AVANZO TECH	EC-IE	3	0	0	3	NIL
9	34121I09	CRYPTOGRAPHY AND NETWORK SECURITY	AVANZO TECH	EC-IE	3	0	0	3	NIL
10	34121I08	CLOUD DATABASE MANAGEMENT AND SECURITY	SALEM INFO TECH	EC-IE	3	0	0	3	NIL

Open Electives – Electives from Innovation, Entrepreneurship, Skill Development etc. Credits -(6-9)

Sl. No	Course Code	Course	Offering Dept	Category	L	T	P	C	Pre - requisite
1.	34121O03	FINANCE AND ACCOUNTING FOR ENGINEERS	MANAG	OE-IE	3	0	0	3	NIL
2.	34121O04	INNOVATION, PRODUCT DEVELOPMENT AND COMMERCIALIZATION	MANAG	OE-IE	3	0	0	3	NIL
3.	34121O07	SOCIAL ENTREPRENEURSHIP	MANAG	OE-IE	3	0		3	NIL
4.	34121O01	ENGINEERING STARTUPS AND ENTREPRENEURIAL MANAGEMENT	MANAG	OE-IE	3	0	0	3	NIL
5.	34121O06	NEW VENTURE PLANNING AND MANAGEMENT	MANAG	OE-IE	3	0	0	3	NIL
6.	34121O02	INTELLECTUAL PROPERTY RIGHTS	MANAG	OE-IE	3	0	0	3	NIL

Open Courses –Electives from other Emerging Areas Credits-(6-9)

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Sl. No	Course Code	Course	Offering Dept	Category	L	T	P	C	Pre - requisite
1.	34421O01	3D PRINTING AND ITS APPLICATIONS	MECH	OE-EA	3	0	0	3	NIL
2.	34421O02	INDUSTRIAL ROBOTICS	MECH	OE-EA	3	0	0	3	NIL
3.	36921O01	BIOMOLECULES – STRUCTURE AND FUNCTION	PE	OE-EA	3	0	0	3	NIL
4.	36921O02	PHARMACOGENOMICS	PE	OE-EA	3	0	0	3	NIL
5.	34221O02	MUNICIPAL SOLID WASTE MANAGEMENT	CIVIL	OE-EA	3	0	0	3	NIL
6.	34221O01	DISASTER RISK MANAGEMENT	CIVIL	OE-EA	3	0	0	3	NIL
7.	34621O01	GREEN POWER GENERATION SYSTEMS	EEE	OE-EA	3	0	0	3	NIL
8.	34621O02	INDUSTRIAL DRIVES ANDAUTOMATION	EEE	OE-EA	3	0	0	3	NIL
9.	38121O01	FOOD AND NUTRITION TECHNOLOGY	BTE	OE-EA	3	0	0	3	NIL
10.	38121O02	INTRODUCTION TO BIOFUELS	BTE	OE-EA	3	0	0	3	NIL
11.	35321O03	PRINCIPLES OF BIOMEDICAL INSTRUMENTATION	BME	OE-EA	3	0	0	3	NIL
12.	35321O02	BIOSENSORS AND TRANSDUCERS	BME	OE-EA	3	0	0	3	NIL
13.	34721O02	INTRODUCTION TO INDUSTRY 4.0 AND INDUSTRIAL INTERNET OF THINGS	ECE	OE-EA	3	0	0	3	NIL
14.	34721O01	DESIGN OF ELECTRONIC EQUIPMENT	ECE	OE-EA	3	0	0	3	NIL

D. Courses for Presentation of Technical Skills related to the specialization (15)

Sl No	Course Code	Course	Offering Dept	Category	L	T	P	C	Pre - requisite
1	35021R01	PROJECT WORK	CSE	PI-P	0	0	16	8	NIL
2	35021M81	MINI PROJECT	CSE	PI-M	0	0	6	3	NIL
3	35021S81	SEMINAR	CSE	PI-S	0	0	2	1	NIL
4	35021T81	INTERNSHIP	CSE	PI-IT	3 WEEKS			3	NIL

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E. Mandatory courses (No Credits) (Not included for CGPA calculations)									
Sl No	**Course Code**	**Course**	**Offering Dept**	**Category**	**L**	**T**	**P**	**C**	**Pre - requisite**
1	34121Z81	YOGA AND MEDITATION	PHED	AC	0	0	2	0	NIL
Any two of the Following Courses									
2	34121Z82	GENDER EQUITY AND LAW	LAW	AC	0	0	2	0	NIL
3	34121Z83	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	GEN	AC	0	0	2	0	NIL
4	34121Z84	INDIAN CONSTITUTION	LAW	AC	0	0	2	0	NIL
5	34121Z86	SPORTS AND GAMES	PHED	AC	0	0	2	0	NIL
6	34121Z85	NCC / NSS / RRC / YRC/ STUDENT CLUBS/UNNAT BHARATH ABHIYAN/SWACTH BHARAT	GEN	AC	0	0	2	0	NIL
SPECIALIZATION IN CLOUD COMPUTING									
1	35021**CC**01	CLOUD COMPUTING ARCHITECTURE	CSE	SE	3	0	0	3	NIL
2	35021CC02	SECURITY IN CLOUD	CSE	SE	3	0	0	3	NIL
3	35021CC03	CLOUD APPLICATION DEVELOPMENT	CSE	SE	3	0	0	3	NIL
4	35021CC04	CLOUD STORAGE INFRASTRUCTURES	CSE	SE	3	0	0	3	NIL
5	35021CC05	CRYPTOGRAPHY TECHNIQUES	CSE	SE	3	0	0	3	NIL
6	35021CC06	DISTRIBUTED COMPUTING	CSE	SE	3	0	0	3	NIL
7	35021CC07	INTERNET SECURITY AND COMPUTER FORENSICS	CSE	SE	3	0	0	3	NIL
8	35021CC08	CLOUD DEPLOYMENT MODEL LAB	CSE	SE	0	0	4	2	NIL
SPECIALIZATION – ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING									
1	35021**AI**01	GENETIC ALGORITHM AND ITSAPPLICATIONS	CSE	SE	3	0	0	3	NIL
2	35021AI02	ARTIFICIAL NEURAL NETWORKS	CSE	SE	3	0	0	3	NIL
3	35021AI03	FUZZY LOGIC AND ITS APPLICATIONS	CSE	SE	3	0	0	3	NIL

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4	35021AI04	COMPUTER VISION	CSE	SE	3	0	0	3	NIL
5	35021AI05	INFORMATION PROCESSING USING NLP	CSE	SE	3	0	0	3	NIL
6	35021AI06	STATISTICAL MACHINE LEARNING	CSE	SE	3	0	0	3	NIL
8	35021AI07	DEEP STRUCTURED LEARNING	CSE	SE	3	0	0	3	NIL
9	35021AI08	REINFORCEMENT LEARNING	CSE	SE	3	0	0	3	NIL
10	35021AI09	ARTIFICIAL INTELLIGENCE AND AGENTS	CSE	SE	3	0	0	3	NIL
SPECIALIZATION – CYBER SECURITY									
1	35021CS01	DIGITAL FORENSICS	CSE	SE	3	0	0	3	NIL
2	35021CS02	CYBER - CRIMES AND LAWS	CSE	SE	3	0	0	3	NIL
3	35021CS03	INTRUSION DETECTION ANDPREVENTION SYSTEM	CSE	SE	3	0	0	3	NIL
4	35021CS04	PENETRATION TESTING	CSE	SE	3	0	0	3	NIL
5	35021CS05	MOBILE COMMUNICATION SECURITY	CSE	SE	3	0	0	3	NIL
6	35021CS06	BIG DATA SECURITY	CSE	SE	3	0	0	3	NIL
7	35021CS07	CLOUD COMPUTING SECURITY	CSE	SE	3	0	0	3	NIL
8	35021CS08	DATA VISUALIZATION TECHNIQUES	CSE	SE	3	0	0	3	NIL

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SPECIALIZATION –BLOCK CHAIN TECHNOLOGY									
1	35021BC01	DESIGN AND DEVELOPMENT OF BLOCKCHAIN APPLICATIONS	CSE	SE	3	0	0	3	NIL
2	35021BC02	CRYPTOGRAPHY AND INFORMATION SECURITY	CSE	SE	3	0	0	3	NIL
3	35021BC03	BITCOIN MINING	CSE	SE	3	0	0	3	NIL
4	35021BC04	PUBLIC KEY INFRASTRUCTURE AND TRUST MANAGEMENT	CSE	SE	3	0	0	3	NIL
5	35021BC05	BLOCK CHAIN TECHNOLOGIES: BUSINESS INNOVATION AND APPLICATIONS	CSE	SE	3	0	0	3	NIL
6	35021BC06	BLOCK CHAIN ARCHITECTURE DESIGN	CSE	SE	3	0	0	3	NIL
7	35021BC07	GRAPHICS AND GAMING	CSE	SE	3	0	0	3	NIL
8	35021BC08	CRYPTO CURRENCY TECHNOLOGIES	CSE	SE	3	0	0	3	NIL
9	35021BC09	ANDROID SECURITY	CSE	SE	3	0	0	3	NIL
10	35021BC10	CYBER FORENSICS AND INVESTIGATION	CSE	SE	3	0	0	3	NIL
SPECIALIZATION – IOT									
1	35021IOT01	IOT ARCHITECTURE AND PROTOCOLS	CSE	SE	3	0	0	3	NIL
2	35021IOT02	MACHINE LEARNING-I	CSE	SE	3	0	0	3	NIL
3	35021IOT03	ARTIFICIAL NEURAL NETWORKS	CSE	SE	3	0	0	3	NIL
4	35021IOT04	NETWORK PROGRAMMING	CSE	SE	3	0	0	3	NIL
5	35021IOT05	INTERNET AND WEB TECHNOLOGY	CSE	SE	3	0	0	3	NIL
6	35021IOT06	WIRELESS AND MOBILE COMMUNICATION	CSE	SE	3	0	0	3	NIL
7	35021IOT07	IOT METHODOLOGY AND APPLICATIONS	CSE	SE	3	0	0	3	NIL
8	35021IOT08	ADVANCED DATABASE SYSTEM	CSE	SE	3	0	0	3	NIL
9	35021IOT09	BIG DATA VISUALIZATION	CSE	SE	3	0	0	3	NIL
10	35021IOT10	INDUSTRIAL INTERNET OF THINGS	CSE	SE	3	0	0	3	NIL

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SPECIALIZATION – DATA SCIENCE AND ANALYTICS									
1	35021DS01	BIG DATA TOOLS AND TECHNIQUES	CSE	SE	3	0	0	3	NIL
2	35021DS02	DATA MINING AND ANALYTICS	CSE	SE	3	0	0	3	NIL
3	35021DS03	BASCIS OF DATA SCIENCE	CSE	SE	3	0	0	3	NIL
4	35021DS04	INFORMATION STORAGE AND MANAGEMENT	CSE	SE	3	0	0	3	NIL
5	35021DS05	TEXT MINING	CSE	SE	3	0	0	3	NIL
6	35021DS06	BUSINESS INTELLIGENCE AND ANALYTICS	CSE	SE	3	0	0	3	NIL
7	35021DS07	WEB INTELLIGENCE	CSE	SE	3	0	0	3	NIL
8	35021DS08	DATABASE SECURITY AND PRIVACY	CSE	SE	3	0	0	3	NIL
9	35021DS09	BIG DATA VISUALIZATION	CSE	SE	3	0	0	3	NIL
10	35021DS10	MACHINE LEARNING - I	CSE	SE	3	0	0	3	NIL

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34121H01	TECHNICAL ENGLISH	Category	L	T	P	Credit
		FC-HS	3	0	0	3

PREAMBLE

Technical English is a life skill course necessary for all students of Engineering and Technology. It aims at developing communication skills in English, essential for understanding and expressing the ideas of different professional context. The outcome of the course is to help the students acquire the language skills of Listening, Speaking, Reading and Writing competency in English language and thereby making the students competent and employable in the globalised scenario.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To enable students to develop LSRW skills in English. (Listening, Speaking, Reading, and Writing.)
2.	To make them become effective communicators
3.	To ensure that learners use Electronic media materials for developing language
4.	To aid the students with employability skills.
5.	To develop the students communication skills in formal and informal situations

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Listen, remember and respond to others in different scenario	Remember
CO2. Understand and speak fluently and correctly with correct pronunciation in different situation.	Understand
CO3. To make the students experts in professional writing	Apply
CO4.. To make the students in proficient technical communicator	Apply
CO5. To make the students recognize the role of technical writing in their careers in business, technical and scientific field	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	L	L	M	M	M	-	S	-	S	S	-	S
CO2	-	-	-	-	-	-	L	-	-	S	-	S	M	-	S
CO3	-	-	-	L	-	-	-	L	-	-	-	L	M	M	-
CO4	L	-	-	-	-	M	-	L	M	S	L	S	S	M	S
CO5	M	-	L	S	-	-	-	-	-	-	-	S	M	-	S

S- Strong; M-Medium; L-Low

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SYLLABUS

SELF INTRODUCTION

Self introduction - Simulations using E Materials - Whatsapp, Face book, Hiker, Twitter- Effective Communication with Minimum Words - Interpretation of Images and Films - Identify the different Parts of Speech- Word formation with Prefixes and suffixes -Common Errors in English -Scientific Vocabulary (definition and meaning)– Technical Abbreviations and Acronyms -Listening Skills- Passive and Active listening, Listening to Native Speakers - Characteristics of a good listener.

STRESS

Articles - Phonetics (Vowels, Consonants and Diphthongs) - Pronunciation Guidelines -Listening to Indian speakers from different regions, intrusion of mother tongue - Homophones – Homonyms - Note taking and Note making - Difference between Spoken and Written English- Use of appropriate language - Listening and Responding to Video Lectures (Green India, environment, social talks, New Norms) - Extempore.

SPEAKING SKILLS

Tense forms- Verbal and Non verbal Communication - Describing objects - Process Description- Speaking Practice - Paragraph Writing on any given topic (My favourite place, games / Hobbies / School life, etc.) -Types of paragraphs - Telephone Etiquettes - Telephonic conversation with dialogue- Interpersonal Skills.

READING SKILLS

English as language of Opportunity and Employability- Impersonal Passive Voice - Conditional Sentences - Technical and Non technical Report Writing (Attend a technical seminar and submit a report) - News Letters and Editing - Skimming- Scanning - How to Improve Reading Speed - Designing Invitations and Poster Preparation – Technical Jargons

TECHNICAL WRITING

Sentence Pattern (SVOCA) - Statement of Comparison - Transcoding (Flow Chart, Bar Chart and Pie Chart) – Informal and Formal letters – Application letter- Resume Writing- Difference among Bio data, Resume and Curriculum Vitae.

TEXTBOOK

1. English for Engineers- Faculty of English – VMKV Engineering College, Salem and AVIT, Chennai

REFERENCE BOOKS

1. 1. English for Effective Communication, Department of English, VMKV & AVIT, SCM Publishers, 2009.
2. Practical English Usage- Michael Swan (III edition), Oxford University Press
3. Grammar Builder- I, II, III, and Cambridge University Press.

4 Pickett and Laster. Technical English: Writing, Reading and Speaking, New York: Harper and Row Publications, 2002.

COURSE DESIGNERS

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1.	Dr. Jennifer G Joseph	Prof. and Head, H&S	**AVIT**	Jennifer@avit.ac.in
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34121H04	BUSINESS ENGLISH	Category	L	T	P	Credit
		FC-HS	3	0	0	3

PREAMBLE

Language is one of the most valued possessions of men. It acts as a repository of wisdom. Among all other languages English, the international language plays a vital role as a propeller for the advancement of knowledge in different fields and as a telescope to view the dream of the future.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To impart and enhance corporate communication.
2.	To enable learners to develop presentation skills
3.	To build confidence in learners to use English in Business context
4.	To make them experts in professional writing
5.	To equip students with employability and job searching skills

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Communicate with a range of formal and informal context	Understand
CO2. demonstrate interaction skills and consider how own communication is adjusted in different scenario	Apply
CO3. Use strengthened oral and written skills in the business context	Apply
CO4. Create interest in a topic by exploring thoughts and ideas	Apply
CO5. Have better performance in the art of communication	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	-	L	-	L	S	S	-	M	S	-	S	S	-	-
CO2	-	M	S	M	-	M	M	-	L	S	-	S	M	-	-
CO3	L	M	-	-	-	M	-	L	-	S	L	M	-	M	-
CO4	-	L	M	M	-	-	L	M	M	S	L	M	M	-	M
CO5	-	L	-	M	-	L	L	-	-	S	-	S	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

Basics of Language and Listening Skills: Subject and Verb Agreement (concord) - Preposition and Relative Pronoun - Cause and effect - Phrasal Verbs-Idioms and phrases-Listening Comprehension -Listening to Audio Files and Answering Questions-Framing Questions-Negotiation Skills-Presentation Skills and Debating Skills

STRESS: Stress (Word Stress and Sentence Stress) Intonation- Difference between British and American English Vocabulary-Indianism-Compound Words (including Technical Terminology) Jargons- Technical and Business

SPEAKING SKILLS AND READING SKILLS: Extempore**,** Listening to TED Talks and discussion on the topic heard, Speaking activities- pair and group designed by the faculty, Group Discussion-Types of Interviews, Watching Documentary Films and Responding to Questions, Reading Skills-Understanding Ideas and making Inferences-– FAQs – E - Mail Netiquette - Sample E – mails , Critical Reading-Book Review-Finding Key Information and Shifting Facts from Opinions

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CORPORATE COMMUNICATION: What is Corporate Communication? Types of Office communications - Recommendation-Instruction-Check List- Circulars-Inter Office Memo- Minutes of Meeting and Writing Agenda - Discourse Markers - Rearranging Jumbled Sentences

WRITING SKILLS Technical Articles – Written communication Project Proposals-Making Presentations on given Topics -Preparing Power Point Presentations-Business Letters (Calling for Quotation, Placing Orders and Complaint Letters) - Expansion of an Idea-Creative Writing.

TEXTBOOK

1. English for Effective Communication - Faculty of English – VMKV Engineering College, Salem and AVIT, Chennai

REFERENCE BOOKS

1. Grammar Builder – I, II, III – Cambridge University Press.
2. Technical English – Writing, Reading and Speaking – Pickett and Lester, Harper and Row

Course Designers:

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34121H81	ENGLISH LANGUAGE LAB	Category	L	T	P	Credit
		FC-HS	0	0	4	2

PREAMBLE

English Language Laboratory provides technological support to students. It acts as a platform for learning, practicing and producing language skills through interactive lessons and communicative mode of teaching.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To understand communication nuisances in the corporate sector.
2.	To understand the role of mother tongue in second language learning and to avoid interference of mother tongue.
3.	To improve the oral skills of the students communicate effectively through different activities
4.	To understand and apply the telephone etiquette
5.	Case study to understand the practical aspects of communication

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Give best performance in group discussion and interview	Understand
CO2. Best performance in the art of conversation and public speaking.	Apply
CO3. Give better job opportunities in corporate companies	Apply
CO4. Better understanding of nuances of English language through audio-visual experience and group activities	Apply
CO5. Speaking skills with clarity and confidence which in turn enhances their employability skills	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	S	M	S	-	L	-	-	S	S	M	-	-	-	M
CO2	M	-	-	-	-	-	-	-	M	S	-	M	M	-	M
CO3	M	-	-	-	-	-	-	-	-	S	-	M	-	-	M
CO4	M	-	-	-	-	-	-	-	-	M	-	-	M	-	M
CO5	M	-	-	S	-	-	-	-	-	M	-	-	M	-	S

S- Strong; M-Medium; L-Low

SYLLABUS

MODULE I: Ice Breaker, Grouping, Listening- (Hearing and listening)- Active Listening- Passive Listening – Listening to songs, videos and understanding- (fill in the blanks) Telephone Conversation

MODULE II: Influence of mother tongue, videos, understanding nuances of English language (video) puzzle to solve, Activity.

MODULE III: Why is English important, Communication skills, TED (video) Communication in different scenario – a case study, ingredients of success, Activity – chart, speak the design, feedback on progress, Group wise, Individual. Role Play

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MODULE IV: Telephone Etiquette, Dining Etiquette, Meeting Etiquette, Corporate Etiquette, Business Etiquette.

MODULE V: Case study of Etiquette in different scenario.

Course Designers:

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34121H82	PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOENT LAB	Category	L	T	P	Credit
		FC-HS	0	0	2	1

PREMABLE:

To develop students with good presentation and writing skills (Professionally & technically). Articulate and enunciate words and sentences clearly and effectively. Develop proper listening skills. Understand different writing techniques and styles based on the communication being used.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To develop communication and personality skills.
2.	To improve Aptitude skills, train to improve self-learning / researching abilities, presentation skills & technical writing.
3.	To improve students employability skills.
4.	To develop professional with idealistic, practical and moral values.
5.	To produce cover letters, resumes and job application strategies.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Improve communication and personality skills.	Apply
CO2. Demonstrate effective use of team work skills and presentation skills to complete given tasks.	Apply
CO3. Speak with clarity and confidence thereby enhancing employability skills of the students.	Apply
CO4. Have balanced value system that can be practiced for enhanced professional life.	Apply
CO5. Improve their vocabulary and use them in appropriate situation	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	-	-	-	M	M	-	M	S	-	-	-	-	-
CO2	M	-	-	-	-	-	-	-	S	M	-	-	-	-	-
CO3	-	-	-	-	-	-	M	-	S	S	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	S	-	-	-	-	-	-	-	M	S	-	M	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT – I: COMMUNICATION AND SELF DEVELOPMENT: Basic Concepts of Communication; Barriers in Communication; How to Overcome Barriers to Communication, Barriers and Filters in Listening Skill, Active and Passive listening, exposure to English language through various activities and maintaining a vocabulary dairy improving confidence in Language usage using activities,

UNIT – II: GRAMMAR & SYNTAX: Subject verb concord, tenses, Homophones, Homonyms, Spotting errors.

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UNIT – III. READING AND WRITING SKILLS: Reading Comprehension; and suggesting title for given

passage Back office job for organizing a conference / seminar (member of organizing committee and submit a report); Jumbled sentences, respond to real time advertisement and prepare a covering letter with CV.

UNIT IV. SPEAKING SKILLS AND ESSENCE OF SOFT SKILLS: Hard and soft Skills; Feedback Skills; Skills of Effective Speaking; Component of an effective Talk; how to make an effective oral presentation, Time management, Team work skills, Leadership skills, Adaptability and bettering oneself, Persuasion skills.

UNIT V TECHNICAL REPORT, RESEARCH CASE STUDY & REPORTING: Types and Structure of Reports; Collecting Data; Technical Proposals; Visual Aids; General Tips for Writing Reports. Research Case Study and reporting, how to make an effective power point presentation

TEXTBOOK

1. The Functional Aspects of Communication Skills, Prajapati Prasad and Rajendra K.Sharma, S. K Kataria& Sons, New Delhi, Rep''nt 2007

REFERENCES

1. Business Communication, Sinha K. K. S. Chand, New Delhi.
2. Business Communication, Asha Kaul, Prentice Hall of India
3. Business Correspondence and Report Writing A Practical Approach to Business and Technical Communication, Sharma, R.C.and Krishna Mohan, Tata Mc Graw – Hill.

Course Designers:

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34121H02	TOTAL QUALITY MANAGEMENT	Category	L	T	P	Credit
		FC-HS	3	0	0	3

PREAMBLE:

Quality is the mantra for success or even for the survival of any organization in this competitive global market. Total Quality Management (TQM) is an enhancement to the traditional way of doing business. TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach for providing quality of products and processes. It becomes essential to survive and grow in global markets, organizations will be required to develop customer focus and involve employees to continually improve Quality and keep sustainable growth.

PREREQUISITE: Not Required

COURSE OBJECTIVES:

1. To understand the Total Quality Management concepts.

2. To practice the TQM principles.

3. To apply the statistical process control

4. To analyze the various TQM tools

5. To adopt the quality systems.

COURSE OUTCOMES:

After successful completion of the course, students will be able to

CO1: Understand the importance of quality and TQM at managerial level.	Understand
CO2: Practice the relevant quality improvement tools to implement TQM.	Apply
CO3: Analyse various TQM parameters with help of statistical tools.	Analysing
CO4: Assess various TQM Techniques.	Evaluate
CO5: Practice the Quality Management Systems in a different organization Environment.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	-	-	-	-	-	L	L	L	M	L	M	-	-	-
CO2	M	-	-	-	L	L	-	L	M	M	-	L	-	-	M
CO3	S	S	M	S	S	-	-	L	-	L	-	L	L	M	L
CO4	L	M	S	L	M	-	L	-	L	M	L	M	-	-	-
CO5	L	L	M	-	L	M	S	S	M	L	L	M	-	-	M

S- Strong; M-Medium; L-Low

SYLLABUS:

INTRODUCTION

Concept of Quality and Quality Management - Determinants of quality of product & service - Quality costs – Analysis Techniques for Quality Costs – TQM Principles and Barriers & Implementation – Leadership – Concepts- Role of Top Management- Quality Council – Quality statements: vision, mission, Policy - SMART Goal setting -- Strategic Planning.

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TQM PRINCIPLES AND PHILOSOPHIES

Customer satisfaction – Perception of Quality- Customer Complaints - Service Quality- Customer Retention- Employee Involvement – Motivation- Empowerment – Teams - Recognition and Reward- Performance Appraisal - Continuous Process Improvement : Deming's Philosophy - Juran's Trilogy - PDSA Cycle- Taguchi Quality Loss Function - 5S principles and 8D methodology - Kaizen - Basic Concepts.

STATISTICAL PROCESS CONTROL (SPC) & PROCESS CAPABILITY

Statistical Fundamentals – Measures of central Tendency & Dispersion - Population and Sample- Normal Curve- Control Charts for variables and attributes - OC curve - Process capability- Concept of six sigma- The Seven tools of Quality - New seven Management tools.

TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT

Benchmarking – Reasons - Process- Quality Function Deployment (QFD) – House of Quality- QFD Process- Benefits- Total Productive Maintenance (TPM) – Concept- Improvement Needs- FMEA – Stages of FMEA - Business process re-engineering (BPR) – principles, applications, reengineering process, benefits and limitations.

QUALITY SYSTEMS

Introduction to IS/ISO 9004:2000 – quality management systems – Elements- Implementation of Quality System - Documentation- Quality Auditing- ISO 14000 – Concept- Requirements and Benefits.

TEXT BOOKS:

1. Dale H.Besterfiled- et at. - Total Quality Management- PHI-1999. (Indian reprint 2002).
2. Feigenbaum.A.V. "Total Quality Management- McGraw-Hill- 1991.

REFERENCES:

1. James R.Evans & William M.Lidsay - The Management and Control of Quality- (5th Edition) - South-Western (Thomson Learning) - 2002 (ISBN 0-324-06680-5).
2. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd - Oxford. 1989.
3. Narayana V and Sreenivasan - N.S. Quality Management – Concepts and Tasks- New Age International 1996.

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34121H83	UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY	Category	L	T	P	Credit
		FC-HS	3	0	0	3

COURSE OBJECTIVES

1.	Development of a holistic perspective based on self- exploration
2.	Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3.	Strengthening of self-reflection.
4.	Development of commitment and courage to act.

UNIT I Introduction
Value Education, Definition, Concept and Need for Value Education-Content and Process of -basic guidelines for Value Education -Self exploration - Happiness and Prosperity as parts of Value Education.

UNIT II Understanding Harmony in the Human Being

Harmony in Myself-Understanding human being as a co-existence of the sentient 'I' and the material 'Body'-Understanding the needs of Self ('I') and 'Body' - happiness and physical facility. -Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)-Understanding the characteristics and activities of 'I' and harmony in 'I'-Understanding the harmony of I with the Body- Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

UNIT III Understanding Harmony in the Family and Society

Harmony in Human-Human Relationship -meaning of Justice - Trust and Respect -Difference between intention and competence- respect and differentiation; the other salient values in relationship 4.Understanding the harmony in the society - Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals –Gratitude

UNIT IV Understanding Harmony in the Nature and Existence

Whole existence as Coexistence -.Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature-Holistic perception of harmony at all levels of existence. **Holistic Understanding of Harmony on Professional Ethics**

Natural acceptance of human values -.Definitiveness of Ethical Human Conduct - Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order- Competence in professional ethics

UNIT V Gender Sensitization Introduction to Gender Sensitization- Sex Vs Gender- Social Construction of Gender-Gender Roles- Gender Stereotypes- Gender Division of Labour- Patriarchy- Masculinity- Ending violence against girls/women: Advance safety and rights- Gender Equality.

TEXT BOOKS:
Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

REFERENCES:
1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2.Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	Dr.S.P.Sangeetha	Vice Principal(Academics)	AVIT	sangeetha@avit.ac.in
2.	Dr.Jennifer G Joseph	HoD-H&S	AVIT	Jennifer@avit.a.cin

34121B01	ENGINEERING MATHEMATICS	Category	L	T	P	Credit
		FC-BS	2	1	0	3

PREAMBLE

The driving force in Engineering Mathematics is the rapid growth of technology and the sciences. Matrices had been found to be of great utility in many branches of engineering applications such as theory of electric circuits, aerodynamics, and mechanics and so on. Many physical laws and relation can be expressed mathematically in the form of differential equations. Based on this we provide a course in matrices, calculus and differential equations. Vector calculus is a form of mathematics that is focused on the integration of vector fields. An Engineer should know the Transformations of the Integrals, as Transformation of Line Integral to surface and then to volume integrals.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To recall the advanced matrix knowledge to Engineering problems.
2.	To equip themselves familiar with the functions of several variables.
3.	To improve their ability in solving geometrical applications of differential calculus problems
4.	To examine knowledge in multiple integrals.
5.	To improve their ability in Vector calculus.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Apply the concept of orthogonal reduction to diagonalise the given matrix	Apply
CO2. Find the radius of curvature, circle of curvature and centre of curvature for a given curve.	Apply
CO3. Classify the maxima and minima for a given function with several variables, through by finding stationary points	Apply
CO4. Find double integral over general areas and triple integral over general volumes	Apply
CO5. Apply Gauss Divergence theorem for evaluating the surface integral.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	--	--	--	--	L	--	--	--	M	--	--	--
CO2	S	S	M	--	--	--	--	L	--	--	--	M	--	--	--
CO3	S	S	M	--	--	--	--	L	--	--	--	M	--	--	--
CO4	S	S	M	--	--	--	--	L	--	--	--	M	--	--	--
CO5	S	S	M	--	--	--	--	L	--	--	--	M	--	--	--

S- Strong; M-Medium; L-Low

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SYLLABUS

MATRICES:
Characteristic equation– Eigen values and eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors (Without proof) – Cayley-Hamilton theorem (excluding proof).

DIFFERENTIAL CALCULUS&PARTIAL DERIVATIVES :
Curvature – Cartesian and Parametric Co-ordinates – Centre and radius of curvature – Circle of curvature.
Partial Derivatives – Total Differentiation – Maxima and Minima -Constrained Maxima and Minima by Lagrangian Multiplier Method,

ORDINARY DIFFERENTIAL EQUATIONS:
Solutions of second and third order linear ordinary differential equation with constant coefficients – Method of variation of parameters -Simultaneous first order linear equations with constant coefficients.

MULTIPLE INTEGRALS:
Introduction of multiple integration by examples of Double and Triple integral-Evaluation of double and Triple Integration(in both Cartesian and polar coordinates)-Change of order of integration.

VECTOR CALCULUS:
Scalar and vector point functions, Gradient, divergence, curl, Solenoidal and irrotational vectors, Vector identities (without proof),Normal and Directional derivatives, Solenoidal and irrotational field, Integration of vectors: Definition of Line, surface and volume integrals, Green's, Gauss divergence and Stoke's theorems (Statements only)

TEXT BOOKS:

1. Veerarajan T., "Engineering Mathematics", Tata McGraw Hill Education Pvt, New Delhi (2019).
2. Grewal B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi (2020).
3. Kreyszig E., "Advanced Engineering Mathematics", 8th Edition, John Wiley and Sons (Asia) Pvt. Ltd., Singapore (2012).

REFERENCES:

1. Engineering Mathematics", Department of Mathematics, VMKVEC (Salem) & AVIT (Chennai), (2017).
2. Dr.A.Singaravelu, "Engineering Mathematics I & II", 23rd Edition, Meenakshi Agency, Chennai (2016).

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. A.K.Bhuvaneswari	Assistant Professor	Mathematics	bhuvaneswari@avit.ac.in
2.	Dr.G.Selvam	Associate Professor	Mathematics	selvam@vmkvec.edu.in

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34121B10	MATHEMATICS FOR COMPUTER ENGINEERS	Category	L	T	P	Credit
		FC-BS	2	1	0	3

PREAMBLE

Impart knowledge about the subject of a single variable and multivariable, integral transformation with its application. The focus of the course will be the study of certain structures called Partial Differential equations, Fourier series, Fourier Transform and Z Transform. Using the understanding of Integral transformation and applications to solve real world problems, it also provides the knowledge of Laplace Transforms and its application.

PREREQUISITE

Engineering Mathematics

COURSE OBJECTIVES

1.	Familiarize themselves with the functions of a variety of variables.
2.	Know how to derive a Fourier series of a given periodic function by evaluating Fourier coefficients
3.	Fourier transforms has the wide application in the field of heat diffusion, wave propagation and in signal and systems analysis.
4.	To learn about Z- transforms and its applications
5.	To familiarize themselves with the Laplace transform and how to use it

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Form the partial differential equations and find its solutions	Apply
CO2. Find Fourier expansion of a given function	Apply
CO3. Solve Fourier integral problems	Apply
CO4. Analyzing discrete signals by using Z-transform	Apply
CO5. Apply Laplace transform technique to solve a differential equations	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	L	--	--	--	M	--	--	--	M	--	--	--
CO2	S	S	M	L	--	--	--	M	--	--	--	M	--	--	--
CO3	S	S	M	L	--	--	--	M	--	--	--	M	--	--	--
CO4	S	S	M	L	--	--	--	M	--	--	--	M	--	--	--
CO5	S	S	M	L	--	--	--	M	--	--	--	M	--	--	--

S- Strong; M-Medium; L-Low

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SYLLABUS

PARTIAL DIFFERENTIAL EQUATIONS: Formation - Solutions of standard types f(p,q) = 0 , Clairaut's form, f(z,p,q) = 0 , f(p,x) = g(q,y) of first order equations - Lagrange's Linear equation - Linear partial differential
equations of second and higher order with constant coefficients

FOURIER SERIES: Dirichlet's conditions - General Fourier series - Half-range Sine and Cosine series - Parseval's identity - Harmonic Analysis

FOURIER TRANSFORMS: Fourier transform pairs - Fourier Sine and Cosine transforms – Properties - Transforms of simple functions - Convolution theorem - Parseval's identity

Z – TRANSFORMS: Z-Transform – Elementary Properties – Inverse Z-Transform – Convolution Theorem – Formation of Difference Equations – Solution of first and second order Difference Equations using Z-Transform

LAPLACE TRANSFORMS: Transform of elementary functions – basic properties – derivatives and integrals of transforms – transforms of derivatives and integrals –Transform of periodic functions-Inverse Laplace transform – Convolution theorem – Initial and Final value theorem-Solution of linear ODE of second order with constant coefficients and first order simultaneous equation with constant coefficients using Laplace transforms

TEXT BOOKS:

1. Grewal, B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi (2017)
2. Kreyszig, E., "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Pvt Ltd., Singapore (2019).

REFERENCES:

1. Dr.A.Singaravelu, "Engineering Mathematics I & II", Meenakshi Agency, Chennai (2019)
2. Dr.A.Singaravelu , "Transforms and Partial differential Equations", Meenakshi Agency, Chennai (2019)
3. Veerarajan, T., "Engineering Mathematics I, II and III", Tata McGraw Hill Publishing Co., New Delhi (2012)
4. "Engineering Mathematics I & II ", by Department of Mathematics, VMKVEC (Salem) & AVIT (Chennai), (2017)

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs.V.T.Lakshmi	Associate Professor	Mathematics	lakshmivt@vmkvec.edu.in
2.	Dr. A.K.Bhuvaneswari	Assistant Professor	Mathematics	bhuvaneswari@avit.ac.in

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34121B04	PHYSICAL SCIENCES - Part A: ENGINEERING PHYSICS	Category	L	T	P	Credit
		FC-BS	2	0	0	2

PREAMBLE

Engineering Physics is the study of advanced physics concepts and their applications in various technological and engineering domains. Understanding the concepts of laser, types of lasers, the propagation of light through fibers, applications of optical fibers in communication, production and applications of ultrasonics will help an engineer to analyze, design and to fabricate various conceptual based devices.

PREREQUISITE : NIL

COURSE OBJECTIVES

1.	To recall the properties of laser and to explain principles of laser
2.	To assess the applications of laser
3.	To detail the principles of fiber optics
4.	To study the applications of fiber optics
5.	To explain various techniques used in Non-destructive testing

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the principles laser, fiber optics and ultrasonics	Understand
CO2. Understand the construction of laser, fiber optic and ultrasonic equipments	Understand
CO3. Demonstrate the working of laser, fiber optic and ultrasonic based components and devices	Apply
CO4. Interpret the potential applications of laser, fiber optics and ultrasonics in various fields	Apply
CO5. Differentiate the working modes of various types of laser, fiber optic and ultrasonic devices.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	M	-	-	-	-	-	-	-	-	M	M	-	M
CO2	S	-	L	-	-	-	-	-	-	-	-	M	M	-	-
CO3	S	-	-	M	-	-	M	-	-	-	-	M	M	-	-
CO4	S	M	-	M	M	S	M	-	-	-	-	M	S	-	M
CO5	S	M	M	-	-	-	-	-	-	-	-	M	M	-	-

S- Strong; M-Medium; L-Low

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SYLLABUS

Unit: I

LASERS: Laser characteristics - Stimulated Emission – Population Inversion - Einstein coefficients – Lasing action – Types of Laser – Nd:YAG laser, CO2 laser, GaAs laser – Applications of Laser – Holography – construction and reconstruction of a hologram.

Unit: II

FIBRE OPTICS: Principle and propagation of light in optical fibers – numerical aperture and acceptance angle – types of optical fibers (material, refractive index, mode) – Applications: Fiber optic communication system – fiber optic displacement sensor and pressure sensor.

Unit: III

ULTRASONICS: Ultrasonic production: Magnetostriction and piezo electric methods – Determination of velocity of ultrasonic waves (acoustic grating) – Applications of ultrasonics

TEXT BOOKS

1. Engineering Physics, compiled by Department of Physics, Vinayaka Mission's Research Foundation (Deemed to be University), Salem.

2. Palanisamy P. K., Engineering Physics, Scientific Publishers, 2011.

3. Avadhanulu M. N., Kshirsagar P. G., Arun Murthy T. V. S., A Textbook of Engineering Physics, S. Chand Publishing, 2018.

REFERENCE BOOKS

1. Beiser, Arthur, Concepts of Modern Physics, 5th Edition, McGraw-Hill, 2009.

2. Halliday.D, Resnick.R, Walker.J, Fundamentals of Physics, Wiley & sons, 2013.

3. Gaur R. K. and Gupta S. L., Engineering Physics, DhanpatRai publishers, New Delhi, 2012.

4. Srivastava S. K., Laser Systems and Applications 3rd Edition, New Age International (P) Ltd Publishers, 2019.

5. Ajoy Ghatak, Thyagarajan K., Introduction To Fiber Optics, Cambridge India, 2013.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. C. SENTHIL KUMAR	PROFESSOR	PHYSICS	senthilkumarc@vmkvec.edu.in
2.	Dr. R. SETHUPATHI	ASSOCIATE PROFESSSOR	PHYSICS	sethupathi@vmkvec.edu.in

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34121B04	PHYSICAL SCIENCES PART-B - ENGINEERING CHEMISTRY (Common to all Branches)	Category	L	T	P	Credit
		FC-BS	2	0	0	2

PREAMBLE

The objective of this course is to better understand the basic concepts of chemistry and its applications in diverse engineering domains. It also imparts knowledge on the properties of water and its treatment methods, Electrochemistry, corrosion and batteries, properties of fuel and combustion. This course also provides an idea to select the material for various engineering applications and their characterization.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To Provide the knowledge on water treatment.
2.	To explain about the importance of electrochemistry, mechanism of different corrosion and principle and working of batteries.
3.	To explain different types of fuel, properties and its important features.

COURSE OUTCOMES

On the successful completion of the course, students will be able to understand

CO1.	Estimate the hardness of water Apply and Identify suitable water treatment methods.	Apply
CO2.	Describe terms involved in electrochemistry, the control methods of corrosion and working of energy storage devices.	Analyse
CO3.	Understand the quality of fuels from its properties and the important features of fuels	Analyse

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12	PSO 1	PSO 2	PSO 3
CO 1	S	M	M	L	-	M	S	M	-	-	-	M	M	M	M
CO 2	S	S	L	L	-	S	S	S	-	-	-	S	M	L	M
CO 3	S	M	M	L	L	L	M	M	-	-	-	S	-	M	M

S- Strong; M-Medium; L-Low

Syllabus

UNIT – I: WATER TECHNOLOGY

Hardness of water – types – expression of hardness – units – estimation of hardness of water by EDTA. Boiler troubles - Treatment of boiler feed water – Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning). External treatment – Ion exchange process, zeolite process – Domestic water treatment - desalination of brackish water – Reverse Osmosis and Electrodialysis.

UNIT – II: ELECTROCHEMISTRY, CORROSION AND BATTERIES

Electrochemistry: Electrode potential - Nernst equation – Electrodes (SHE, Calomel and Glass) - Galvanic cell- Electrochemical cell representation - EMF series and its significance. Corrosion – Definition causes and effects, Classification, Types of corrosion- dry corrosion, Wet corrosion, Factors influencing rate of corrosion, Corrosion control methods – Sacrificial anode method and impressed current cathodic method.

Batteries: Terminology- Daniel cell – Dry cell - Lead-acid accumulator- Nickel-Cadmium batteries, Lithium batteries: Li/SOCl2 cell - Li/I2 cell- Lithium ion batteries. Fuel cells: Hydrogen-oxygen fuel cell, Solid oxide fuel cell (SOFC)

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UNIT – III FUELS AND COMBUSTION

Fuels: Introduction – classification of fuels – coal – analysis of coal (proximate and ultimate). Carbonization – manufacture of metallurgical coke (Otto Hoffmann method) – petroleum – manufacture of synthetic petrol (Bergius process). Knocking – octane number – cetane number – natural gas – compressed natural gas (CNG). Liquefied petroleum gases (LPG) – power alcohol and biodiesel. Combustion of fuels: Introduction – calorific value – higher and lower calorific values- theoretical calculation of calorific value – ignition temperature – spontaneous ignition temperature – explosive range – flue gas analysis (ORSAT Method).

TEXTBOOK

1. Engineering Chemistry by Jain and Jain, 16th Edition, Dhanpat Rai Publishing Company, New Delhi, 2017
2. A text book of Engineering Chemistry by S.S. Dara, S.Chand & company Ltd., New Delhi
3. A text book of Engineering Chemistry by Shashi Chawla, Edition 2012 Dhanpatrai & Co., New Delhi.

REFERENCES

1. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane, 3rd Edition, McGraw Hill, 1980
2. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
3. Physical Chemistry, by P. W. Atkins, Julio de Paula, 8th Edition, Oxford University press, 2007
4. Engineering Chemistry by Dr. A. Ravikrishnan, Sri Krishna Publications, Chennai.

Course Designers:

S.No	Name of the Faculty	Mail ID
1.	Dr. A.R. Sasieekumar	sasieekhumar@vmkvec.edu.in
2.	Dr. R. Nagalakshmi	nagalakshmi.chemistry@avit.ac.in

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34121B14	NUMERICAL METHODS AND NUMBER THEORY	Category	L	T	P	Credit
		FC-BS	2	1	0	3

PREAMBLE

This course aims at developing the ability to formulate an engineering problem in a mathematical form appropriate for subsequent computational treatment and to choose an appropriate numerical approach. Number theory encodes properties of the integers, primes or other number-theoretic objects and it has various applications in the field of security, memory management, authentication and coding theory. Number theory is probably one of the most important areas of mathematics used in computer science, and the basis behind almost all of modern cryptography.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To familiar with numerical solution of equations
2.	To be get exposed to finite differences and interpolation
3.	To be thorough with the numerical Differentiation and integration
4.	To give an integrated approach to Number Theory and to have the knowledge of division algorithm and fundamental theorem of arithmetic
5.	To familiar with congruences and classical theorems

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Solve the system of linear algebraic equations and single non linear equations arising in the field of Computer Science Engineering	Apply
CO2. Apply various numerical methods to find intermediate numerical value & Polynomial of numerical data.	Apply
CO3. Find the differentiation of a polynomial and evaluate the definite integrals by using numerical methods	Apply
CO4. Define and interpret the concepts of divisibility, congruence, greatest common divisor, prime, and prime-factorization	Apply
CO5. Solve a system of linear congruences and derive some classical theorems	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO 4	PO 5	PO6	PO 7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	L	--	--	--	L	--	--	--	M	--	--	--
CO2	S	M	M	L	--	--	--	L	--	--	--	M	--	--	--
CO3	S	M	M	L	--	--	--	L	--	--	--	M	--	--	--
CO4	S	M	L	--	--	--	--	L	--	--	--	M	--	--	--
CO5	S	M	L	--	--	--	--	L	--	--	--	M	--	--	--

S- Strong; M-Medium; L-Low

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SYLLABUS

SOLUTION OF LINEAR EQUATIONS:

Method of false position, Newton-Raphson method for single variable, Solutions of a linear system by Gauss Elimination, Gauss-Jordan, Jacobi and Gauss- Seidel methods. Inverse of a matrix by Gauss-Jordan method - Eigen value of a matrix by Power Method.

INTERPOLATION AND APPROXIMATION:

Interpolation with Newton's divided differences, Lagrange's polynomial, Newton forward and backward differences, central difference Formula (Stirling's and Bessel's).

NUMERICAL INTEGRATION AND DIFFERENTIATION:

Numerical differentiation with interpolation polynomials, Numerical integration by Trapezoidal and Simpson's (both1/3rd and 3/8th) rules. Numerical differentiation: Euler's method, Modified Euler's method, Taylor's series

DIVISIBILITY THEORY AND CANONICAL DECOMPOSTIONS:

Division algorithm - Base-b Representations - Number Patterns - Prime and Composite Numbers – GCD - Euclidean Algorithm - Fundamental Theorem of Arithmetic - LCM.

CONGRUENCES AND CLASSICAL THEOREMS:

Congruence's - Linear Congruence's, Chinese Remainder Theorem, Wilson's Theorem - Fermat's Little Theorem - Euler's Theorem - Multiplicative Functions - Eulers Phi functions – Tau and Sigma functions

TEXT BOOKS:

1. B.S. Grewal, "Numerical Methods in Engineering and Science", 6th Edition, Khanna Publishers, New Delhi (2014).
2. Thomas Koshy, "Elementary Number Theory with Applications", Elsevier publications (2007).
3. David.M.Burton."Elementary Number theory", Tata McGraw Hill (2012).

REFERENCES:

1. T. Veerarajan, T.Ramachandran, "Numerical Methods with Programs in C and C++", Tata McGraw-Hill (2008).
2. Niven.I, Zuckerman.H.S and Montgomery.H.L, "An Introduction to Theory of Numbers", John Wiley and sons (2004).

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr. A.K.Bhuvaneswari	Assistant Professor Grade-II	Mathematics	bhuvaneswari@avit.ac.in
2	Dr.G.Selvam	Associate Professor	Mathematics	selvam@vmkvec.edu.in

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34121B17	PROBABILITY AND QUEUEING THEORY	Category	L	T	P	Credit
		FC-BS	2	1	0	3

PREAMBLE

Probabilistic and statistical analysis is mostly used in varied applications in Engineering and Science. Statistical method introduces students to cognitive learning in statistics and develops skills on analyzing the data by using different tests and designing the experiments with several factors. Queueing theory is the mathematical study of waiting lines and it's a primary tool for studying the problem of congestion.

PREREQUISITE - Nil

COURSE OBJECTIVES

1.	To get the knowledge on concepts of random variables and distributions with respect to how they are applied to statistical data.
2.	To acquire skills in handling situations involving more than one random variable and functions of random variables.
3.	To be get exposed to the concepts of random processes and discrete time Markov chain.
4.	To acquire knowledge of Testing of Hypothesis useful in making decision and test them by means of the measurements made on the sample.
5.	To study queuing models for analyzing the real world systems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Select an appropriate probability distribution to determine the probability function for solving engineering problem.	Understand
CO2. Derive the marginal and conditional distributions of bivariate random variables, and use generating functions to establish the distribution of linear combinations of independent random variables.	Apply
CO3. Classify and apply the concepts of Random Process, Markov Process and their applications to answer quantitative questions about the outcomes of probabilistic systems	Apply
CO4. Apply the concepts of large/small sample tests into real life problems.	Apply
CO5. Derive and apply main formulas for some properties (such as stationary probabilities, average waiting and system time, expected number of customers in the queue, etc.) M/M/1, M/M/C – finite and infinite capacity queueing systems.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	--	L	--	--	L	--	--	--	M	--	--	--
CO2	S	M	L	--	L	--	--	L	--	--	--	M	--	--	--
CO3	S	M	L	--	L	--	--	L	--	--	--	M	--	--	--
CO4	S	S	M	M	L	--	--	L	--	--	--	M	--	--	--
CO5	S	S	M	M	L	--	--	L	--	--	--	M	--	--	--

S- Strong; M-Medium; L-Low

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SYLLABUS

PROBABILITY AND RANDOM VARIABLES:
Probability concepts - Random variables - Discrete and continuous random variables - Expectation - Variance - Moment Generating function, Standard Distributions**:** Binomial, Poisson, Normal, Uniform and Exponential

TWO-DIMENSIONAL RANDOM VARIABLES:
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Regression Analysis, Transformation of random variables, Central limit theorem.

RANDOM PROCESSES:
Classification, Stationary process, Markov process, Poisson process, Birth and death process, Renewal process, Markov chain, Transition probabilities, Limiting distributions.

TESTING OF HYPOTHESIS:
Sampling distributions – Statistical hypothesis – Testing of hypothesis for mean, variance, and proportions for large and Small Samples (Z, t and F test) - Chi-square Tests for Goodness of fit - independence of attributes.

QUEUEING THEORY:
Markovian queueing models, Little's formula, M/M/1, M/M/C – finite and infinite capacity - M/G/1 Queues, Pollaczek - Khintchine formula (Statement only)

TEXT BOOKS:

1. S.C. Gupta and V.K. Kapoor, "Fundamentals of Mathematical Statistics", 11th extensively revised edition, S. Chand & Sons (2015).
2. T. Veerarajan, "Probability, Statistics and Random processes" (Third Edition), Tata McGraw-Hill publishing Company Ltd., New Delhi (2017).
3. F.S Hillier and G.J. Lieberman, "Introduction to Operations Research: Concept and Cases", McGraw-Hill International (2012).

REFERENCES:

1. I.R. Miller, J.E. Freund and R. Johnson, " Probability and Statistics for Engineers", 8th Edition, (2015)
2. Dr.A.Singaravelu, "Probability and Queuing Theory", Meenakshi Agency, Chennai (2012).
3. Premkumar Gupta, D.S. Hira, "Operations Research", S.Chand & company New Delhi (2014).

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Department	Mail ID
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34121B05	SMART MATERIALS AND NANOTECHNOLOGY	Category	L	T	P	C
	Total Contact Hours: 45	FC-BS	3	0	0	3
	Prerequisite: Physical Sciences – Engineering Physics					

Preamble:

This syllabus enables the students to learn the applications of smart materials and uses of various smart engineering devices. The syllabus also discusses about the nanomaterials, their unique properties and applications in various fields.

Course Objectives:

1.	Gain the knowledge about the concepts of smart systems and various smart materials.
2.	Realize about the smart sensor materials which are used for Industrial Applications.
3.	Understand about the Industrial application oriented Smart materials'Actuators.
4.	To learn the properties and classifications and importance of Nanomaterials
5.	Understand the characteristic features of materials at nanoscale and their potential applications

COS	**Course Outcomes:** On the successful completion of the course, students will	
CO1	Learn the smart-properties of various functional materials	Learn
CO2	understand the applications of different smart materials as sensors	Understand
CO3	understand the applications of different smart materials as actuators	Understand
CO4	Gather knowledge on unique properties of nanomaterials	Learn
CO5	Use of Nanomaterials for industrial applications	Acquire
CO6	Gain knowledge about nanomaterials in health care industry	

Mapping with Programme Outcomes and Programme Specific Outcomes

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	S	S	S	S	M	-	-	-	-	-	-	S	-	-	
CO3	S	M	S	S	-	-	-	-	-	-	-	S	-	-	-
CO4	S	S	S	S	M	-	-	-	-	-	-	S	-	-	-
CO5	S	S	S	S	-	-	-	-	-	-	-	S	-	-	-
CO6	S	M	M	S	M	-	-	-	-	-	-	S	-	-	-

S – strong, M- Medium, L - Low

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Syllabus
Overview of Smart Materials: Introduction to Smart materials –piezoelectric materials – piezoelectricity – magnetostriction materials – magnetostriction effect– shape memory alloys (SMA) – photoelastic materials – photoelasticity.
Smart material based sensors: Introduction to sensing technology - electric and magnetosrictive sensors - SMA based sensors - Infrared sensors – stress analysis by photoelastic sensors- Industrial Applications of smart sensors: Accelerometer and Biological DNA sensors.
Smart Materials For Actuators: Introduction to smart actuators - piezoelectric actuators - magnetostrictive actuators - SMA based actuators - polymeric and carbon nanotubes based low power actuators –Industrial Applications: robotic artificial muscles , materials for bone substitutes and tissue replacement implants - smart polymeric materials for skin engineering
Materials in Nanoscale: Historical development of nanomaterials - Unit and dimensions - Classifications of nanomaterials - quantum dots, nanowires, ultra-thin films, nanoparticles, multilayered materials. Length Scales involved and effect on properties: mechanical, electronic, optical, magnetic and thermal properties.
Selected Applications of Nanomaterials: Medical diagnostics – nanomedicine – targeted drug delivery – Biosensors; Information storage – nanocomputer – molecular switch – single electron transistors; design and fabrication of MEMS and NEMS devices.
TEXT BOOKS
1. Palanisamy P.K. Materials Science. SCITECH Publishers, 2015. 2. Fundamental of Smart Materials, Editor: Mohsen Shahinpoor, RSC Publishers 2020 3. Charles P. Poole, Jr. and Frank J Ownes, "Introduction to Nanoscience and Nanotechnology", Wiley-Interscience Inc., Publication, 1st Edition, 2020. 4. Smart Material Systems And Mems Design And Development Methodologies by Vijay K Varadan, WILEY INDIA 2014.
REFERENCE BOOKS
1. Pillai S.O., Solid State Physics, 9th Edition, New Age International (P) Ltd., Publishers, 2020. 2. William D. Callister Jr., David G. Rethwisch., Materials Science and Engineering: An Introduction, 10th Edition, Wiley Publisher, 2018. 3. Nanotechnology, Second eition, M. A. Shah and K. A. Shah, Wiley Publishers 2019. 4. Fundamentals of Nanotechnology, Hornyak, G. Louis, Tibbals, H. F., Dutta, Joydeep, CRC Press, 2009.

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34121B21	DISCRETE MATHEMATICS	Category	L	T	P	Credit
		FC-BS	2	1	0	3

PREAMBLE

Discrete mathematics is very useful in constructing computer programs and in mastering many theoretical topics of computer science. It works with discrete structures, which are the abstract mathematical structures used to represent discrete objects and relationships between these objects. It is used to design efficient networks, optimally assign frequencies to cellular phones, efficiently schedule large projects, plan optimal routes, and solve many other problems, both applied and abstract.

PREREQUISITE - Nil

COURSE OBJECTIVES

1.	To extend student's logical and mathematical maturity and ability to deal with abstraction
2.	Students will be able to Formulate statements from common language to formal logic, apply truth tables and the rules of propositional and predicate calculus
3.	To understand the basic concepts of combinatorics
4.	To familiarize the applications of algebraic structures
5.	To understand the concepts and significance of lattices and Boolean algebra which are widely used in computer science and engineering

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Rephrase real world statements as logical propositions and demonstrate whether the proposition is satisfiable, tautology or a contradiction	Apply
CO2. Infer whether a logical argument is valid from the given set of premises by applying the inference rules of predicate calculus.	Apply
CO3. Construct the recurrence relation for a given engineering problem and solve the recurrence equation	Apply
CO4. Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.	Apply
CO5. To be familiar with the notions of ordered algebraic structures, including lattices and Boolean algebras	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	L	--	--	--	M	--	--	--	M	--	--	--
CO2	S	S	M	L	--	--	--	M	--	--	--	M	--	--	--
CO3	S	S	M	L	--	--	--	M	--	--	--	M	--	--	--
CO4	S	S	S	L	--	--	--	M	--	--	--	M	--	--	--
CO5	S	S	M	M	L	--	--	M	--	--	--	M	--	--	--

S- Strong; M-Medium; L-Low

SYLLABUS

PROPOSITIONAL CALCULUS

Propositions – Logical connectives – Compound propositions – Conditional and biconditional propositions – Truth tables – Tautologies and contradictions – Contrapositive – Logical equivalences and implications – DeMorgan's Laws - Normal forms – Principal conjunctive and disjunctive normal forms – Rules of inference – Arguments - Validity of arguments.

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PREDICATE CALCULUS

Predicates – Statement function – Variables – Free and bound variables – Quantifiers – Universe of discourse – Logical equivalences and implications for quantified statements – Theory of inference – The rules of universal specification and generalization – Validity of arguments.

COMBINATORICS

Review of Permutation and combination-Mathematical Induction-Pigeon hole principle-Principle of inclusion and exclusion-Generating function-Recurrence relations.

GROUPS

Semi groups-Monoids-groups-permutation group –Cosets-Lagrange's theorem-Group homomorphism-Kernal-Rings and Fields (definitions and Examples only).

LATTICES

Partial ordering- Posets-Hasse diagram-Lattices-Properties of Lattices-Sub Lattices- Distributed Lattices -Special Lattices-Boolean Algebra-Homomorphism

TEXT BOOKS:

1. Tremblay J.P, and Manohar R., "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill Book Company (1975), International Edition (1987).
2. Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition (2011).

REFERENCES:

1. Dr.A.Singaravelu, "Discrete Mathematics", Meenakshi Publishers, Chennai (2019).
2. K.Sankar , "Discrete Mathematic", 3rd edition, Indian Publishers, Chennai.(2016)

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34121B36	**STATISTICAL FOUNDATION** (Statistical table permitted for Examination)	**Category**	**L**	**T**	**P**	**Credit**
		FC-BS	**2**	**1**	**0**	**3**

PREAMBLE

Statistical methods are important tools which provide the engineers with both descriptive and analytical methods for dealing with the variability in observed data. It introduces students to cognitive learning in statistics and develops skills on analyzing the data by using different tests and methods.

PREREQUISITE

- **NIL**

COURSE OBJECTIVES

1.	To describes the characteristic of the entire group of data and choose the best central tendency and variability statistic for different levels of measurement.
2.	To Understand the role of Sampling and steps in developing a sampling plan
3.	To acquire knowledge about important inferential aspects such as point estimation, test of hypotheses and associated concepts.
4.	Studying multiple partial correlations and fitting multiple linear regression to trivariate data.
5.	Understand the theory of random number generators and the methods used in random variate generation

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Analyze statistical data using measures of central tendency, dispersion and location for grouped and ungrouped data cases.	Apply
CO2. Identify and recognize the appropriate sample survey design in real life related problems.	Apply
CO3. Estimate the characteristic of the population with degree of confidence from the random sample.	Apply
CO4. Apply the concept of linear correlation and regressions to engineering problems. Apply least square method in fitting linear and non linear regression curves.	Apply
CO5. Generate random numbers and random variates using different techniques.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	L	--	--	--	L	--	--	--	M	--	--	--
CO2	S	S	M	L	--	--	--	L	--	--	--	M	--	--	--
CO3	S	S	M	L	--	--	--	L	--	--	--	M	--	--	--
CO4	S	S	M	M	--	--	--	M	--	--	--	M	--	--	--
CO5	S	S	M	M	--	--	--	M	--	--	--	M	--	--	--

S- Strong; M-Medium; L-Low

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SYLLABUS

EMPIRICAL STATISTICS

Introduction to Statistics – Frequency distribution – Measures of Central tendency, dispersion, Skewness and Kurtosis.

SAMPLING THEORY

Fundamentals of sampling – Methods of Sampling – Random Sampling - Simple random Sampling – Restricted Random sampling - Non-Random Sampling – Judgment or Purposive Sampling – Quato sampling – Convenience Sampling – Mixed sampling

ESTIMATION THEORY

Sampling distributions – Estimation of parameters (consistent and unbiased) – Point and interval estimates for population proportions, mean and variance - Maximum likelihood estimate method - Method of moments

LINEAR STATISTICAL MODELS

Simple linear correlation and regression – Multiple and partial correlation and regression – Curve fitting by method of least squares – fitting of straight lines – polynomials – exponential curves.

RANDOM NUMBER GENERATION

Generation of random numbers, Techniques, tests for random numbers, Chi-square test, Runs test, Poker test, Kolmogrov Simrnov test, Random Variate generation – Inverse transform method, Exponential Random Variates, uniform random Variates, Poisson Random Variates, Binomial Random Variates, Normal Random Variates.

TEXT BOOKS:

1. S.P. Gupta, "Statistical Methods", Sultan Chand & Sons, New Delhi, 45th Revised Edition (2017).
2. Douglas C. Montgomery and George C.Runger, "Applied Statistics and Probability for Engineers", 6th Edition, Wiley (2013).
3. Jerry Banks, John S. Carson, Barry L. Nelson, David M.Nicol, "Discrete – Event System Simulation", Prentice Hall of India, Delhi (2002).

REFERENCES:

1. S.C.Gupta and V.K.Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi (2015).
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition (2007).
3. Geoffrey Gordon, "System Simulation", Prentice Hall of India, Delhi (2002).

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34121B81	PHYSICAL SCIENCES LAB: PART A – REAL AND VIRTUAL LAB IN PHYSICS	Category	L	T	P	Credit
		FC-BS	0	0	2	1

PREAMBLE

In this laboratory, experiments are based on the calculation of physical parameters like young's modulus, rigidity modulus, viscosity of water, wavelength of spectral lines, thermal conductivity and band gap. Some of the experiments involve the determination of the dimension of objects like the size of a microparticle and thickness of a thin wire. In addition to the above real lab experiments, students gain hands-on experience in virtual laboratory.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To impart basic skills in taking reading with precision of physics experiments
2	To inculcate the habit of handling equipments appropriately
3	To gain the knowledge of practicing experiments through virtual laboratory.
4	To know the importance of units
5	To obtain results with accuracy

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Recognize the importance of units while performing the experiments, calculating the physical parameters and obtaining results	Understand
CO2. Operate the equipments with precision	Apply
CO3. Practice to handle the equipments in a systematic manner	Apply
CO4. Demonstrate the experiments through virtual laboratory	Apply
CO5. Calculate the result with accuracy	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	S	S	M	M	S	-	-	-	M	-	-	M	M	-	M
CO3	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	S	S	M	M	S	-	-	-	-	-	-	S	M	-	M
CO5	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

1. Young's modulus of a bar - Non-uniform bending
2. Rigidity modulus of a wire - Torsional Pendulum
3. Viscosity of a liquid - Poiseuille's method
4. Velocity of ultrasonic waves in liquids - Ultrasonic Interferometer
5. Particle size determination using Laser

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6. Wavelength of spectral lines – grating – Spectrometer
7. Thickness of a wire - Air wedge Method
8. Thermal conductivity of a bad conductor - Lee's disc
9. Band gap determination of a thermistor - Post Office Box
10. Specific resistance of a wire – Potentiometer

LAB MANUAL

Physical Sciences Lab: Part A – Real And Virtual Lab In Physics Manual compiled by Department of Physics, Vinayaka Mission's Research Foundation (Deemed to be University), Salem.

COURSE DESIGNERS

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1	Dr. C. SENTHIL KUMAR	PROFESSOR	PHYSICS	senthilkumarc@vmkvec.edu.in
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34121B81	PHYSICAL SCIENCES PART B - ENGINEERING CHEMISTRY LAB (Common to All Branches)	Category	L	T	P	Credit
		FC-BS	0	0	2	1

Engineering Chemistry Lab experiments explains the basics and essentials of Engineering Chemistry. It also helps the students to understand the applications of Engineering Chemistry. The electrodes, Cell and batteries study gives clear basic application oriented knowledge about electrochemistry. Water technology study gives the idea about hardness and its disadvantages. Now-a-days the practical and handling of equipments are needed for our fast growing life style.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To impart basic skills in Chemistry so that the student will understand the engineering concept.
2.	To inculcate the knowledge of water and electrochemistry.
3.	To lay foundation for practical applications of chemistry in engineering aspects.

C.OURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the basic skills for his/her future studies.	Understand
CO2 Analyze the water comprehensively.	Apply
CO3. Apply the practical knowledge in engineering aspects	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	-	L	M	M	S	-	-	-	M	-	-	-
CO2	S	M	M	-	L	M	M	L	-	-	-	M	-	-	-
CO3	S	S	M	-	L	M	M	M	-	-	-	M			

S- Strong; M-Medium; L-Low

1. Determination of Hardness by EDTA method
2. Estimation of Hydrochloric acid by conductometric method
3. Acid Base titration by pH method
4. Estimation of Ferrous ion by Potentiometric method
5. Determination of Dissolved oxygen by Winkler's method
6. Estimation of Sodium by Flame photometer
7. Estimation of Copper from Copper Ore Solution
8.Estimation of Iron by Spectrophotometer

TEXT BOOK:

1. Engineering Chemistry Lab Manual by VMU.

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34121B19	ENVIRONMENTAL SCIENCES (Common to All Branches)	Category	L	T	P	Credit
		FC-BS	3	0	0	3

Environmental science is an interdisciplinary field that integrates physical, chemical, biological, and atmospheric sciences. Environmental studies deals with the human relations to the environment and societal problems and conserving the environment for the future. Environmental engineering focuses on the various issues of environment and its management for sustainable development by improving the environmental quality in every aspect.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To inculcate the knowledge of significance of environmental studies and conservation of the natural resources.
2	To acquire knowledge of ecosystem, biodiversity, it's threats and the need for conservation
3	To gain knowledge about environmental pollution, it's sources, effects and control measures
4	To familiarize the legal provisions and the national and international concern for the protection of environment
5	To be aware of the population on human health and environment, role of technology in monitoring human health and environment.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the importance of environment and alternate energy resources	Understand
CO2. Initiate the awareness and recognize the social responsibility in ecosystem and biodiversity conservation	Apply
CO3. To develop technologies to analyse the air, water and soil pollution and solve the problems	Apply
CO4. To evaluate the social issues and apply suitable environmental regulations for a sustainable development	Evaluate
CO5. To identify and analyse the urban problems, population on human health and environment	Analyse

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MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	S	S	S	-	-	-	S	-	-	-
CO2	S	M	M	-	-	S	S	S	-	-	-	S	-	-	-
CO3	S	L	M	-	-	S	S	S	-	-	-	S	-	-	-
CO4	S	S	S	L	-	S	S	S	-	-	-	S	-	-	-
CO5	S	S	S	M	-	S	S	S	-	-	-	S	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT –I ENVIRONMENT AND NATURAL RESOURCES **6 hrs**

Environment - Definition, scope & importance - Public awareness- Forest resources- Use and over-exploitation, deforestation, case studies- Water resources: Use and over-utilization of surface and ground water, dams-benefits and problems –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, Agriculture- effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, Scope & role of engineers in conservation of natural resources.

UNIT –II ECOSYSTEMS AND BIO – DIVERSITY **6 hrs**

Ecosystem - Definition, structure and function - Food chain, food web, ecological pyramids- Introduction, types, characteristics, structure and function of forest and Aquatic ecosystems – pond and sea, Introduction to biodiversity, Levels of biodiversity: genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values –India as a mega-diversity nation – hot-spots of biodiversity –Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT –III ENVIRONMENTAL POLLUTION **6 hrs**

Pollution - Definition, causes, effects and control measures of Air, Water and Land pollution, Solid waste- solid waste Management,–Disaster management: Floods, earthquake, cyclone, landslides and tsunamis - Clean technology options, Low Carbon Life Style.

UNIT-IV SOCIAL ISSUES AND ENVIRONMENT **6 hrs**

Sustainable Development- Water conservation – rain water harvesting, watershed management -Resettlement and rehabilitation of people , case studies –Climate change - Global warming - Acid rain - Ozone depletion- Environment Protection Act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act- Pollution Control Board-central and state pollution control boards.

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UNIT-V HUMAN POPULATION AND ENVIRONMENT **6 hrs**

Population – Population growth & Population Explosion –Family welfare programme - Environment & human health - Human rights – Value education –AIDS/HIV, Role of information technology in environment and human health.

TEXT BOOK

1. Environmental Science and Engineering by Dr.A. Ravikrishnan, Sri Krishna Publications, Chennai.
2. Erach Bharucha "The Biodiversity of India" Mapin Publishing Pvt Ltd, Ahmedabad, India
3. Benny Joseph "Environmental Science and Engineering", Tata Mc Graw- Hill, New Delhi

REFERENCES:

1. Wager K.D. "Environmental Management", W.B. Saunders Co. Philadelphia, USA, 1998.
2. Anubha Kaushik and C.P Kaushik "Perspectives of Environmental Studies", New age international publishers.
3. Trivedi R.K. "Handbook of Environmental Laws", Rules, Guidelines,Compliances and Standards Vol I & II, Enviromedia.
4. Environmental Science and Engineering by Dr. J. Meenambal, MJP Publication, Chennai Gilbert M. Masters: Introduction to Environmental Engineering and Science , Pearson EducationPvtLtd., II Edition, ISBN 81-297-0277-0,2004.
5. Miller T.G.Jr. Environmental Science Wads worth Publishing. Co.
6. Townsend C. Harper J. and Michael Begon, Essentials of Ecology, Blackwell Science.

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35021E01	FOUNDATIONS OF COMPUTING AND PROGRAMMING (THEORY AND PRACTICALS)	Category	L	T	P	Credit
		FC-ES	2	0	2	3

PREAMBLE

This course aims to provide the fundamental concepts of Computer operations like hardware and software, emphasizing principles programming languages. Studying the fundamentals database languages, commands and internet basics.

PRERQUISITE – Nil

COURSE OBJECTIVES

1.	To provide basic knowledge of hardware components of computers and classifications.
2.	To introduce and demonstrate various Software application packages.
3.	To study Principles of programming and applications of programming.
4.	To learn Operating system and Database Management Systems language & commands used.
5.	To learn basics of Internet and Web services.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the Basic knowledge on computer hardware and its functions.	Understand
CO2. Get knowledge of Fundamentals of Application Softwares	Understand
CO3.Understand the principles of programming and categories of programming languages.	Apply
CO4. Understand the fundamentals of operating systems and Database Management Systems languages and their classifications.	Apply
CO5.Understands the Internet Basics.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	-	-	-	-	-	-	-	-	S	M	-
CO2	S	M	M	-	M	-	-	-	-	-	-	M	S	M	M
CO3	S	S	S	-	M	-	-	-	-	-	-	-	S	-	M
CO4	S	S	S	-	S	-	-	-	-	-	-	-	S	M	M
CO5	S	M	M	-	M	-	-	-	-	-	-	S	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction to computers:

Computer – Characteristics of computers -Generations of computers- Types of Computers- Block diagram of a computer – Components of a computer system –Hardware and software definitions – Categories of software – Booting.

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Application Softwares:
Office Automation: Application Packages – Word processing (MS Word) – Spread sheet (MS Excel) – Presentation (MS PowerPoint).
Lab Component-Ms Word,,Ms Excel,Ms powerpoint.

Introduction to programming
Problems Solving Techniques - Program Development Cycle – Algorithm Development – Flow chart generation –Programming Constructs (Sequential, Decision-Making, Iteration) – Types and generation of programming Languages**.**

Fundamentals of Operating System and DBMS :
Operating Systems: Introduction, Functions of an operating System, types of Operating Systems
Introduction to Database Management Systems- -File system vs DBMS, Database applications, Database users, Introduction to SQL, Classification of SQL:DDL, DML, DCL, TCL
Lab Component- DDL, DML, DCL, TCL constraints

Internet Basics
Introduction, Features of Internet, Internet application, Services of Internet
Basics of HTML – Applications of HTML – HTML Fonts – anchor tag and its attributes – Using images in HTML programs – list tag - Table tag .

Lab Component -HTML programs
TEXT BOOKS:

1. "Essentials of Computer Science and Engineering", Department of Computer Sciences, VMKVEC, Salem, Anuradha Publishers, 2017.
2. J. Glenn Brookshear,"Computer Science: An Overview", Addision-Wesley, Twelfth Edition, 2014

REFERENCES:

1. "Concepts of programming language" Concepts of Programming Languages Eleventh Edition GLOBAL Edition Robert W. Sebesta, 2019.

Knuth D.E., "The Art of computer programming Vol 1: Fundamental Algorithms", 3rd Edition, Addison Wesley, 2011

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
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34621E01	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING A. BASIC ELECTRICAL ENGINEERING	Category	L	T	P	Credit
		FC-ES	2	0	0	2

PREAMBLE

It is a preliminary course which highlights the basic concepts and outline of Electrical engineering. The concepts discussed herein are projected to deliver explanation on basic electrical engineering for beginners of all engineering graduates.

PREREQUISITE – Nil

COURSE OBJECTIVES

1	To explain the basic laws used in Electrical circuits and various types of measuring instruments.
2	To explain the different components and function of electrical dc and ac machines.
3	To understand the fundamentals of safety procedures, Earthing and Power system.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Explain theelectrical quantities and basic laws of electrical engineering.	Remember
CO2: Demonstrate Ohm's and Faraday's Law.	Apply
CO3: Describe the basic concepts of measuring instruments.	Understand
CO4: Explain the operation of electrical machineries and its applications.	Understand
CO5: Explain the electrical safety and protective devices.	Understand
CO6: Compare the various types electrical power generation systems by application of conventional and non-conventional sources.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	M	L	-	-	-	L	M	L	S	M	L
CO2	S	M	M	L	M	-	-	-	S	M	M	L	S	L	-
CO3	S	M	M	M	M	-	-	-	-	L	M	L	S	M	L
CO4	S	M	L	L	M	L	-	-	-	L	M	L	S	L	-
CO5	S	M	L	-	M	S	-	-	-	L	L	L	-	-	-
CO6	S	M	-	-	M	L	S	L	-	L	L	L	M	L	M

S- Strong; M-Medium; L-Low

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SYLLABUS

ELECTRICAL CIRCUITS AND MEASUREMENTS

Electrical quantities - Charge, Electric potential, current, power and Energy, Passive components (RLC)- Fundamental laws of electric circuits-steady solution of DC circuits - Introduction to AC circuits- Sinusoidal steady state analysis-Power and Power factor – Single phase and Three phase balanced circuits - Classification of Instruments-Operating Principles of indicating instruments.

ELECTRICAL MACHINES

Faraday's Law, Construction, Principle of operation, Basic Equation and Applications of DC & AC Generators and Motors - Single Phase Transformer, Single phase and Three phase Induction Motor.

ELECTRICAL SAFETY AND INTRODUCTION TO POWER SYSTEM

Protection & Safety - Hazards of electricity - shock, burns, arc-blast, Thermal Radiation, explosions, fires, effects of electricity on the human body. Electrical safety practices, Protection devices.

Types of Generating stations, Transmission types & Distribution system (levels of voltage and power ratings)- Simple layout of generation, transmission and distribution of power.

TEXT BOOKS:

1. Metha.V.K, Rohit Metha, "Basic Electrical Engineering", Fifth Edition, Chand. S&Co, 2012.
2. Kothari.D.P and Nagrath.I. J, "Basic Electrical Engineering", Second Edition, Tata McGraw-Hill, 2009.
3. R.K.Rajput , "Basic Electrical and Electronics Engineering", Second Edition, Laxmi Publication, 2012.

REFERENCE BOOKS:

1. Smarajt Ghosh, "Fundamentals of Electrical &Electronics Engineering", Second Edition, PHI Learning, 2007.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Devarajan	Professor	EEE/VMKVEC	devarajan@vmkvec.edu.in
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34621E01	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING B. BASIC ELECTRONICS ENGINEERING	Category	L	T	P	Credit
		FC-ES	2	0	0	2

PREAMBLE

The course aims to impart fundamental knowledge on electronics components, digital logics and communication engineering concepts. The course begins with classification of various active and passive components, diodes and transistors. It enables the student to design small digital logics like multiplexer, de-multiplexer, encoder, decoder circuits, etc. It crafts the students to get expertise in modern communication systems.

PRERQUISITE – Nil

COURSE OBJECTIVES

1	To learn and identify various active and passive components and their working principles.
2	To understand the number conversion systems and working Principles of logic gates.
3	To learn the digital logic principles and realize adders, multiplexer, etc.,
4	To understand the application-oriented concepts in the Various communication systems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Interpret working principle and application of various active and passive electronic components like resistors, capacitors, inductors, diodes and transistors.	Understand
CO2. Construct the rectifier, Clipper, Clamper, regulator circuits and explore their operations.	Apply
CO3. Execute number system conversions and compute several digital logic operations.	Apply
CO4. Design adders, Multiplexer, De-Multiplexer, Encoder, Decoder circuits for given data input.	Apply
CO5. Expose the working principles of modern technologies in developing application-oriented gadgets like the UHD, OLED, HDR and various communication systems.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	-	-	-	-	L	-	-	-	M	-	-
CO2	S	M	M	M	-	-	M	-	L	-	-	L	-	M	-
CO3	S	M	M	-	-	-	-	-	L	-	-	-	S	-	-
CO4	S	M	M	M	-	-	M	-	L	-	-	L	M	-	-
CO5	S	M	-	-	-	-	-	-	L	L	-	L	S	-	L

S- Strong; M-Medium; L-Low

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SYLLABUS

SEMICONDUCTOR DEVICES

Passive and Active Components - Resistors, Inductors, Capacitors- Intrinsic Semiconductor, Extrinsic Semiconductor, Energy band diagram- Conductor, insulator, semiconductor, Characteristics of PN Junction Diode - Zener Diode and its Characteristics - Half wave and Full wave Rectifiers, Voltage Regulation- Simple wave shaping circuits- Clipper, Clamper. Bipolar Junction Transistor, JFET, MOSFET & UJT.

DIGITAL FUNDAMENTALS

Number Systems – Binary, Octal, Decimal and Hexa-Decimal – Gray Code- Conversion from one to another – Logic Gates and its characteristics – AND, OR, NOT, XOR, Universal Gates – Adders, Multiplexer, De Multiplexer, Encoder, Decoder – Memories.

COMMUNICATION AND ADVANCED GADGETS

Modulation and Demodulation – AM, FM, PM ,PCM,DM– RADAR – Satellite Communication – Mobile Communication, Optical communication, Microwave communication. LED, HD, UHD, OLED, HDR & Beyond, Smart Phones – Block diagrams Only.

TEXT BOOKS:

1. R.K. Rajput, "Basic Electrical and Electronics Engineering", Laxmi Publications, Second Edition, 2012.
2. Dr.P.Selvam, Dr.R.Devarajan, Dr.A.Nagappan, Dr.T.Muthumanickam and Dr.T.Sheela,"Basic Electrical and Electronics Engineering", Department of EEE & ECE, Faculty of Engineering & Technology, VMRFDU, Anuradha Agencies, 2018.
3. Edward Hughes, "Electrical and Electronics Technology", Pearson Education Limited, Ninth Edition, 2005.

REFERENCES:

1. John Kennedy, "Electronics Communication System", Tata McGraw Hill, 2003.

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35021E02	PYTHON PROGRAMMING (THEORY AND PRACTICALS)	CATEGORY	L	T	P	CREDIT
		FC-ES	2	0	2	3

PREAMBLE

The purpose of this course is to introduce Python, a remarkably powerful dynamic programming language to write code for different operating systems along with application domain. Python has evolved on more popular and powerful open source programming tool

PRERQUISITE :NIL

COURSE OBJECTIVES

1.	To provide basic knowledge on Python programming concepts.
2.	To introduce different methods in list, string, tuple, dictionary and sets.
3.	To compute different programs using python control statements.
4.	To learn about different functions in python.
5.	To compute the exception handling functions and file concepts.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Learn python statements, comments and indentation, tokens, input and output methods using various example programs.	Understand
CO2. Apply the different methods involved in List, String, Tuples and Dictionary.	Apply
CO3. Design solutions for complex programs using decision making and looping statements.	Apply.
CO4.Apply the function programs with all the concepts like lambda and recursion.	Apply.
CO5. Compute the exception handling programs, file concept programs and understand the concepts .	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	M	-	-	-	-	-	-	-	M	M	M
CO2	S	M	M	M	M	-	-	-	-	-	-	-	S	M	M
CO3	M	S	S	S	M	-	-	-	-	-	-	-	M	M	M
CO4	S	S	S	S	M	-	-	-	-	-	-	-	S	S	M
CO5	S	M	M	M	M	-	-	-	-	-	-	-	S	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Introduction to python-Advantages of python programming-Tokens-Variables-Input/output methods-Datatypes-Operators

DATA STRUCTURES

Strings-Lists-Tuples-Dictionaries-Sets

CONTROL STATEMENTS

Flow Control-Selection control Structure- iterative control structures.

FUNCTIONS

Introduction-Declaration of function-Types of function-Types of Arguments-parameters-recursion and lambda function

FILE HANDLING AND EXCEPTION HANDLING

FILES:Open,read ,write, append ,close,tell and seek method,.Exception Handling:errors and exceptions-Raising exceptions-user defined exception

LIST OF EXPERIMENTS

1. Write a program to sum of series of N natural numbers
2. Write a program to calculate simple interest.
3. Write a program to generate Fibonacci series using for loop
4. Write a program to calculate factorial using while loop
5. Write a program to find the greatest of three numbers using if condition
6. Write a program for finding the roots of a given quadratic equation using conditional control statements
7. Write a program to find the greatest of three numbers using conditional operator
8. Write a program to compute matrix multiplication using the concept of arrays
9. Write a program to implement recursive function
10. Write a program to read and write data using file concepts

TEXT BOOKS:

1. Bill Lubanovic, "Introducing Python Modern Computing in Simple Packages", 2st Edition, O'Reilly Media, 2019.
2. Programming With Python- II 'Himalaya Publishing House Pvt Ltd, 2018.
3. "Dive Into Python3" by Mark Pilgrim, 2012

REFERENCES:

1. Mark Lutz, "Learning Python", 6th Edition, O'Reilly Media, 2014.
2. David Beazley, Brian K. Jones, "Python Cookbook", 3rd Edition, O'Reilly Media, 2015.
3. Mark Lutz, "Python Pocket Reference", 6th Edition, O'Reilly Media, 2015.

COURSE DESIGNERS

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1	Mr. K.Karthik	Assistant Professor	CSE	karthik@avit.ac.in
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34421E01	BASICS OF CIVIL AND MECHANICAL ENGINEERING PART-A BASICS OF CIVIL ENGINEERING (Common to All Branches)	Category	L	T	P	Credit
		FC-ES	2	0	0	2

PREAMBLE

Objective of this course is to provide an insight and inculcate the essentials of Civil Engineering discipline to the students of all branches of Engineering.

PREREQUISITE-NIL

COURSEOBJECTIVES

1	To understand the basic concepts of surveying and apply in practical problems
2	To study in detail different types of construction materials.
3	To impart basic knowledge about building components.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1.An ability to apply concepts of Surveying on practical applications.	Apply
CO2. Explain different types of buildings, building components, building materials and building construction.	Remember
CO3.Expalin the essentials of components of a building and application of load on it	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	PSO 1	PSO 2	PSO3
CO1	L	M	-	S	L	-	M	M	L	L	-	L	M	M	M
CO2	S	M	L	-	M	S	-	-	-	-	-	-	M	-	-
CO3	S	M	L	S	M	S	-	-	M	-	-	-	-	S	-

S-Strong;M-Medium; L-Low

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SYLLABUS

SURVEYING
Objects–types–classification–principles–measurementsofdistances–angles–levelling–determination of areas–illustrative examples.

CIVIL ENGINEERING MATERIALS
Bricks –stones–sand –cement –concrete mix design and Quantity computation–steel sections.

BUILDING COMPONENTS AND STRUCTURES:

FOUNDATIONS: Types, Safe Bearing capacity of Soil–Requirement of good foundations.
SUPERSTRUCTURE: Brick Masonry–Stone Masonry–Beams –Columns –Lintels–Roofing–Flooring–Plastering–Mechanics – Internal and External Forces –Load Transformation Mechanism in Structural Elements– Stress – Strain –Elasticity – Types of Bridges and Dams – Basics of Interior Design and Landscaping–Water Supply–Sources and Quality of Water— Rain water harvesting—Introduction to highway and railway.

TEXTBOOKS:

1. Basic Civil and Mechanical Engineering,VMU,(2017).CompanyLtd.,NewDelhi,2009.
2. Basic Civil and Mechanical Engineering, M.Prabakaran, S.P.Sangeetha, Vemuri Lakshminarayana, Maruthi Publishers, 2017.
3. Reinforced Concrete Structures B.C.Punmia,Vol.1&2,-Laxmi Publications,Delhi,2004.

REFERENCES:

1. Ramamrutham S., "Basic Civil Engineering", Dhanpatrai Publishing Co. (P) Ltd., 2009.
2. Rangwala S.C and Dalal K.B, Building Construction, Charotar Publishing house, 2022.

COURSE DESIGNERS

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1	S.Supriya	Assist.Professor	Civil/VMKVEC	jansupriyanair@gmail.com
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34421E01	BASICS OF MECHANICAL ENGINEERING	Category	L	T	P	Credit
		FC (ES)	2	0	0	2

Preamble

This course provides a preliminary knowledge of the applications of mechanical engineering in our day to day life.

Prerequisite-NIL

CourseObjective

1	To demonstrate the principles of casting and metal joining processes in manufacturing
2	Understand the importance and uses of IC Engines, working principles of IC Engines.
3	Comprehend the working and use of various power plants

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	Illustrate the application of casting and metal joining processes in manufacturing	Apply
CO2.	Demonstrate the operation of automotive engines and important components	Apply
CO3.	Understanding the construction and the working principle of conventional and non-conventional power generation	Understand

Mapping with Programme Outcomes and Programme Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	S	L	M	-	-	-	-	-	-	-	-	-	-
CO2	S	M	M	L	L	-	-	-	-	-	-	-	-	-	-
CO3	S	M	M	L	L	-	-	-	-	-	-	-	-	-	-

S-Strong; M-Medium; L-Low

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SYLLABUS

BASIC MANUFACTURING PROCESSES

Casting process-Introduction, Principle, Advantages, casting defects Forging process-introduction, forging, rolling, drawing, extrusion Welding process- introduction, principle, types-Gas and arc welding

IC ENGINES

The Importance and uses of Engines-Definition, Classification-I C & E C Engines- two stroke engines - four stroke engines - various parts and functions of I C engines-working of two stroke petrol engine and diesel engine with line sketches - working of four stroke petrol and diesel engines with line sketches - Comparison between two stroke and four stroke engines -S I and C I engines.

POWER PLANT ENGINEERING

Classification of power plants- Working of power plant with line Sketches-Steam power plant-Hydro- electric power plant - Diesel power plant -Nuclear power plant- merits and demerits. Nonconventional energy power plants – solar- wind-tidal- geo thermal, with line sketches- merits & demerits of various non conventional power plants

Text Books

1	Power plant Engineering, by G.R Nagpal
2	Internal combustion Engines by Ganesan
3	Workshop technology vol1, by S K Hajra Choudhury

Reference Books

1	Production technology, by P.C Sharma
2	Thermal Engineering by R.S.Khurumi
3	Power plant Engineering, by R.K Bansal

Course Designers

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34621E81	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB A. BASIC ELECTRICAL ENGINEERING	Category	L	T	P	Credit
		FC-ES	0	0	2	1

PREAMBLE

It is a laboratory course which familiarizes the basic electrical wiring, measurement of electrical quantities and various types of earthing methods.

PRERQUISITE – NIL

COURSE OBJECTIVES

1	To learn the residential wiring and various types of electrical wiring.
2	To measure the various electrical quantities.
3	To know the necessity and types of earthing and measurement of earth resistance.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO 1: Implement the various types of electrical wiring.	Apply
CO 2: Measure the fundamental parameters of AC circuits.	Analyze
CO 3: Measure the earth resistance of various electrical machineries.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	--	S	--	--	--	--	--	--	L	M	L	--
CO2	S	M	S	S	--	--	--	--	M	--	--	M	M	L	--
CO3	L	S	L	--	S	--	--	--	--	L	--	L	M	L	--

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring.
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Types of wiring, Joints and Measurement of resistance to earth of an electrical equipment.

REFERENCES

1. Laboratory Reference Manual.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department/ Name of the College	Mail ID
1	Dr. R. Devarajan	Professor	EEE/VMKVEC	devarajan@vmkvec.edu.in
2	Dr. G. Ramakrishnaprabu	Associate Professor	EEE/VMKVEC	ramakrishnaprabu@vmkvec.edu.in
3	Ms. D. Saranya	Assistant Professor (Gr-II)	EEE/AVIT	dsaranya@avit.ac.in
4	Mr. S. Prakash	Assistant Professor (Gr-II)	EEE/AVIT	sprakash@avit.ac.in

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34621E81	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB PART B - BASIC ELECTRONICS ENGINEERING	Category	L	T	P	Credit
		FC-ES	0	0	2	1

PREAMBLE

This course is to provide a practical knowledge in Basic Electronics Engineering. It starts with familiarization of electronic components and electronic equipments. It enables the students to construct and test simple electronic projects

PRERQUISITE – NIL

COURSE OBJECTIVES

1	To familiarize the electronic components, basic electronic equipments and soldering techniques.
2	To study the characteristics of Diodes, BJT and FET.
3	To understand the principles of various digital logic gates.
4	To understand the concept of basic modulation techniques

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Familiarize with the fundamentals of soldering techniques.	Understand
CO2. Construct experiments for PN and Zener diode characteristics also determine diode forward and reverse resistance	Apply
CO3. Construct clipper and clamper circuit and verify their voltage levels	Apply
CO4. Construct and justify operation simple voltage regulator for given Zener diode	Apply
CO5. Verify the truth tables and characteristics of logic gates (AND, OR, NOT, NAND, NOR, XOR).	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	-	-	-	-	L	-	-	-	M	-	-
CO2	S	M	M	M	-	-	M	-	L	-	-	L	-	M	-
CO3	S	M	M	-	-	-	-	-	L	-	-	-	S	-	-
CO4	S	M	M	M	-	-	M	-	L	-	-	L	M	-	-
CO5	S	M	-	-	-	-	-	-	L	L	-	L	S	-	L

S- Strong; M-Medium; L-Low

Syllabus

LIST OF EXPERIMENTS

1. Practicing of Soldering and Desoldering.
2. Characteristics of PN junction Diode and find the forward and reverse resistance
3. Construct and Study simple clipper and clamper circuits
4. Characteristics of Zener diode and determine the break down voltage and diode resistance

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5.Construct and Study simple voltage regulator using zener diode
6. Verification of Logic Gates.
7. Find the characteristics of AND ,NOR,NOT gate
8. Construct and Study simple voltage regulator using zener diode.

COURSE DESIGNERS

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34421E84	ENGINEERING SKILL PRACTICALS LAB PART- A BASICS OF CIVIL ENGINEERING	Category	L	T	P	Credit
		FC-ES	0	0	2	1

PREAMBLE

Engineering Skills Practice is a hands- on training practice to Mechanical, Civil and Mechatronics Engineering students. It deals with fitting, carpentry, sheet metal and related exercises.Also, it will induce the habit of selecting right tools, planning the job and its execution

PREREQUISITE

Nil

COURSEOBJECTIVES

1	To understand the basic concepts of building components.
2	To impart basic knowledge about Plumping and Carpentry works.

COURSEOUTCOMES

On the successful completion of the course, students will be able to

CO1. Prepare the different types of fitting and plumbing lines.	Apply
CO2.Prepare the different types of joints using wooden material	Apply

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L	L	L	L	L	L	L	L	L	L	L	-	S	-
CO2	S	S	S	L	L	L	L	L	L	L	L	L	L	-	M

S-Strong; M-Medium; L-Low

SYLLABUS

Buildings:

1. Study of plumbing and carpentry components of residential and industrial buildings, Safety aspects.

Plumbing and Carpentry Works:

2. Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
3. Preparation of plumbing line sketches for water supply and sewage works.
4. Hands on Exercise on Demonstration of plumbing requirements of high-risebuildings.

CarpentryusingPowerToolsonly:

5. Study of the joints in roofs, doors, windows and furniture.
6. Hands-on-exercise: Woodwork, jointsbysawing,planningandcutting.

TEXTBOOK

1.BasiccivilengineeringLabManual by Department of Civil Engineering, VMRF.

COURSEDESIGNERS

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1	M.Senthilkumar	Asst.Professor	Civil/ VMKVEC	senthilkumar@vmkvec.edu.in
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34421E84	ENGINEERING SKILL PRACTICALS LAB B. BASICS OF MECHANICAL ENGINEERING	Category	L	T	P	Credit
		FC-ES	0	0	2	1

Preamble

Workshop is a hands-on training practice to Mechanical Engineering students. It deals with fitting, carpentry, foundry and welding related exercises. Also, it will induce the habit of selecting right tools, planning the job and its execution.

Prerequisite –NIL

Course Objective

1	To perform the practice in different types of fitting processes.
2	To executive joints using wooden materials.
3	To apply in depth knowledge in metal joining processes.
4	To demonstrate the pattern using foundry processes

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	Perform the different types of fitting using MS plate.	Apply
CO2.	Practice the different types of joints using wooden material	Apply
CO3.	Demonstrate the different types of joints in metal by Arc Welding	Apply
CO4.	Utilize the different types of green sand mould	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	L	-	-	-	-	-	M	-	-	-	L	-	-
CO2	S	-	L	-	-	-	-	-	M	-	-	-	L	-	-
CO3	S	-	-	-	-	-	-	-	-	-	-	-	L	-	-
CO4	S	-	L	-	-	-	-	-	M	-	-	-	L	-	-

S- Strong; M-Medium; L-Low

Syllabus

LIST OF EXPERIMENTS

Tee – FittingVee –
Fitting
Preparation of a mould for a single piece pattern
Preparation of a mould for a split piece pattern Half-
Lap Joint in Carpentry
Dove Tail Joint in CarpentryLap
Joint – Welding
Butt Joint – Welding

Text Books

1	**BASIC MECHANICAL ENGINEERING, LAB MANUAL**

Reference Books

1	K.Venugopal, Basic Mechanical Engineering, Anuradha Publications, Chennai
2	NR. Banapurmath, Basic Mechanical Engineering, Vikas Publications, Noida

Course Designers

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1	V K Krishnan	Associate Professor	Mech / VMKVEC	vkkrishnan@vmkvec.edu.in
2	S. Duraithilagar	Associate Professor	Mech / VMKVEC	sduraithilagar@vmkvec.edu.in

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34421E81	ENGINEERING GRAPHICS AND DESIGN	Category	L	T	P	Credit
		FC-ES	1	0	4	3

Preamble

Engineering Graphics is referred as language of engineers. An engineer needs to understand the physical geometry of any object through its orthographic or pictorial projections. The knowledge on engineering graphics is essential in proposing new product through drawings and interpreting data from existing drawings. This course deals with orthographic and pictorial projections, sectional views and development of surfaces.

Prerequisite - NIL

Course Objective

1	To implement the orthographic projections of points, straight lines, plane surfaces and solids.
2	To construct the orthographic projections of sectioned solids and true shape of the sections.
3	To develop lateral surfaces of the uncut and cut solids.
4	To draw the pictorial projections (isometric and perspective) of simple solids.
5	To draw the orthographic views from the given pictorial view.

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	Execute in the form of drawing of the orthographic projections of points, straight lines, plane surfaces and solids.	Apply
CO2.	Demonstrate in the form of drawing of the orthographic projections of sectioned solids and true shape of the sections.	Apply
CO3.	Develop lateral surfaces of the solid section and cut section of solids.	Apply
CO4.	Draw the pictorial projections (isometric and perspective) of simple solids.	Apply
CO5.	Draw the orthographic views from the given pictorial view.	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO 11	PO 12	PS O1	PS O2	PSO3
CO1	S	S	L	S	L	-	-	-	-	-	-	-	L	-	-
CO2	S	S	L	S	L	-	-	-	-	-	-	-	L	-	-
CO3	S	S	L	S	L	-	-	-	-	-	-	-	L	-	-
CO4	S	M	L	S	S	-	-	-	-	-	-	-	L	-	-
CO5	S	S	L	S	L	-	-	-	-	-	-	-	L	-	-

S- Strong; M-Medium; L-Low

Syllabus

PLANE CURVES AND DIMENSIONING

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Dimensioning. Projection of points.

PROJECTION OF SOLIDS

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to any one reference plane by change of position method.

SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

Sectioning of above solids in simple vertical position by cutting planes inclined to any one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids like Prisms, pyramids, cylinders and cones.

ORTHOGRAPHIC VIEWS AND ISOMETRIC VIEWS – First angle projection – layout views – Representation of Three Dimensional objects -multiple views from pictorial views of objects.

Principles of isometric View – isometric scale – Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids – Prisms, pyramids, cylinders, cones.

INTRODUCTION TO AUTO CAD

Introduction to Auto CAD- Basic introduction and operational instructions of various commands in AutoCAD. Limit System- Tolerance, Limits, Deviation, Actual Deviation, Upper Deviation, Lower Deviation, Allowance.

Preparation of manual parts drawing and assembled sectional views from orthographic part drawings,

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Text Books				
1	Natarajan K V, “Engineering Graphics”, Tata McGraw-Hill Publishing Company Ltd. New Delhi.			
2	K.Venugopal and V.Prabhu Raja, “Engineering Graphics”, New Age International Private Limited.			
3	K.R.Gopalakrishna“Engineering Drawing” (Vol. I & II), Subhas Publications, 2014.			
4	Bhatt-N.D.-"Machine Drawing"-Published by R.C.Patel- Chartstar Book Stall- Anand-India- 2003			
Reference Books				
1	N.D. Bhat and V.M. Panchal, Engineering Graphics, Charotar Publishers 2013			
2	E. Finkelstein, “AutoCAD 2007 Bible”, Wiley Publishing Inc., 2007			
3	R.K. Dhawan, “A text book of Engineering Drawing”, S. Chand Publishers, Delhi,2010.			
4	DhananjayA.Jolhe, “Engineering Drawing with an Introduction to AutoCAD”, Tata McGraw Hill Publishing Company Limited, 2008.			
5	G.S. Phull and H.S.Sandhu, “Engineering Graphics”, Wiley Publications, 2014.			
Course Designers				
S.No	**Faculty Name**	**Designation**	**Department / Name of the College**	**Email id**
1	Dr. S.Venkatesan	Professor	Mech / VMKVEC	venkatesan@vmkvec.edu.in
2	Dr. N.Rajan	Professor	Mech / VMKVEC	rajan@vmkvec.edu.in

Alternative NPTEL/SWAYAM Course:

S. No.	**NPTEL Course Name**	**Instructor**	**Host Institute**	**Duriation**
1.	Engineering Graphics and Design	Prof. Naresh Varma Datla, Prof. S. R. Kale	IIT Delhi	12 weeks
2.	Engineering Drawing	Robi, P.S.	IIT Guwahati	12 weeks
3.	Engineering Drawing and Computer Graphics	Prof. Rajaram Lakkaraju	IIT Kharagpur	12 weeks

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35021E03	PROGRAMMING FOR PROBLEM SOLVING	Category	L	T	P	Credit
		FC-ES	3	0	0	3

PREAMBLE

The course is designed to introduce basic problem solving and program design skills that are used to create computer programs. It gives engineering students an introduction to programming and developing analytical skills to use in their subsequent course work and professional development. This course focuses on problem solving, algorithm development, top-down design, modular programming, debugging and testing using the programming constructs like flow-control, looping, iteration and recursion. It presents several techniques using computers to solve problems, including the use of program design strategies and tools, common algorithms used in computer program and elementary programming techniques.

PREREQUISITE–NIL

COURSEOBJECTIVES

1.	To gain basic knowledge about simple algorithms for arithmetic and logical problems.
2.	To learn how to write a program, syntax and logical errors.
3.	To understand how to decompose a problem into functions and synthesize a complete program.

COURSEOUTCOMES

On the successful completion of the course, students will be able to

CO1: Formulate simple algorithms for arithmetic and logical problems.	Understand
CO2: Test and execute the programs and correct syntax and logical errors	Apply
CO3: Implement conditional branching, iteration and recursion.	Apply
CO4: Decompose a problem into functions and synthesize a complete program.	Analze
CO5: Use arrays, pointers, strings and structures to formulate algorithms and programs	Apply

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S-Strong; M-Medium; L-Low

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SYLLABUS

UNIT – I: INTRODUCTION

Computer system: components of a computer system-computing environments-computer languages, creating and running programs, Algorithms, flowcharts- Introduction to C language: basic structure of programs, process of compiling and running program, -tokens, keywords, identifiers, constants, strings, special symbols, variables, data types-I/O statements

UNIT – II: OPERATORS, EXPRESSIONS AND CONTROL STRUCTURES

Operators and expressions: Operators- arithmetic- relational and logical- assignment operators-increment and decrement operators,-bitwise and conditional operators-special operators- operator precedence and associativity- evaluation of expressions-type conversions in expressions- Control structures: Decision statements: if and switch statement- Loop control statements: while, for and do while loops- jump statements- break-continue-goto statements.

UNIT – III: ARRAYS AND FUNCTIONS

Arrays: One dimensional array-declaration and initialization of one dimensional arrays- two dimensional arrays- initialization and accessing- multidimensional arrays- Basic Algorithms: Searching-Basic Sorting Algorithms- Functions: User defined and built-in Functions- Parameter passing in functions-call by value-Passing arrays to functions-call by reference,-Recursion-Example programs, such as Finding Factorial, Fibonacci series

UNIT – IV: STRINGS AND POINTERS

Strings: Arrays of characters- variable length character strings-inputting character strings-character library functions-string handling functions- Pointers: Pointer basics- pointer arithmetic-pointers to pointers-generic pointers-array of

Pointers- functions returning pointers,-Dynamic memory allocation

UNIT – V: STRUCTURES AND FILE HANDLING

Structures and unions: Structure definition- initialization- accessing structures,-nested structures,-arrays of structures-structures and functions- unions- typedef- enumerations.-File handling :command line arguments- File modes- basic file operations read,-write and append

TEXTBOOKS

1. Schaum's Outline of Programming with C by Byron Gottfried , McGraw-Hill, 2017

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REFERENCES

1. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education, 2015.
2. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, Seventh Edition 2013.

Course Designers:

S.No.	Name of the Faculty	Designation	Department	MailID
1.	Mrs.R.Shobana	Assistant Professor	CSE	shobana@avit.ac.in
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35021C02	DATA STRUCTURES	CATEGORY	L	T	P	CREDIT
		CC	3	0	0	3

PREAMBLE

This course aims at understanding the basic concepts in programming structures, linear structures and non linear structures

PRERQUISITE - NIL

COURSE OBJECTIVES

1.	To remember and understand the basic concepts in linear structures
2.	To learn about tree structures.
3.	To understand about balanced trees
4.	To learn about hashing and sets.
5.	To learn and understand about graphs and sorting

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Remember the basic concepts in linear structures	Understand
CO2. Learn about tree structures and tree traversals	Apply
CO3. Understand about balanced trees	Apply
CO4. Learn about hashing and sets.	Apply
CO5. Learn and understand about graphs and sorting	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	-	-	-	-	-	-	-	-	M	S	S	S
CO2	S	M	M	M	M	-	-	-	-	-	-	M	S	S	S
CO3	S	M	L	M	M	-	-	-	-	-	-	M	S	S	M
CO4	S	M	M	M	M	-	-	-	-	-	-	L	S	S	M
CO5	S	M	L	M	M	-	-	-	-	-	-	M	S	S	M

S- Strong; M-Medium; L-Low

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SYLLABUS

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

Linear Structures

Abstract Data Types (ADT) – List ADT – array-based implementation – linked list implementation – cursor-based linked lists – doubly-linked lists – applications of lists –Stack ADT – Queue ADT – circular queue implementation – Applications of stacks and queues.

Tree Structures

Tree ADT – tree traversals – Balanced Trees: AVL Trees – Splay Trees – B-Tree - heaps – binary heaps – applications of binary Heaps**.**

Hashing and Set

Hashing – Separate chaining – open addressing – rehashing – extendible hashing -Disjoint Set ADT – dynamic equivalence problem – smart union algorithms – path compression – applications of Set.

Graphs

Definitions – Topological sort – breadth-first traversal - shortest-path algorithms –minimum spanning tree – Prim's and Kruskal's algorithms – Depth-first traversal – bi-connectivity – Euler circuits – applications of graphs.Sorting algorithms: Insertion sort - Selection sort -Quick sort - Merge sort - Bubble sort - Shell sort – Radix sort.

TEXT BOOKS:

1. **1.** Mark A. Weiss, "Data Structures and Algorithm Analysis in C (2nd Edition), Pearson Education, 2002

REFERENCES:

2. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, First EditionReprint. R. F. Gilberg, B. A. Forouzan, "Data Structures", Second Edition, Thomson India,Edition, 2005.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. R. Jaichandran	Associate Professor	CSE	jaichandran@avit.ac.in
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35021C01	COMPUTER ARCHITECTURE AND ORGANIZATION	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:

The course is dedicated to number system, logic design, and memory and processing. This is the only course that is concerned with the hardware of a computer, its logic design and organization. It aims at making the student familiar with digital logic and functional design of arithmetic and logic unit that is capable of performing floating point
arithmetic operations.

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To provide knowledge on overview of computer Architecture, function and addressing modes.
2	Hardware and software implementation of arithmetic unit.
3	To provide knowledge of memory technologies, interfacing techniques and subsystem devices
4	Apply the knowledge of methods to solve arithmetic problems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 Provide fundamentals of Architecture, Registers, machine instructions and addressing modes	Understand
CO2 . Comprehend the various Architecture for computer arithmetic and pipeline concepts.	Apply
CO3 Analyse the performance of various memory modules in memory hierarchy	Analyse
CO4 Provide the features of Peripheral devices and Interfaces.	Understand
CO5 Outline the evaluation of multicore architectures, structure of disk drives and RAID architectures.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	M	-	-	-	-	-	-	-	L	M	M	-
CO2	M	M	M	M	-	-	-	-	-	-	-	L	M	M	-
CO3	M	M	S	M	-	-	-	-	-	-	-	-	S		-
CO4	S	M	M		-	-	-	-	-	-	-	-	S	M	-
CO5	S	-	M	L	-	-	-	-	-	-	-	-	S		-
CO6	M	M	M	S	-	-	-	-	-	-	-	L	M	M	-

S- Strong; M-Medium; L-Low

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SYLLABUS

1. Introduction to Computer Architecture

Overview of Computer Organization and Architecture- Interconnection Structures - Bus interconnection- Machine instructions and addressing modes- Registers and register files - Addressing modes-Instruction set.

2. Central Processing Unit

CISC & RISC- ALU- data path and control unit- Microprogramming control unit- Instruction pipelining.

3 Memory Organization

Characteristics of Memory- Memory Hierarchy- Memory system overview -Main Memory organization - Cache memory- Cache memory principles – Elements of Cache design- address mapping - Virtual memory systems mapping functions, replacement algorithms

4. Peripheral devices and their characteristics

I/O fundamentals: handshaking, buffering; I/O techniques: programmed I/O- interrupt-driven I/O- DMA- I/O device interfaces

5. Device Subsystems

External storage systems- organization and structure of disk drives and optical memory- RAID.
Multi-Core Architectures: Flynn's Classification- Moore's Law- Hyper-Threading- Multi threading-Single core- multiprocessor- Multi-Core- Amdahl's law

TEXT BOOKS:

1. William Stallings, Computer Organization and Architecture 10th Ed, Pearson, 2019
2. M. M. Mano, Computer System Architecture, 3rd ed., Prentice Hall of India, 1993.

REFERENCES:

1. Hency Patterson, Quantative Approach –Computer Architecture, Elsevier, 4th edition, 2006.
2. Shameem Akhter and Jason Roberts, Multi-Core Programming, 1st edition, Intel Press, 2012
3. John P. Hayes, Computer Architecture and Organization, McGraw Hill Education, 5 edition, 2017.

COURSE DESIGNERS

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2	Mrs. S.Leelavathy	Assistant. Professors (GII)	CSE	leelavathy@avit. ac.in

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35021C11	OPERATING SYSTEM (THEORY AND PRACTICALS)	Category	L	T	P	Credit
		CC	3	0	2	4

PREAMBLE

The student will be able to understand the concepts of operating system, scheduling algorithms, Inter process communication, threads, disk management and file systems.

PREREQUISITE:NIL

COURSE OBJECTIVES

1.	To be aware of the evolution of operating systems, process scheduling, CPU utilization and scheduling algorithms
2.	To learn what processes are, how processes communicate, how process synchronization is done and how to manage processes.
3.	To have an understanding of the memory management techniques.
4.	To learn and understand the disk management systems
5.	To learn and understand the file management systems

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.	Apply
CO2. Understand the process synchronization concepts for the given scenario in operating systems environment.	Understand
CO3. Develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.	Apply
CO4.Apply the I/O Subsystem concepts for a given scenario.	Apply
CO5. Design and implement file management system.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	M	-	-	-	-	-	-	-	-	S	S	-
CO2	S	S		M	-	-	-	-	-	-	-	-	S	M	-
CO3	S	S		M	-	-	-	-	-	-	-	-	S	M	-
CO4	S	M	L	M	-	-	-	-	-	-	-	-	S	L	M
CO5	S	M	L	L	-	-	-	-	-	-	-	-	S	M	-

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Introduction: Concept of Operating Systems, Types of Operating Systems, Concept of Virtual Machine, Different states of a Process, Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling, criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

INTER PROCESS COMMUNICATION

Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing,

Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc. Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery..

MEMORY MANAGEMENT

Logical and Physical address map, Memory allocation, Paging, Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging. Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

DISK MANAGEMENT

Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O.Secondary-Storage Structure: Disk structure, Disk scheduling algorithms..

FILE MANAGEMENT

Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed),Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

LIST OF PRACTICALS

1. Basics of UNIX commands.
2. Shell programming
3. Implementation of CPU scheduling. a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies
5. Implement Semaphores
6. Implement File Organization Techniques
7. Implement Bankers algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection

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9. Implement the all page replacement algorithms a) FIFO b) LRU c) LFU

10. Implement Shared memory and IPC

TEXT BOOKS:

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", 10th Edition, Wiley India Pvt. Ltd, 2018..

Referances

1) Operating Systems: Internals and Design Principles, 5th Edition, William Stallings,Prentice Hall of India.
2) Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
3) Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
4) Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
5) Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates.

COURSE DESIGNERS

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35021C05	DESIGN AND ANALYSIS OF ALGORITHMS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:

This subject introduces students the concepts of design and analysis of algorithms. On completion of this course students will be able to:

i) Learn the algorithm analysis techniques.
ii) Become familiar with the different algorithm design techniques
iii) Construct efficient algorithms for solving engineering problems by using appropriate algorithm design paradigms and data structures.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To familiarize the student with good programming design methods, particularly Top- Down design.
2.	To develop algorithms for manipulating stacks, queues, linked lists, trees, graphs
3.	To create the data structures for implementing the above algorithms
4.	To construct the recursive algorithms as they apply to trees and graphs
5.	To familiarize the student with the issues of Time complexity and examine various algorithms from this perspective

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Analyse the correctness of algorithms using induction and loop invariants.	Analyze
CO2. Analyse the worst-case, best-case and average-case running time of algorithms using asymptotic.	Analyze
CO3. Analyse the performance of a sequence of operations using amortized analysis techniques like potential method and accounting method.	Analyze
CO4. Construct algorithms using design paradigms like divide and conquer, greedy and dynamic programming for a given problem.	Analyze
CO5. Infer when a design scenario requires the application of the different algorithm design paradigms.	Apply
CO6. Analyse how the performance of an algorithm is affected based on the choice of data structures the algorithm uses.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	-	-	-	-	-	-	-	-	-	S	M	M
CO2	S	M	M	-	-	-	-	-	-	-	-	-	S	S	M
CO3	M	M	S	-	-	-	-	-	-	-	-	-	S	M	M
CO4	S	M		-	-	-	-	-	-	-	-	-	S	S	M
CO5	M	M	M	-	-	-	-	-	-	-	-	-	S	M	S

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CO6	M	M	M	-	-	-	-	-	-	-	-	-	S	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO ALGORITHMS

The role of algorithms in computing, Growth of functions, Asymptotic notations, Designing and Analyzing algorithms-an Introduction using insertion sort. Review on the Math needed for algorithm design and analysis.

DIVIDE AND CONQUER

Solving recurrences – The Substitution method, Recurrence Tree method and Master's method, Multiplying large integers, Binary Search, Sorting [Merge Sort and Quick Sort], Selection in linear time [Expected and Worst-case], Strassen‟s algorithm for Matrix Multiplication, The maximum sub-array problem.

GREEDY ALGORITHMS

Characteristics of Greedy algorithms, The problem of making change, Greedy algorithms for Scheduling, Minimum Spanning Trees – Kruskal's Algorithm and Prim's Algorithm, Greedy Algorithms for finding the shortest paths in a Graph, The Knapsack problem Amortized Analysis: The accounting method, The potential method.

DYNAMIC PROGRAMMING

Calculating the binomial co-efficient, The problem of making change, The Knapsack problem, Chained matrix multiplication, Finding the shortest paths in a Graph, Reformulating Dynamic programming algorithms using recursion and memory functions.

GRAPH ALGORITHMS

Depth-first search & Breadth-First Search, Flow Networks, Topological sort, Strongly connected components Computational Complexity: Classes P and NP, Polynomial reductions, Classes NP-Complete and NP-Hard. Heuristics: Graph Coloring problem, Travelling Sales Person problem.

TEXT BOOKS:

1. Charles E. Leiserson, "Thomas H. Cormen, Ronald L. Rivest, Clifford Stein – Introduction to Algorithms", Third edition, PHI, 2010

REFERENCES:

1. Gilles Brassard and Paul Bratley, "Fundamentals of Algorithmic", PHI, 2000.
2. Sara Baase - Computer algorithms: Introduction to Design and Analysis –, Addison Wesley publication, 1998.

COURSE DESIGNERS

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35021C04	DATABASE MANAGEMENT SYSTEMS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:

This course aims at facilitating the student to understand the various concepts and functionalities of Database Management Systems, the method and model to store data and how to manipulate them through query languages, the effective designing of relational database and how the system manages the concurrent usage of data in multi user environment.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	Describe a relational database and object-oriented database.
2	Create, maintain and manipulate a relational database using SQL.
3	Describe ER model and normalization for database design.
4	Examine issues in data storage and query processing and can formulate appropriate solutions.
5	Design and build database system for a given real world problem.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Illustrate the database design for applications and database adminstrators.	Understand
CO2. Build and manipulate the relational database using Structured Query Language and relational languages.	Apply
CO3. Develop a normalized database for a given application by incorporating various constraints like integrity and value constraints.	Apply
CO4. Apply concurrency control & recovery mechanism for database problems.	Apply
CO5. Construct data structures like indexes and hash tables for the fast retrieval of data.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	M	-	-	-	-	-	M	S	S	M	S
CO2	M	M	M	L	M	-	-	-	-	-	M	M	S	M	S
CO3	M	M	S	M	M	-	-	-	-	-	M	L	S	M	S
CO4	S	M	M	M	L	-	-	-	-	-	M	M	S	S	S
CO5	S	M	M	M	M	-	-	-	-	-	M	M	S	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Database-System Applications - Purpose of Database Systems - View of Data - Database Languages - Database Design - Database Engine - Database and Application Architecture - Database Users and Administrators - History of Database Systems

RELATIONAL APPROACH

The relational Model - Additional & Extended Relational - Types of Keys - Relational Algebra - Null Values - Domain Relational Calculus - Tuple Relational Calculus - Fundamental operations - Additional Operations- SQL fundamentals - Structure of SQL Queries - SQL Data Types and Schemas - Nested Sub queries - Complex Queries - Integrity Constraints - Triggers - Security - Advanced SQL Features - Embedded SQL- Dynamic SQL- Views - Introduction to Distributed Databases and Client/Server Databases..

RELATIONAL DATABASE DESIGN

Overview of the Design Process - Functional Dependencies - Non-loss Decomposition - Functional Dependencies - Normalization and its Types - Dependency Preservation - Boyce/Codd Normal Form- Decomposition Using Multi-valued Dependencies and Fourth Normal Form - Join Dependencies and Fifth Normal Form - Entity Sets and its Types.

TRANSACTION &CONCURRENCY CONTROL

Transaction Concepts - Transaction State - Transaction Recovery - ACID Properties - System Recovery - Media Recovery - Two Phase Commit - SQL Facilities for recovery -Advanced Recovery Techniques - Buffer Management - Remote Backup Systems - Concurrency Control - Need for Concurrency - Locking Protocols -Two Phase Locking - Internet Locking - Deadlock Handling - Serializability - Recovery Isolation Levels - SQL Facilities for Concurrency.

STORAGE STRUCTURE

Introduction to Storage and File Structure - Overview of Physical Storage Media - Magnetic Disks - RAID - Tertiary storage - File Organization - Organization of Records in Files - Indexing and Hashing - Ordered Indices - B+ tree Index Files - B- tree Index Files - Bitmap Indices - Static Hashing - Dynamic Hashing -Query Processing - Catalogue Information for Cost Estimation – Selection Operation - Sorting - Join Operation - Query optimization - Database Data Analysis.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, McGraw-Hill Education; 6 edition, 2019).

REFERENCES:

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Pearson India; 7th edition, 2017, 2017).

2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Third Edition, McGraw Hill, 2002.

3. Carlos Coronel, Steven Morris , "Database Systems – Design, Implementation and Management, 13th Edition, Cengage Learning; 13th edition, 2018) .

COURSE DESIGNERS

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35021C06	OBJECT ORIENTED PROGRAMMING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This syllabus is intended for the Computer science students and enables them to learn Object Oriented Programming and the design of computer solutions in a precise manner. The syllabus emphasizes on OOP concepts, Functions, Polymorphism, Inheritance and I/O. The intention is to provide sufficient depth in these topics to enable candidates to apply Object Oriented Programming approach to programming. The modules in the syllabus reflect solving general problems via programming solution. Thus, modules collectively focus on programming concepts, strategies and techniques; and the application of these toward the development of programming solutions.

PRERQUISITE

Nil

COURSE OBJECTIVES

1.	To learn about the syntax and semantics of C++ programming language
2.	To learn about the concepts of object oriented programming.
3.	To determine how to reuse the code, Constructors and member functions
4.	To Analyse how to reduce the coding by applying overloading concepts
5.	To Analyse how to reuse the code, how to verify and validate the coding

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Develop fundamental programming concepts such as variables, conditional statements, looping constructs	Apply
CO2 Apply derived data types and methods (procedures), inline function, friend function in applications	Apply
CO3. Develop object-oriented programs for a given application using the concepts of compile-time and run-time polymorphism	Analyze
CO4. Apply operator overloading and inheritance in solving real time problems	Analyze
CO5. Construct object-oriented applications for a given scenario using files, Sting handling and to handle exceptions	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	M	-	-	-	-	-	M	L	M	M	M
CO2	M	M	M	M	M	-	-	-	-	-	M	L	M	M	M
CO3	M	M	S	M	S	-	-	-	-	-	M	L	S	M	M
CO4	S	M	M	M	S	-	-	-	-	-	M	L	S	M	S
CO5	S	M	M	M	M	-	-	-	-	-	M	L	M	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION TO OOPS AND C++

Introduction to Object Oriented Programming and C++: Object oriented concepts and its characteristics - History of C++ - Applications of C++ - Structure of C++ - Tokens – Keywords – Identifiers - Basic data types - Input and output statements - C++ Operators and control statements.

DERIVED DATA TYPES AND FUNCTIONS

Derived data types: Arrays – Structures - Unions - Type casting - Symbolic constants - Scope resolution operator -Functions: Function Prototyping - Function components - Passing parameters – Call by value - Call by reference - Inline function - Default arguments - Overloaded function- Introduction to friend function.

CLASSES AND OBJECTS

Classes and Objects: Class specification - Member function definition - Access qualifiers - Instance creation - Static data members and member functions - Array of objects - Objects as arguments - Returning objects – Constructors - Parameterized Constructors - Overloaded Constructors - Constructors with default arguments - Copy constructors – Destructors.

OPERATOR OVERLOADING AND INHERITANCE

Operator Overloading - Operator function – Overloading unary and binary operator – Inheritance Introduction – Types of Inheritance - Constructors in derived class - Abstract classes - Runtime Polymorphism– Virtual functions - Pure virtual functions – Templates - Function templates- class templates.

STREAMS, FILES AND EXCEPTION HANDLING

Streams: Streams in C++ - Stream classes - Formatted and unformatted data – Manipulators - File streams - File pointer and manipulation - File open and close - Sequential and random access - Name Space.

Exception Handling: Principle of exception handling - Exception handling mechanism - Multiple catch statements - Nested try statements.

TEXT BOOKS:

1. Robert Lafore, "Object-Oriented Programming in C++" Pearson Education, 4 Edition, 2009.
2. K R Venugopal, RajkumarBuyya "Mastering C++" Tata McGraw Hill, New Delhi, Second edition 2015.
3. B. Trivedi, "Programming with ANSI C++", Oxford University Press, 2013.
4. Bjarne stroustrup, The C++ programming Language, Addison Wesley, 4rd edition2018.
5. Harvey M. Deitel and Paul J. Deitel, C++ How to Program, 7th edition, Prentice Hall, 2010.
6. Tony Gaddis, Starting Out with Java: From Control Structures through Objects, 4/E, Addison-Wesley, 2009.

COURSE DESIGNERS

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35021C08	COMPILER DESIGN AND AUTOMATA THEORY	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enables them to learn about compiler design. Its helps the students to study about language processing systems, phases of compiler, parsing techniques, symbol table management, intermediate code generation, code optimization and generation and introduction to finite automata and regular expression.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To introduce the major concept areas of language translation and compiler design.
2.	To develop an awareness of the function and complexity of compilers.
3.	To learn the role of a parser and to study the different ways of recognizing and parsing of tokens.
4.	To study the concepts of code generation and concepts of Code Optimization and about various code improving transformations
5	To understand the concepts of automata theory

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the major phases of compilation and the use of a tool to generate lexical analyzer	Understand
CO2: Understand and Apply context-free grammar and to design parsers	Understand
CO3: Design and implement intermediate code generation	Apply
CO4: Apply for various optimization techniques and code generation	Apply
CO5: To understand the concepts of automata theory	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	S	-	-	-	-	-	-	-	-	L	L	-	-	-
CO2	S	M	-	L	-	-	-	-	-	-	-	L	-	-	-
CO3	M	M	L	L	-	-	-	M	-	-	-	-	-	-	-
CO4	M	S	L	-	-	L	-	-	-	L	-	M	-	-	-
CO5	M	M	-	-	M	-	-	-	M	-	-	M	-	-	-

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT - I INTRODUCTION TO COMPILERS

Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens.

UNIT - II SYNTAX ANALYZER

Role of the parser -Types of Grammar - Ambiguity in Grammar – Parse Tree – Syntax Tree –Writing Grammars –Context-Free Grammars – Top Down parsing – Predictive Parsing – Bottom-up parsing – Shift Reduce Parsing – LR Parsers – SLR Parser .

UNIT - III INTERMEDIATE CODE GENERATOR

Intermediate Code Generation – Introduction, Implementation of Three Address Code, Types of Three Address Statements Code Generation -Intermediate languages – Declarations – Assignment Statements – Boolean Expressions.

UNIT - IV CODE OPTIMIZATION AND CODE GENERATION

Introduction– Principal Sources of Optimization – Peephole Optimization- Issues in the design of code generator- DAG representation of Basic Blocks.

UNIT –V AUTOMATA AND REGULAR EXPRESSIONS 9

Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions. Regular Expression – FA and Regular Expressions – Applications of Regular Expression – Closure properties of regular languages

TEXT BOOKS

1. Alfred V.Aho, Ravi Sethi, Jeffrey D. Ullman, Compiler Principles, Techniques and Tools, Published 2013 by Pearson Education Limited.
2. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.

REFERENCES

1. Yunlin Su, Song Y. Yan, Principles of Compilers: A New approach to Compilers including the Algebraic Method,Springer edition, 2011.
2. Compiler Design in C – Holub, Prentice Hall, 1992.

COURSE DESIGNERS

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35021C09	COMPUTER NETWORKS (THEORY AND PRACTICALS)	Category	L	T	P	Credit
		CC	3	0	2	4

PREAMBLE

The purpose of this course is to understand the concepts of data communication and computer networks. Identify the components required to build different types of networks. Choose the required functionality at each layer for given application. Identify the solution for each functionality for each layer. Trace the flow of information from one node to another node in the network.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To provide basic knowledge in networking concepts.
2	To introduce and demonstrate various bridges, switches and Ethernets.
3	To introduce different methodologies in routing.
4	To learn about transmission protocols and QOS.
5	To provide knowledge about different application protocols.

COURSE OUTCOMES

On successful completion of the course, students will be able to

CO1.Learn the fundamentals of networks and different types of OSI Layers.	Understand
CO2.Learn the different Ethernet, wireless networks, switching and bridging concepts	Understand
CO3.Design solutions for complex routing methods and different multicast routing techniques.	Apply
CO4.Learn the concepts of different protocols for transmission purpose and study the quality of service for TCP protocol.	Analyse
CO5.Learn different types of application protocols and its architecture.	Analyse

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	S	M	-	-	-	-	-	-	S	M	**M**	**M**
CO2	S	M	L	M	S	-	-	-	-	-	-	M	M	**M**	**M**
CO3	S	S	S	S	M	-	-	-	-	-	-	M	**M**	**M**	**M**
CO4	S	S	S	S	S	-	-	-	-	-	-	M	**M**	**M**	**S**
CO5	S	M	M	M	M	-	-	-	-	-	-	M	**M**	**M**	**S**

S- Strong; M-Medium; L-Low

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SYLLABUS

FUNDAMENTALS & LINK LAYER

Building a network – Requirements - Layering and protocols - Internet Architecture – Network software – Performance ; Link layer Services - Framing - Error Detection - Flow control.

DATA-LINK LAYER & MEDIA ACCESS

Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols – HDLC – PPP – Media Access Control – Wired LANs: Ethernet – Wireless LANs – Introduction – IEEE 802.11, Bluetooth – Connecting Devices.

NETWORK LAYER

Network Layer Services – Packet switching – Performance – IPV4 Addresses – Forwarding of IP Packets – Network Layer Protocols: IP, ICMP v4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6 Protocol.

TRANSPORT LAYER

Overview of Transport layer - UDP - Reliable byte stream (TCP) - Connection management - Flow control - Retransmission – TCP Congestion control - Congestion avoidance (DECbit, RED) – QoS – Application requirements.

APPLICATION LAYER

Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS – SNMP.

LIST OF EXPERIMENTS.

1. Implementation of Stop and Wait Protocol and Sliding Window Protocol.
2. Study of Socket Programming and Client – Server model
3. Write a code simulating ARP /RARP protocols.
4. Write a code simulating PING and TRACEROUTE commands
5. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
6. Simple Tcp/Ip Client Server Communication
7. UDP Echo Client Server Communication
8. Half Duplex Chat Using TCP/IP
9. Full Duplex Chat Using TCP/IP
10. Simulation of Distance Vector/ Link State Routing algorithm.
11. Performance evaluation of Routing protocols using Simulation tool.
12. Simulation of error correction code (like CRC).

TEXT BOOKS:

1. Behrouz A. Foruzan, “Data communication and Networking”, Seventh Edition, Tata McGraw-Hill, 2017.
2. Andrew S. Tannenbaum, David J. Wetherall “Computer Networks”, Pearson Education, Eighth Edition, 2016.

REFERENCES:

1. William Stallings, “Data and Computer Communication”, Eighth Edition, Pearson Education.
2. Knuth,D.E., “Computer Communication and Networks”, Sixth Edition , McGrath-Hill, 2016.

COURSE DESIGNERS

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35021C13	SOFTWARE ENGINEERING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:

course aims at introducing to the students about the product that is to be engineered and the process that es a framework for the engineering technology. The course facilitates the students to analyze risk in software and quality and to plan, design, develop and validate the software project.

EQUISITE:NIL

RSE OBJECTIVES

	aware of generic models to structure the software development process.
	rstand fundamental concepts of requirements engineering and requirements specification.
	rstand different notion of complexity at both the module and system level.
	aware of some widely known design methods.
	rstand the role and contents of testing activities in different life cycle phases.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the process model for a software project Development.	Understand
CO2. Prepare the SRS, Life Cycle Models for given problem.	Apply
CO3. Apply Design document, Project plan of a given software system, Project Management and Requirement analysis, Principles to S/W project development.	Understand
CO4. Analyze the cost estimate and problem complexity using various estimation techniques.	Understand
CO5. Generate test cases using the techniques involved in selecting: (a) White Box testing (b) Block Box testing.	Apply
CO6. Analyze the advantages of Design Process, configuration management and risk management activities	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	L	-	-	-	-	-	L	-	L	S	L	L
CO2	S	M	M	-	-	M	M	L	-	L	-	-	S	L	L
CO3	S	S	M	L	-	M	M	L	-	-	L	-	S	L	-
CO4	S	S	M	L	L	L	M	M	M	M	L	L	S	S	-
CO5	S	M	M	M	M	L	M	M	L	M	M	M	S	S	L

S- Strong; M-Medium; L-Low

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SYLLABUS

SOFTWARE

Introduction – The Evolving Role of Software– Software Characteristics– Software Applications– Software Engineering: A Layered Technology–S/W Engineering paradigm -SDLC– Software Process.

LIFE CYCLE MODELS

Linear Sequential Model- Prototyping Model-RAD Model-Evolutionary Software Process Models-Component Based Development - Project Planning Objectives – Software Scope – Resources – Software Project Estimation – Empirical Estimation Models – Make/Buy Decision-Functional and Non Functional requirements –software requirement specification (SRS) – Requirement Engineering process-Feasibility studies.

ANALYSIS MODELING AND DESIGN CONCEPTS

Data Modeling – Data Flow Diagrams – Behavioral Modeling – The Mechanics of Structured Analysis – The Data Dictionary – Software Design and Software Engineering – The Design Process – Design Principles – Design Concepts – Effective Modular Design – Design Heuristics for effective Modularity – The Design Model – Design Documentation.

REQUIREMENT ENGINEERING TASKS

Requirements Management, Structured coding Techniques-Coding Styles-Standards and Guidelines-Software testing Fundamentals-Types of testing - Quality Concepts – Quality Movement - Software Quality Assurance – Software Reviews — Formal Approaches to SQA - Software Reliability – ISO 9000 Quality Standards – SQA Plan.

SOFTWARE CONFIGURATION MANAGEMENT

Introduction about software configuration management – the SCM process –identification of objects in the software configuration – version control – change control – configuration audit – status reporting – SCM standards –software Documentation-seven rules for sound documentation..

TEXT BOOKS:

1. Roger S. Pressman, "Software Engineering – A practitioner's Approach", Seventh Edition, McGraw- Hill International Edition, 2010.
2. Ian sommerville ," Software Engineering ", Seventh Edition, Pearson Education Asia, 2017.
3. Mary Shaw, David Garlan,"Software Architecture- a perspectives on an Emerging Discipline

REFERENCES:

1. WattsS.Humphrey,"A Discipline for Software Engineering", Pearson Education, 2007.
2. James F.Peters and WitoldPedrycz,"Software Engineering, An Engineering Approach", Riley-India, 2007

RSE DESIGNERS

	of the Faculty	Designation	Department	Email Id
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35021C16	JAVA PROGRAMMING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course of study builds on the skills gained by students in Java Fundamentals and helps to advance Java programming skills. Students will design object-oriented applications with Java and will create Java programs using hands- on, engaging activities.

PREREQUISITE

NIL

COURSEOBJECTIVES

1	Understand fundamentals of programming such as variables,conditional and iterative execution,methods,etc.
2	Understand fundamentals of object-oriented programming in Java, including defining classes,invoking methods, Using class libraries,etc.
3	Be aware of the important topics and principles of software development.
4	Understand Event Handling and Swing Components.
5	Understand Generic Programming.

COURSEOUTCOMES

On successful completion of the course ,students will be able to

CO1.Knowledge of the structure and model of the Java programming language	Knowledge
CO2.Use the Java programming language for various programming technologies	Understand
CO3.Develop software in the Java programming language	Apply
CO4.Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements	Analyse
CO5.Choose an engineering approach to solving problems,Starting from the acquired knowledge of programming and knowledge of operating systems.	Evaluation

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S			S	S	M	S				S	S			
CO2	S		S		S			S	L	L		L			
CO3	S		M	L	S	M					L	L			
CO4	S		S	M	S		S				S	M			
CO5	S		S	M	S		M				S	M			

S-Strong;M-Medium;L-Low

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SYLLABUS

BASICS OF JAVA

Object oriented programming concepts – objects – classes – methods and messages – abstraction and encapsulation –inheritance–abstract classes–polymorphism.-ObjectsandclassesinJava–defining classes–methods-access specifiers–static members –constructors–finalize method.

ARRAYS, OPERATORS, STRINGS &OBJECTS

Arrays - Operators: Arithmetic Operators, The Bit wise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements–Strings-Packages–Java-Doc comments–-Inheritance–class hierarchy–polymorphism–dynamic binding–final keyword–abstract classes- The Object class–Reflection–interfaces–object cloning–inner classes–proxies.

EVENTS & GRAPHICS PROGRAMMING

I/Streams- Filter and pipe streams– Byte Code interpretation- Basics of event handling – event handlers–adapter classes–actions–mouse events–AWTeventhierarchy–Graphics programming–Frame–Components–workingwith2Dshapes.

SWING & GENERIC PROGRAMMING, APPLETS

Introduction to Swing – Model-View-Controller design pattern – buttons – layout management – Swing Components –exception handling – exception hierarchy – throwing and catching exceptions - Motivation for generic programming –generic classes–generic methods–genericcodeandvirtualmachine–inheritanceandgenerics–reflectionandgenerics.

Applets and HTML- Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet.

THREADS & SOCKET PROGRAMMING

Multi-threaded programming–interrupting threads–thread states–thread properties–thread synchronization–Executors–synchronizes–Socket Programming–UDP Datagram–IntroductiontoJavaBeans.

TEXTBOOKS:

1. CayS.HorstmannandGaryCornell,"CoreJava:VolumeI–Fundamentals",Ninth Edition, Sun MicrosystemsPress,2013.
2. ElliotteRustyHarold,"JavaNetworkProgramming",O"Reillypublishers,2000(UNITII).
3. EdRoman,"MasteringEnterpriseJavaBeans",JohnWiley&SonsInc.,1999(UNITIIIandUNITV).

REFERENCES:

1. K.ArnoldandJ.Gosling,"TheJAVAprogramminglanguage",Thirdedition,PearsonEducation,2008.
2. TimothyBudd,"Understanding Object-orientedprogrammingwithJava",UpdatedEdition,PearsonEducation,2000.
3. C.ThomasWu,"AnintroductiontoObject-orientedprogrammingwithJava",FourthEdition,TataMcGraw-HillPublishingcompanyLtd.,2006.

COURSEDESIGNERS

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35021C20	WEB TECHNOLOGY (THEORY AND PRACTICALS)	Category	L	T	P	Credit
		CC	3	0	2	4

PREAMBLE:

This course aims at introducing to the students about to provide the web concepts and enable the student to create simple Web based applications and to create an overview of 3-tier architecture and enable the student to create enterprise applications

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To create simple Web pages and provide client side validation
2	To create dynamic web pages using server side scripting
3	To design and create user interfaces using JSP
4	To write the business logic for the middle tier
5	To provide transaction and security support for enterprise applications

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the basic concepts of network and web page	Understand
CO2.Learn the concepts of scripting and developing the webpage.	Apply
CO3. Apply the concept of JSP .	Apply
CO4. Apply and develop the application using the concept of ASP	Apply, Analyze
CO5.Develop the web page by using all the application.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	M	-	-	-	-	-	L	L	M	M	M
CO2	M	M	M	M	S	M	-	-	-	-	M	L	M	M	M
CO3	M	M	S	S	S	M	-	-	-	-	M	L	S	M	M
CO4	S	M	M	S	S	M	-	-	-	-	M	L	S	M	S
CO5	S	M	M	S	M	M	-	-	-	-	M	L	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I - INTRODUCTION TO NETWORKS AND WEB CONCEPTS

History of the Internet and World Wide Web – Internet standards –URLs - CGI – HTML 4 protocols – HTTP, SMTP, POP3, MIME, and IMAP - Introduction to SGML – HTML – forms – frames – tables

UNIT II- DYNAMIC HTML & JAVASCRIPT

Dynamic HTML – introduction – cascading style sheets – JavaScript introduction – control structures – functions – arrays –

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objects – simple web applications, object model and collections – event model – filters and transition – data binding – data control.

Exercise: Home page Development static pages (using Only HTML) of an online Book store.

UNIT III- DATABASE & XML

Database Connectivity – JDBC Drivers – SQL Statements - XML – Structure in Data – Default Namespaces – DTD – XSD– Parsing XML.

Exercise : Programs using XML – Schema – XSLT/XSL.

UNIT IV -ASP & Session Tracking

ASP – Working of ASP – Objects – File System Objects – ADO – Access a Database from ASP – Server side Active-X Components – HTTP GET and POST requests – session tracking – cookies.

Exercise: Programs using DOM and SAX parsers.

UNIT V- SERVLETS AND JSP

Introduction – Servlet – Architecture – Lifecycle– Generic Servlet & HTTP Servlet - JSP – Overview – Objects – scripting – Standard Actions – Directives.

Exercise : implement the web applications using (a) Servlets and (b) JSP

TEXT BOOKS:

1. Deitel & Deitel, Goldberg, "Internet and World Wide Web – How to Program", Fifth edition, Pearson Education Asia, 2017.

2. Uttam K.Roy, "Web Technologies", OXFORD University Press – 2010

REFERENCES:

1. Behrouz A. Forouzan ,"TCP/IP Protocol Suite", Tata McGraw-Hill ,4th Edition,2010
2. Jeffrey C.Jackson, "Web Technologies–A Computer Science Perspective", Pearson Education, 2008.
3. Robert. W. Sebesta, "Programming the World Wide Web", Seventh Edition, Pearson Education, 2019.
4. R. Krishnamoorthy & S. Prabhu, "Internet and Java Programming", New Age International Publishers, 2004.
5. Thomno A. Powell, "The Complete Reference HTML and XHTML", fourth edition, Tata McGraw Hill, 2003.

COURSE DESIGNERS

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35021C07	ARTIFICIAL INTELLIGENCE	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to lean about Artificial Intelligence. This syllabus contains intelligent agent, Knowledge Representation and Machine learning, and application. Which is useful to how represent knowledge and in machine learning contain some important prediction method. Thus, this syllabus focuses on to know about AI and its concepts, application.

PREREQUISITE:NIL

COURSE OBJECTIVES

1.	To identify the kind of problems that can be solved using AI technique: to know the relation between AI and other areas of computer science.
2.	To have knowledge of generic problem-solving methods in AI..
3.	TO Design software agents to solve a problem.
4.	Apply the knowledge of algorithms to solve arithmetic problems.
5.	Assemble an efficient code for engineering problems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1:. Identify the different agent and its types to solve the problems	Understand
CO2: know about the problem solving technique in Artificial Intelligence.	Apply
CO3: Construct the normal form and represent the knowledge.	Apply
CO4: to know about extension of condition probability and how to apply in the real time environment.	Apply
CO5: to lean about Information Retrieval and Speech Recognition	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M		L					L	L	L	**L**		
CO2	M	M	L	L	L					M		L		L	S
CO3	M	M	L	L		M				L				M	
CO4	M	S	L			L				L		M	**M**		M
CO5	M	L				M				M	M	L	**S**		

S- Strong; M-Medium; L-Low

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UNIT - I	INTRODUCTION
Introduction-Definition-History of Artificial Intelligence-Intelligent Agents-Types Of Agents- simplex reflex agent, model based agent, utilized based agent, learning agent, agent environments.	
UNIT - II	**PROBLEM SOLVING**
Problem Solving Methods-Search Strategies-Uninformed Search Strategies-Comparison of Uninformed Search Algorithms-Informed Search Strategies-Local Search Algorithms-Searching With Partial Information-Constraint Satisfaction Problem	
UNIT - III	**KNOWLEDGE REPRESENTATION**
Propositional Logic-First Order Predicate Logic-Prolog Programming-Unification-Forward Chaining-Backward Chaining-Ontological Engineering-Categories and Objects-Events-Mental Events and Mental Objects.	
UNIT - IV	**MACHINE LEARNING**
Conditional Probability-Joint probability, Prior Probability- Bayes Rule and Its Applications-Bayesian Networks-Inferences in Bayesian Networks- Morkov chain, Hidden Markov Models- Learning from Observation-Supervised Learning.	
UNIT - V	**APPLICATION**
AI Applications-Language Models-Information Retrieval-Information Extraction-Natural Language Processing-Machine Translation-Speech Recognition	

TEXT BOOKS

1. S. Russell and P. Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2020
2. Bratko, I., Prolog Programming For Artificial Intelligence (International Computer Science Series), Addison-Wesley Educational Publishers Inc; 4th Edition, 2012..

REFERENCES

1.David Poole, Alan Mackworth, Randy Goebel,"Computational Intelligence: A Logical Approach", Oxford University Press, 2004.
2. G. Luger, "Artificial Intelligence: Structures and Strategies For Complex Problem Solving", Sixth Edition, Pearson Education, 2009.
3. J. Nilsson, "Artificial Intelligence: A New Synthesis", Elsevier Publishers, 2011.

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35021C03	PROBLEM SOLVING USING COMPUTER	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course is designed to introduce basic problem solving and program design skills that are used to create computer programs. It gives engineering students an introduction to programming and developing analytical skills to use in their subsequent course work and professional development. This course focuses on problem solving, algorithm development, top-down design, modular programming, debugging and testing using the programming constructs like flow-control, looping, iteration and recursion. It presents several techniques using computers to solve problems, including the use of program design strategies and tools, common algorithms used in computer program and elementary programming techniques.

PRERQUISITE

Nil

COURSE OBJECTIVES

1.	To understand the basic concepts of problem solving methodology.
2.	To study and apply algorithm design.
3.	To study and apply programming and developing skills.
4.	To understood, analyze and evaluate the problem.
5.	To apply, analyze, evaluate and solve the problem by using programming concepts.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Comprehend the role of computing and use of programming concepts in developing engineering solutions.	Understand
CO2. Develop algorithms to solve fundamental mathematical problems, merging, sorting and searching.	Apply
CO3. Develop algorithms for text processing and pattern searching	Analyze
CO4. Analyze a problem, identify the data in the problem, divide a problem into parts, solve individual parts using proper control structures and compose into an overall solution	Evaluate
CO5. Design algorithmic solutions to problems drawn from engineering contexts and implement using any structured programming language	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction to problem solving with computers - Computing Systems:

Hardware and Software – Engineering Problem Solving Methodology: problem specification and analysis, algorithm design, flowchart, implementation, program testing and verification.

Algorithm Design: Fundamental algorithms:

Swapping of two variables – counting – summation of set of numbers – factorial – Fibonacci sequence – base conversion Factoring Techniques: smallest divisor of an integer – greatest common divisor – generating prime number – generating prime factor

Merging, Sorting and Searching Techniques:

Two way merge – sorting by selection sort – sorting by exchange – sorting by insertion – linear search

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– binary search Array techniques: Array order reversal – Statistical measurement - array counting - array Partitioning Text Processing and Pattern Searching: Key word search – text line editing –linear pattern search.

Programming Concepts:

Basics of programming -Constant, variable, keywords, data types - Operators, operator precedence, expressions - Control Structures: Selection structure- Repetition Structure.

Modular Programming and Functions:

User defined functions- Recursive functions Array Handling: 1-D, 2-D: declaration – initialization, Using arrays as function arguments- Strings Pointers: Basics of Pointers - Arrays and Pointers - Pointers and Functions - Structures and Union - File Handling.

TEXT BOOK:

1. R. G. Dromey, "How to solve it by Computer", Pearson Education India,2014

REFERENCES:

1. Maureen Sprankle, Jim Hubbard, "Problem Solving & Programming Concepts",
2. Prentice Hall, 2012
3. Jeri R. Hanly - Elliot B. Koffman, "Problem Solving and Program Design in C", 7th Edition, Pearson, 2013
4. Delores M. Etter, "Engineering Problem Solving with C", Pearson, 4th Edition, 2013.
5. Donald E. Knuth, "Art of Computer Programming", Pearson Education, 2012.
6. Yashavant Kanetkar, "Let us C", 8th Edition, BPB Publications, 2007.

COURSE DESIGNERS

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35021C85	ARTIFICIAL INTELLIGENCE LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

To gain programming knowledge in Artificial Intelligence

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	The aim of Artificial Intelligence is to prepare students for career in computer science & engineering where knowledge of AI techniques leading to the advancement of research and technology.
2.	Artificial Intelligence is the terms of computer science.
3.	AI is the learning in which machine can learn by its own without being explicitly programmed. It is an application of AI that provide system the ability to automatically learn and improve from experience.
4.	AI is the learning in which machine can learn by its own without being explicitly programmed.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Apply breadth first, depth first and best first search technique for problems like 8-puzzle,8-queens,Travelling salesperson and water jug problems etc.	Apply
CO2. Apply hill climbing, A* algorithm and randomized search techniques for gaming applications.	Apply
CO3. Apply to develop the solutions for combinatorial problems using intelligent optimization algorithms like Simulated Annealing, Genetic Algorithm, Particle Swarm Optimization.	Apply
CO4. Construct rule based systems for any application using logic programming language.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	S	M	L											M
CO2.	S	S	M	M	L										M
CO3.	S	S	M	L											M
CO4.	S	S	M	L											M

S- Strong; M-Medium; L-Low

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SYLLABUS

LIST OF EXPERIMENTS:

1. Implement Breadth First Search (for 8 puzzle problem or Water jug problem or any AI search problem)
2. Implement Depth First Search (for 8-queen problem or 8 puzzle problem or Water jug problem or any AI search problem)
3. Solve travelling salesperson problem using Best First Search
4. Implement Hill climbing algorithm
5. Apply any one randomized search technique (Simulated annealing, Genetic Algorithms, Particle swarm optimization) for solving problems like, TSP, Graph coloring, Vertex cover problem, shortest path problems, etc.
6. Write a program to generate the output for A* algorithm.
7. Write a program to show the Tic Tac Toe game for 0 and X
8. Solve the crossword puzzle problem as constraint satisfaction problem
9. Implement anyone Propositional calculus related problem
10. Develop any rule based system for an application of your choice.
11. Generate, view and access decision tree and rules.
12. Implement a k-means clustering algorithm for any given data set.

TEXT BOOKS

1. S. Russell and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education, 2015

Bratko, I., Prolog Programming For Artificial Intelligence (International Computer Science Series), Addison-Wesley Educational Publishers Inc; 4th Edition, 2011..

REFERENCES

1.David Poole, Alan Mackworth, Randy Goebel,"Computational Intelligence: A Logical Approach", Oxford University Press, 2004.

2. G. Luger, "Artificial Intelligence: Structures and Strategies For Complex Problem Solving", Fourth Edition, Pearson Education, 2002.

3. J. Nilsson, "Artificial Intelligence: A New Synthesis", Elsevier Publishers, 1998.

COURSE DESIGNERS

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35021C83	DATABASE MANAGEMENT SYSTEMS LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This course aims at facilitating the student to apply the effective designing of relational database for real-world applications, perform many operations related to creating, manipulating and maintaining databases using DBMS tools and manipulate data using other languages through ODBC and JDBC.

PREREQUISITE: Nil

COURSE OBJECTIVES

1.	To demonstrate the basic fundamentals of Structured Query Language (SQL).
2.	To employ the conceptual and relational models to design large database systems.
3.	To design and build database system for a given real world problems

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1	On the successful completion of the course, students will be able to Build and manipulate relational databases using simple and complex queries in Structured Query Language.	Apply
CO2	Develop normalized and demoralized databases for a given application using various constraints like integrity and value constraints.	Apply
CO3	Construct and make use of database objects such as indices, sequences, synonyms using Structured Query Language.	Analysis
CO4	Develop objects using PL/SQL and manipulate databases through these objects	Analysis
CO5	Construct and make use of composite data types using PL/SQL (CO5) Develop a complete database application in a high level language using Java Database Connectivity.	Analysis

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	M	M	M	M							M	M
CO2	M	M	M	M							M	M
CO3	M	M	M	M							M	M
CO4	S	M	M	M							M	S
CO5	S	M	M	M							M	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. To write a query in Data Definition Language (DDL) commands in DBMS
2. To write a query in Data Manipulation Language (DML) commands in DBMS

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3. To write a query in Data Control Language (DCL) and Transfer Control Language (TCL) Commands in DBMS
4. To write a query in Inbuilt functions of SQL in DBMS
5. To write a query in Join operations and Set operations in DBMS
6. To write a query to illustrate the creation of Cursor
7. To write a query to illustrate the creation of Triggers
8. To write a query to illustrate the creation of Procedures and Functions
9. To write a query for Database design using Normalization functions
10. To design and implementation of a database application for Payroll Management System
11. To design and implementation of a database application for Report Generation
12. To design and implementation of a database application for Student Management System

References:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Fourth Edition, Tata McGraw Hill, 2012.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Addision weskey, 2002.
3. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill, 2002.
4. Peter Rob and Corlos Coronel, "Database Systems – Design, Implementation and Management, Fifth Edition, Thompson Learning, Course Technology, 2003.

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35021C84	OBJECT ORIENTED PROGRAMMING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

With a dynamic learn-by-doing focus, this laboratory course encourages students to understand the use of object oriented way of problem solving. This course challenges students to exercise their creativity in both programming and analysis.

PRERQUISITE: NIL

COURSE OBJECTIVES

1.	To be capable of explaining procedure as well as object oriented programming concepts & their differences.
2.	To be able to implement inline and friend function very well.
3.	To be familiar with how to make programs using function overloading & operator overloading
4.	To get the capability to implement the different types of inheritance & done problems related to them

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Construct object-oriented programs for a given scenario using the concepts of abstraction, encapsulation, message-passing and modularity.	Analysis
CO2. Develop object-oriented programs for a given application using the concepts of compile-time and run-time polymorphism.	Apply
CO3. Construct object-oriented programs for a given application by demonstrating the inter-relationship between classes using inheritance and aggregation.	Apply
CO4. Develop object-oriented applications that can handle exceptions..	Apply
CO5. Construct object-oriented applications for a given scenario to persist data using files and object-serialization.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	M	M	M	M	S	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	M	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	S	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	M	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	M	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

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1. Write a program to illustrate function overloading feature

2. Write a program to illustrate the overloading of various operators Ex. Binary operators, Unary operators, New and Delete operators.
3. Write a program to illustrate the use of following functions: a) Friend functions b) Inline functions c) Static Member functions d) Function with default arguments
4. Write a program to illustrate the use of destructor and the various types of constructors (no arguments, constructor, constructor with arguments, copy constructor etc).
5. Write a program to illustrate the various forms of inheritance: Ex. Single, Multiple, multilevel, hierarchical inheritance etc.
6. Write a program having student as on abstract class and create many derived classes such as Engg. Science, Medical, etc. from student's class. Create their objects and process them.
7. Write a program to illustrate the use of virtual functions.
8. Write a program to illustrate the use of virtual base class.
9. Write a program to illustrate file handling operations: Ex. a) Copying a text files b) Displaying the contents of the file etc.
10. Write a program to illustrate how exceptions are handled (ex: division-by-zero, overflow and underflow in stack etc).

REFERENCES:

1. H.M. Deitel and P.J. Deitel, C How to program Introducing C++ and Java, Fourth Edition, Pearson Prentice Hall, 2010.
2. B. Stroustrup, "The C++ Programming language", Third edition, Pearson Education, 2004.
3. B. Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.
4. K. R. Venugopal, Rajkumar, T. Ra vishankar, Mastering C++, 4th Edition, Tata McGraw 2. Hill, 2008.
5. Budd T., An Introduction to Object-oriented Programming, Addison-Wesley 3rd 4. edition, 2008.
6. Bjarne stroustrup, The C++ programming Language, Addison Wesley, 3rd edition2008.
7. Harvey M. Deitel and Paul J. Deitel, C++ How to Program, 7th edition, Prentice Hall, 2010.
8. Tony Gaddis, Starting Out with Java: From Control Structures through Objects, 4/E, Addison-Wesley, 2009.

COURSE DESIGNERS

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35021C88	JAVA PROGRAMMING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

The goal of this course is to provide students with the ability to write programs in Java and apply concepts described in the Object-Oriented Programming course. The course is designed to accommodate students with diverse programming backgrounds, consequently Java is taught from first principles in a practical class setting were students can work at their own pace from a course handbook. Each practical class will culminate in an assessed exercise.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2.	Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
3.	Understand the principles of inheritance, packages and interfaces.

COURSE OUTCOMES

On successful completion of the course, students will be able to

CO1. Understand Java programs that solve simple business problems.	Understand, Apply
CO2. Understand the Validate user input.	Analyze
CO3. Construct a Java class based on a UML class diagram.	Apply
CO4. Perform a test plan to validate a Java program.	Apply
CO5. Document a Java program.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	S	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	S	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	S	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	M	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

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LIST OF EXPERIMENTS.

1. Write a JAVA program to search the largest element from the given array.
2. Write a JAVA program to sort the strings in an alphabetical order.
3. Write a JAVA program to extract a portion of a character string and to print the extracted portion and the remaining portion of the string. Assume that m characters are extracted, starting with the nth character.
4. Write a JAVA program for illustrating overloading and overriding methods in JAVA.
5. Write a JAVA program which illustrates the implementation of multiple inheritance using interfaces in JAVA.
6. Write a JAVA program to create your package for basic mathematical operations such as add, subtract, multiply. Demonstrate the use of this package in another class.
7. Write a JAVA program that counts the number of digits in a given number. If an alphabet is entered instead of a number, the program should not terminate. Instead it should display appropriate error message. (Exception Handling).
8. Write a JAVA program to move the text "JAVA PROGRAMMING LAB" diagonally using Applet.
9. Write a JAVA program to create an Applet with a label "Do you know car driving?" and two buttons Yes, NO.
   When the user clicks "Yes" button, the message "Congrats" must be displayed. When the user clicks "NO "button, "Regrets" must be displayed.
10. Write a JAVA program to animate the face image using Applet.
11. Write a JAVA program to create four Text fields for the name, street, city and pin code with suitable Labels. Also add a button called "My Details". When you click the button, your name, street, city, and pin code must appear in the Text fields.

References:

1. TimothyBudd,"Understanding Object-orientedprogrammingwithJava",UpdatedEdition,PearsonEducation,2000.
2. Java Lab Manual by Asif Munir - November 2018

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35021C82	DATA STRUCTURES LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This laboratory enables the students clearly understand the concepts of data structures. Also students can implement the searching and sorting algorithms.

PRERQUISITE

NIL

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Develop algorithms for the concepts of data structures.	Apply
CO2. Able to Apply searching and sorting techniques	Apply
CO3. Construct implementations for Abstract Data Types (ADT) using appropriate Data Structures	Apply
CO4. Assess the suitability of a data structure to solve a problem, based on the time and space complexities of different operations on the data structure	Analyze
CO5. Implement algorithms which use sorting, searching and/or selection as sub-procedures.(CO5)	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS:

1. Exercises using Objects, Classes, Inheritance
2. Operator Overloading and Polymorphism
3. Array implementation of List Abstract Data Type (ADT)
4. Linked list implementation of List ADT
5. Cursor implementation of List ADT
6. Array implementations of Stack ADT
7. Linked list implementations of Stack ADT
8. Queue ADT
9. Search Tree ADT - Binary Search Tree
10. Heap Sort
11. Quick Sort

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REFERENCES:

1. Laboratory Reference Manual.
2. Balaguruswami. E, “Programming in C”, TMH Publications, 1997
3. Gottfried, “Programming with C”, schaums outline series, TMH publications, 1997.
4. Mahapatra , “Thinking in C”, PHI publications, 2nd Edition, 1998.
5. Subbura.R , “Programming in C”, Vikas publishing, 1st Edition, 2000.

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35021C14	ADVANCED JAVA PROGRAMMING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To understand the concepts of object-oriented, networking, multi-tier and enterprise application and develop skills in using these paradigms using Advanced Java.

PREREQUISITE

Java Programming

COURSE OBJECTIVES

1.	This module aims to introduce the students to some concepts of advanced programming and practice on reusing components.
2.	It focuses on Graphical User Interface (GUI), multithreading, networking, and database manipulation.
3.	A selected programming language is used such as Java.
4.	By completing this module, the students should be able to write sophisticated Java applications.
5.	Understand Generic Programming

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand some advanced programming concepts. Deal with complex data objects as whole entities, rather than by twiddling with their elements	Understand
CO2. Analyze a problem and determine what problem elements to represent as functions or objects	Analyze
CO3. Write the simplest possible program that solves a given problem while explaining to the reader how it solves that problem	Apply
CO4. Effectively use parameterization and inheritance to promote reuse - Develop programs with networking and multithreading	Apply
CO5. Compose more complex programs from simpler parts - Write programs that implement GUIs	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	M	M	-	-	-	-	-	-	-	S	M	M
CO2	S	S	M	M	M	-	-	-	-	-	-	-	S	M	M
CO3	S	S	S		L	-	-	-	-	-	-	-	S	-	M
CO4	S	M	M		L	-	-	-	-	-	-	-	S	M	S
CO5	S	S	M	M	L	-	-	-	-	-	-	-	S	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS

JAVA FUNDAMENTALS

Java I/O streaming – filter and pipe streams – Reflection — Threading – Java Native Interfaces- Swing - Collections Framework: Enumerations - Stack - Queue – Sets – Maps - Utility Classes.

NETWORK PROGRAMMING IN JAVA

Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application– Java Messaging services.

APPLICATIONS IN DISTRIBUTED ENVIRONMENT

Remote method Invocation – activation models – RMI custom sockets – Object Serialization – RMI –IIOP implementation – CORBA – IDL technology – Naming Services – CORBA programming Models -JAR file creation.

MULTI-TIER APPLICATION DEVELOPMENT

Server side programming – servlets - The Servlet API - Servlet Package-Handling HTTP Request and Response- – Java Server Pages -Scripting Elements - JSP Directives - JSP Action - JSP Implicit Objects - JSP Expression Language – JDBC.

ENTERPRISE APPLICATIONS & FRAME WORKS

Server Side Component Architecture – Introduction to J2EE – Session Beans – Entity Beans – Persistent Entity Beans – Transactions- Struts – Spring - Hibernate.

TEXT BOOK

1. Elliotte Rusty Harold, " Java Network Programming", O"Reilly publishers, 2000 (UNIT II).
2. Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc., 1999. (UNIT III and UNIT V).
3. ortsmann& Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", Pearson Education, 2002. (UNIT I and UNIT IV).

REFERENCE BOOKS

2. Web reference: http://java.sun.com.
3. Patrick Naughton, "COMPLETE REFERENCE: JAVA2", Tata McGraw-Hill, 2003.

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35021C86	ADVANCED JAVA PROGRAMMING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

To gain advanced & recent trends programming knowledge in java program.

PREREQUISITE Java programming lab

COURSE OBJECTIVES

1.	To make effective use of Java generic types.
2.	To write multi-threaded Java applications, servlets & JSP
3.	To communicate between processes using network sockets.
4.	To develop advanced HTML pages with the help of frames, scripting languages, and evolving technology like DHTML, XML.
5.	To design dynamic web pages using java script.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Design/Develop Program	Apply
CO2. Develop appropriate data model and database scheme	Apply
CO3.Identify major subsystems and interfaces	Evaluate
CO4.Validate design scheme and models	Evaluate
CO5. Resolve defects and revise and adapt existing code	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	M	M	M	M	S	-	-	-	-	-	-	-	M	M	S
CO2.	M	M	M	M	S	-	-	-	-	-	-	-	M	M	S
CO3.	M	M	S	M	M	-	-	-	-	-	-	-	M	M	M
CO4.	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S
CO5.	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

1.Write a Java Program to implement multithreading(three threads using single run method).
2. Write a Java Program to implement the calculator.
3. Write a Java Program to implement the URL.
4. Write a Java Program to implement the InetAddress.
5. Write a Java Program for Sending E-mail in Java.
6. Write a Java Program to implement Single Client-Server Communication.
7. Write a Java Program to implement the Login_Id Form using JDBC.
8. Write a Java Program to implement the SQL commands using JDBC.

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9. Write a Java Program to implement the JTrees.
10. Write a Java Program to implement the JTable.
11. Write a Java Program to create the table using JDBC.
12. Write a Java Program to implement Remote Method Invocation.

Text Books

1.Silberschatz, Galvin, and Gagne, "Operating System Concepts", Wiley India Pvt Ltd, 2014.
2.Hortsmann& Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", Pearson Education, 2002.

Reference Books

1.Web reference: http://java.sun.com.
2.Patrick Naughton, "COMPLETE REFERENCE: JAVA2", Tata McGraw-Hill, 2003.
3.Laboratory Reference Manual.

COURSE DESIGNERS

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35021C89	PYTHON FOR DATA SCIENCE LAB	Category	L	T	P	Credi
		CC	0	0	4	2

PREAMBLE

The goal of this course is to provide students with the ability to write programs in python for data manipulate and cleaning techniques using the popular data science library . The course is designed to accommodate stude with diverse programming background and can work at their own pace from a course handbook on how to usefunctions such as group by, merge, and pivot tables effectively.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To gain basic knowledge of Pandas, MatplotLib and NumPy Packages
2.	To produce Python code to statistically analyze a dataset.
3.	To Understand the principles of inheritance and overloading

COURSE OUTCOMES

On successful completion of the course, students will be able to

CO1. Understand and demonstrate the usage of built-in objects in Python.	Understand
CO2. Use Python data structures – lists, tuples, dictionaries	Apply
CO3. Read and write data from/to files in Python programs	Apply
CO4. Use Python packages and apply them to Data Analysis and Data Visualization projects.	Apply
CO5. Apply data science concepts and methods to solve problems in real-world contexts.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS
CO1	S	M	S	M	S	-	-	-	-	-	-	-	M	S	M
CO2	S	S	M	M	S	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	S	S	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	M	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

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LIST OF EXPERIMENTS:

1. Editing and executing Programs involving Flow Controls.
2. Editing and executing Programs involving Functions.
3. Program in String Manipulations
4. Creating and manipulating a Tuple
5. Creating and manipulating a List
6. Creating and manipulating a Dictionary
7. Object Creation and Usage
8. Program involving Inheritance
9. Program involving Overloading
10. Reading and Writing with Text Files and Binary Files
11. Combining and Merging Data Sets
12. Program involving Regular Expressions
13. Data Aggregation and GroupWise Operations

References:

1. Gowrishanker and Veena, “Introduction to Python Programming”, CRC Press,2019.
2. Python Crash Course, 2nd Edition, By Eric Matthes, May 2019
3. NumPy Essentials, By Leo Chin and Tanmay Dutta, April 2016
4. Joel Grus, “Data Science from scratch”, O'Reilly, 2015.
5. Wes Mc Kinney, “Python for Data Analysis”, O'Reilly Media, 2012.
6. Kenneth A. Lambert, (2011), “The Fundamentals of Python: First Programs”,Cengage Learnin
7. Jake Vanderplas. Python Data Science Handbook: Essential Tools forWorking with Data 1st Edition.

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35021C12	PROBLEM SOLVING USING PYTHON PROGRAMMING (THEORY AND PRACTICALS)	Category	L	T	P	Credit
		CC	3	0	2	4

PREAMBLE:

This course is designed to introduce basic problem solving and program design skills that are used to create computer Programs using python programming skills. It gives engineering students an introduction to python programming and developing analytical skills to use in their subsequent course work and professional development. It presents several techniques using computers to solve problems, including the use of program design strategies and tools, common algorithms used in computer program and elementary programming techniques.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To study algorithmic solutions to simple computational problems.
2.	To study programs using simple Python statements and expressions.
3.	To study an explain control flow and functions concept in Python for solving problems
4.	To study and use Python data structures – lists, tuples & dictionaries for representing compound data
5.	To study and explain files, exception, modules and packages in Python for solving problems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand and develop algorithmic solutions to simple computational problem.	Understand
CO2. Familiarize with the programming concepts in Python Programming Language	Understand
CO3. Understand and apply programming solutions related to Objects, Classesand Functions	Understand , Apply
CO4. Construct algorithms using design paradigms like divide and conquer, greedy and dynamic programming for a given problem.	Apply
CO5. Construct algorithms using Python for searching and sorting based problems	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	L	-	-	-	-	-	L	M	M	M
CO2	S	M	L	-	M	L	-	-	-	-	-	L	S	M	M
CO3	S	M	L	-	M	L	-	-	-	-	-	L	M	M	M
CO4	S	M	L	-	M	L	-	-	-	-	-	L	S	S	M
CO5	M	M	L	-	M	L	-	-	-	-	-	L	M	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION TO PROBLEM SOLVING WITH COMPUTING SYSTEMS:

Hardware and Software – Engineering Problem Solving Methodology: problem specification and analysis, algorithm design, flowchart, implementation, program testing and verification. Lab 1: find minimum in a list, Lab 2: insert a card in a list of sortedcards, guess an integer number in a range, Lab 3: Towers of Hanoi.

PROGRAMMING CONCEPTS:

Basics of Python programming -Constant, variable, keywords, data types - Operators, operator precedence, expressions - Control Structures: Selection structure- Repetition Structure, File Handling, Exception Handling. Lab 4. word count, Lab 5 File handling. Lab 6. Exception handling .

OBJECTS, CLASSES AND FUNCTIONS:

Object and Classes : Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes, Functions: Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Standard Modules in Python. Lab 7. Lambda functions, Lab 8. Functions Lab 9. User defined functions

ALGORITHM DESIGN: FUNDAMENTAL ALGORITHMS:

Swapping of two variables – counting – summation of set of numbers – factorial – Fibonacci sequence – base conversion Factoring Techniques: smallest divisor of an integer – greatest common divisor – generating prime number – generating prime factor. Lab 10. Exchange the values of two variables, Lab 11. Circulate the values of n variables, Lab 12. Distance between two points.

MERGING, SORTING AND SEARCHING TECHNIQUES:

Two way merge – sorting by selection sort – sorting by exchange – sorting by insertion – linear search – binary search Array techniques: Array order reversal – Statistical measurement - array counting - array Partitioning Text Processing and Pattern Searching: Key word search – text line editing –linear pattern search. Lab 7: square root, gcd, Lab 13 exponentiation, sum an array of numbers, Lab 14: linear search, binary search, Lab 15: selection sort, insertion sort mergesort.

TEXT BOOKS:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3,Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think- python/)
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, NetworkTheory Ltd., 2011.

REFERENCES:

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley IndiaEdition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press
, 2013
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.

COURSE DESIGNERS

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35021C19	THEORY OF COMPUTATION	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course helps the learners to know the models of computation, along with their variants in the context of formal languages and their recognizer. This can be applied in designing compilers and pattern recognition system

PREREQUISITE NIL

COURSE OBJECTIVES

1.	To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages
2.	To introduce the fundamental concepts of formal languages, grammars and automata theory
3.	Classify machines by their power to recognize languages
4.	Employ finite state machines to solve problems in computing
5.	To understand deterministic and non-deterministic machines.
6.	To understand the differences between decidability and un-decidability

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the concept of abstract machines and their power to recognize the languages	Understand
CO2: Distinguish between decidability and un-decidability	Understand
CO3: Gain proficiency with mathematical tools and formal methods	Understand
CO4: Employ finite state machines for modeling and solving computing problems	Apply
CO5: Design context free grammars for formal languages	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	S	M	-	M	-	-	-	-	-	M	S	M	-
CO2	-	S	M	-	M	-	-	-	-	-	M	**S**	M	-
CO3	-	-	M	-	S	-	-	-	-	-	M	**-**	M	-
CO4	S	M	M	-	M	-	-	-	-	M	M	**-**	M	S
CO5	-	S	M	-	M	-	-	-	-	-	M	M	-	-

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S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with €- moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA"s with and without €-moves – Equivalence of finite Automaton.

REGULAR EXPRESSIONS

Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Properties of Regular Languages Pumping Lemma for Regular Languages, Applications of the Pumping Lemma, Closure Properties of Regular Languages, Decision Properties of Regular Languages.

CONTEXT-FREE GRAMMARS:

Chomsky hierarchy of languages.Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Tress, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages. Push Down Automata,: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.

TURING MACHINES

Definitions of Turing machines – Models – Computable languages and functions –Techniques for Turing machine construction – Multi head and Multi tape Turing Machines – The Halting problem – Partial Solvability – Problems about Turing machine

UN-DECIDABILITY:

A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Post's Correspondence Problem, Other Undecidable Problems, Intractable Problems: The Classes P and NP, An NP Complete Problem

TEXT BOOKS

1. Introduction to Automata Theory, Languages, and Computation, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education, 3rd Edition.
2. Introduction to the Theory of Computation, Michael Sipser, Cengage Learning, 3rd Edition.

REFERENCES

1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson Education.
5. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.

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35021C81	COMPUTERPROGRAMMINGLAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This course is designedtocomplementthecourse Problem Solving using Computer.Thepurposeof this laboratorycourseistogivehandsontrainingtothestudentsinunderstandingandpracticingtheprogrammingconceptsandalgorithms.Thiswillimprovetheproblemsolvingcapabilityofthestudents.

PRERQUISITE: NIL

COURSEOUTCOMES

Onthesuccessfulcompletionofthecourse,studentswillbeableto

CO1Write,compile,debug,linkandexecuteCprogramforthegivenspecification/application	Apply
CO2.Designandimplementalgorithmsinvolvingdecisionstructures,loops,arraysandpointers.	Apply
CO3.Usedifferentdatastructuresforsolvingthegivenproblemusingcomputer	Apply
CO4.Create/updatedatafiles.	Apply
CO5.Analyzetheimplementationcomplexityofalgorithmbymodularizingtheproblemintosmallmodulesforthegivenproblem	Analyze

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	S	-	-	M	M	-	-	L	M	-	-
CO2	S	M	L	-	S	-	-	M	S	L	-	M	M	-	-
O3	S	M	L	-	S	-	-	M	S	L	-	M	M	-	-
CO4	S	M	L	-	S	-	-	M	S	-	-	-	M	-	M
CO5	S	S	M	-	S	-	-	M	S	L	-	M	M	-	M

S-Strong;M-Medium;L-Low

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LISTOFEXPERIMENTS

1. Basicprogramstounderstanddifferenttypesofdata,operatorsandexpressions.
2. Programsusingcontrolstructures
    i) Factorialofanumber
    ii) Fibonacciseries
    iii) Generatingprimenumbers
    iv) GeneratingArmstrongnumbers
    v) Greatestcommondivisor
3. Programsusingarrays
    i) Mergingofarrays
    ii) Arrayorderreversal
    iii) Selectionsort
    iv) Bubblesort
    v) Insertionsort
4. Programsusingstrings
    i) Palindromechecking
    ii) Stringsorting
    iii) Linearpatternsearch
    iv) Textlineediting
5. Programsusingfunctions
6. Programsusingpointers
7. Programsusingstructures
8. Programsusingfilestructure

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35021P03	BIG DATA AND ANALYTICS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This course covers foundational techniques and tools required for big data analytics. This course spotlights the concepts, principles, and techniques are applicable in big data analytics environment in industry and real-world experience.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To understand how big data analytics can leverage into a key component
2.	To understand the big data tools with their applications
3.	To understand the big data reports for the existing tools
4.	To understand the big data applications like MongoDB, Cassandra and Hive.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the basics of digital data and introduction to big data	Understand
CO2: Analyze the basic big data challenges, important and technologies.	Analyze
CO3: Solve big data analytics challenges with the help of Hadoop and MongoDB architecture and technologies.	Apply
CO4: Analyze big data storage like MongoDB, Cassandra and Hive.	Analyze
CO5: Analyze Pig and Hive in terms of processing and to design JasperReports.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

DIGITAL DATA AND INTRODUCTION TO BIG DATA

Types of Digital Data-Structured Data-Semi-Structured Data-Unstructured Data-Introduction to Big Data-What is Big Data–Characteristics of Big data-Why Big Data–Applications of Big data-Traditional Business Intelligence (BI)versus Big Data-Typical Hadoop Environment-Co existence of Big Data and Data Warehouse.

BIG DATA ANALYTICS

Big Data Analytic-Classification of Analytics with examples-Greatest Challenges that Prevent Businesses from Capitalizing on Big Data-Technologies for Meet the Challenges Posed by Big Data-Data Science-Data Scientist-Analytics Tools.

HADOOP

Introduction to Hadoop-Hadoop Components-Hadoop Conceptual Layer-High Level Architecture of Hadoop-Business Value of

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Hadoop–GFS-Hadoop Distributed File System-Processing Data with Hadoop-Map Reduce Daemons-Map Reduce working-Map Reduce Example-Managing Resources and Application with Hadoop YARN- Hadoop Ecosystem.

MONGODB, CASSANDRA AND HIVE

MongoDB- RDBMS and MongoDB-Data Types in MongoDB -CRUD- Introduction to Apache Cassandra-Features of Cassandra-CQL Data Types- CQLSH- Key spaces- CRUD- Collections -Using a Counter- Time To Live(TTL)-Alter-Import and Export-Export to CSV-Importfrom CSV-Import from STDIN-Export to STDOUT -System Tables- Practice Examples-Introduction to Hive-Hive Architecture-Hive Data Types-Hive File Format-Hive Query Language- RCFILE Implementation-SERDE-UDF.

PIG AND JASPER REPORTS

Anatomy of Pig-Pigon Hadoop- Pig Philosophy-Use Case for Pig:ETL Processing-Pig Latin Overview- Data Types in Pig-Running Pig-Execution Modes of Pig-HDFS Commands-Relational Operators- Eval Function-Complex Data Type-Piggy Bank-UDF(User Defined Function)-ParameterSubstitution-DiagnosticOperator-WordCountExample-WhentousePig?-When NOT to use Pig?-PigatYahoo-PigversusHive-HiveVsPig-IntroductiontoJasperReports,JaspersoftStudio-ConnectingtoMongoDBNoSQLdatabase-ConnectingtoCassandraNoSQLDatabases

TEXT BOOKS

1. BigDataandAnalytics-SeemaAcharyaandSubhashiniC-WileyIndia
2. Bigdatafordummies-JudithHurwitz,AlanNugent,FernHalper,MarciaKaufman
3. Hadoop:TheDefinitiveGuidebyTomWhite
4. Hadoopinaction-ChuckLam
5. Hadoopfordummies-DirkDeroos,PaulC.Zikopoulos,RomanB.Melnyk,BruceBrown

REFERENCES

1. FrankJOhlhorst,“BigDataAnalytics:TurningBigDataintoBigMoney”,WileyandSASBusinessSeries,2012.
2. ColleenMccue,“DataMiningandPredictiveAnalysis:IntelligenceGatheringandCrimeAnalysis”,Elsevier,2007
3. MichaelBerthold,DavidJ.Hand,IntelligentDataAnalysis,Springer,2007.
4. AnandRajaramanandJeffreyDavidUllman,MiningofMassiveDatasets,CambridgeUniversityPress,2012.

BillFranks,“TamingtheBigDataTidalWave:FindingOpportunitiesinHugeDataStreamswithAdvancedAnalytics”,WileyandSAS BusinessSeries,2012

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35021P17	ETHICAL HACKING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To analyze the basic concepts of security and hacking process

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand Technical foundation of cracking and ethical hacking
2	To identify Aspects of security, importance of data gathering, foot printing and system hacking
3	To understand evaluation of computer security
4	To understand Practical tasks will be used to re-enforce and apply theory to encourage an analytical and problem based approach to ethical hacking
5	To discuss about security tools and its applications

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Identify and analyse the stages an ethical hacker requires to take in order to compromise a target system.	Understand
CO2: Identify tools and techniques to carry out a penetration testing.	Understand
CO3: Critically analyze security techniques used to protect system and user data.	Apply
CO4: Demonstrate systematic understanding of the concepts of security at the level of policy and strategy in a computer system.	Apply
CO5: To apply information security features in real time	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	-	-	-	-	S	-	-	-	M	M	M	S	M
CO2	M	M	S	M	-	-	-	-	-	-	L	M	S	-	-
CO3	M	M	M	M	-	M	-	L	-	-	L	-	S	M	S
CO4	M	S	M	-	-	M	-	-	-	M	-	M	-	M	-
CO5	M	M	-	-	S	M	-	L	-	-	M	M	-	-	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Introduction to Hacking, Types of Hacking, Hacking Process, Security – Basics of Security- Elements of Security, Penetration Testing, Scanning, Exploitation- Web Based Exploitation. Simple encryption and decryption techniques implementation.

HACKING TECHNIQUES

Building the foundation for Ethical Hacking, Hacking Methodology, Social Engineering, Physical Security, Hacking Windows, Password Hacking, and Privacy Attacks, Hacking the Network, Hacking Operating Systems- Windows & Linux, Application Hacking, Footprinting, Scanning, and Enumeration. Implementing System Level Hacking- Hacking Windows & Linux.

WEB SECURITY

Evolution of Web applications, Web application security, Web Application Technologies- Web Hacking, Web functionality, How to block content on the Internet, Web pages through Email, Web Messengers, Unblocking applications, Injecting Code- Injecting into SQL, Attacking Application Logic. Check authentication mechanisms in simple web applications. Implementation of Web Data Extractor and Web site watcher. Implementation of SQL Injection attacks in ASP.NET.

WIRELESS NETWORK HACKING

Introduction to Wireless LAN Overview, Wireless Network Sniffing, Wireless Spoofing, Port Scanning using Netcat, Wireless Network Probing, Session Hijacking, Monitor Denial of Service (DoS) UDP flood attack, Man-in-the-Middle Attacks, War Driving, Wireless Security Best Practices, Software Tools, Cracking WEP, Cracking WPA & WPA-II. Implementation- Locate Unsecured Wireless using Net-Stumbler/ Mini-Stumbler.

APPLICATIONS

Safer tools and services, Firewalls, Filtering services, Firewall engineering, Secure communications over insecure networks, Case Study: Mobile Hacking- Bluetooth-3G network weaknesses, Case study: DNS Poisoning, Hacking Laws. Working with Trojans using NetBus.

TEXT BOOKS

1. Stuart McClure, Joel Scambray, George Kurtz, "Hacking Exposed 6: Network Security Secrets & Solutions", Seventh edition, McGraw-Hill Publisher, 2012.

2. Kevin Beaver, "Hacking for Dummies" Second Edition, Wiley Publishing, 2007.

3. Dafydd Stuttard and Marcus Pinto, "The Web Application Hacker's Handbook: Discovering and Exploiting Security Flaws" Wiley Publications, 2007.

4. Ankit Fadia, "An Unofficial Guide to Ethical Hacking" Second Edition, Macmillan publishers India Ltd, 2006.

REFERENCES

1. Hossein Bidgoli, "The Handbook of Information Security" John Wiley & Sons, Inc., 2005.

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35021P24	MOBILE COMPUTING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To learn the standards and issues in Mobile Computing.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To Learn wireless communication and cellular networks basics
2	To learn various protocols that support mobility at network layer and transport layer.
3	To learn protocols in Mobile Network and Transport Layer
4.	To study various mobile app development platforms and learn developing mobile applications.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Explain the basics of wireless transmission and signal processing	Understand
CO2: Understand the concept of Mobile cellular network	Understand
CO3: Understand the concept of wireless LAN network	Understand
CO4: Analyzing problems in designing mobile applications	Apply
CO5: Various mobile app development platforms and developing mobile applications.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	-	-	-	S	M	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	S	M	M	-
CO3	S	M	L	-	M	-	-	-	-	-	-	M	-	S	-
CO4	S	M	L	-	M	-	-	-	-	-	-	M	S	S	S
CO5	S	M	L	-	M	-	-	-	-	-	-	M	M	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Introduction – wireless transmission – radio propagation – signals and propagation – antennas – multiplexing and modulation – spectrum - Multiple Access Techniques: FDMA, TDMA, CDMA, OFDMA – Duplexing Techniques: FDD, TDD – Cellular Networks – Tessellation, Frequency Reuse and Handoff – Generations of Cellular Networks – 2G Systems.

MOBILITY SUPPORT IN IP AND TCP

Mobile IP – Mobile Agent, Foreign Agent, Care of Address, Registration, Advertisement and Discovery, Tunneling, IP within IP – Mobility Support in IPV6 – Mobility Header, Mobility Options, Dynamic Home Agent Address Discovery, Cache Management, Bidirectional Tunneling – TCP Over Wireless Networks – Indirect TCP –Snoop TCP – Mobile TCP.

WIRELESS LAN

Wireless LAN – IEEE 802.11 standards – HIPERLAN – Blue tooth technology and protocols. Wireless Local Loop technologies.

APPLICATION DESIGN

Aspects of Mobility – Middleware and Gateways – Mobile Devices and Profiles – Generic UI Development – Multimodal and Multichannel UI – Mobile Memory Management – Design Patterns for Limited Memory – Work Flow for Application Development – Techniques for Composing Applications – Dynamic Linking – Plug-ins and Rule of Thumb for Using DLLs – Concurrency and Resource Management – Look and Feel, Intents and Services – Storing and Retrieving Data – Communication via the Web – Notification and Alarms.

APPLICATION DEVELOPMENT

Google Android Platform – Eclipse Simulator – Android Application Architecture – Event Based Programming – Apple Iphone Platform – UI Tool Kit Interfaces – Cross Platform Design and Tools – Event Handling and Graphics Services – Layer Animation – Location Based Services – Resilient Programming Practices – Packaging and Deployment – Security And Hacking.

TEXT BOOKS

1. Jochen Schiller, "Mobile Communications", Addison Wesley, 2000.
2. C.Siva Ram Murthy and B.S Manoj "Ad hoc Wireless Networks", Pearson Education,2007.
3. Clint Smith, Daniel Collins, "Wireless Networks", Third Edition, McGraw Hill Publications, 2014.
4. Share Conder, Lauren Darcey, "Android Wireless Application Development", Volume I, Third Edition, Pearson, 2014.

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REFERENCES

1. Mobile Computing Principles-Reza B'Far-Cambridge University Press-2005.
2. Uyless Black, "Mobile and Wireless Networks", Prentice Hall , 1996.
3. Willian C.Y.Lee, Mobile Communication Design Fundamentals, John Wiley, 1993.
4. Zigurd Mednieks, Laird Dornin, G, Blake Meike and Masumi Nakamura, "Programming Android", O'Reilly, 2011
5. Alasdair Allan, "iPhone Programming", O'Reilly, 2010.
6. Donny Wals, "Mastering iOS 12 Programming", Packt, 2018.

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35021P01	UNIX INTERNALS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This talk is a brief guide to UNIX programming languages, tools and concepts. It is aimed at programming novices or programmers migrating from a Windows system. The aim is to introduce you to the concepts, the possibilities and the tools used in Unix programming.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand the design of the UNIX operating system
2	To become familiar with the various data structures used

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: To learn The basic Unix operating systems and its basic commands.	Understand
CO2: To analyze the buffers and kernel representation.	Analyze
CO3: To analyze the UNIX system structure, system calls.	Analyze
CO4: To understand UNIX segmentation, scheduling, paging.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3
CO1	S	M	L	L	M	-	-	-	-	-	-	M	S	M	M
CO2	S	M	L	L	M	-	-	-	-	-	-	M	S	M	M
CO3	S	M	L	-	L	-	-	-	-	-	-	M	S	M	M
CO4	S	M	L	L	M	-	-	-	-	-	-	M	S	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

General Review of the System-History-System structure-User Perspective-Operating System Services-Assumptions About Hardware. Introduction to the Kernel-Architecture System Concepts-Data Structures-System Administration

DISK BLOCKS

The Buffer Cache-Headers-Buffer Pool-Buffer Retrieval-Reading and Writing Disk Blocks - Advantages and Disadvantages. Internal Representation of Files-Inodes- Structure-Directories-Path Name to Inode- Super Block-Inode Assignment-Allocation of Disk Blocks -Other File Types

FILE SYSTEM

System Calls for the File System-Open-Read-Write-Lseek-Close-Create-Special files Creation -Change Directory and Change Root-Change Owner and Change Mode-Stat- Fstat-Pipes-Dup-Mount-Unmount-Link-Unlink-File System Abstraction-Maintenance.

PROCESS MANAGEMENT

The System Representation of Processes-States-Transitions-System Memory-Context of a Process-Saving the Context-Manipulation of a Process Address Space-Sleep Process Control-signals-Process Termination-Awaiting-Invoking other Programs-The Shell-System Boot and the INIT Process.

MEMORY MANAGEMENT

Memory Management Policies-Swapping-Demand Paging-a Hybrid System-I/O Subsystem-Driver Interfaces-Disk Drivers-Terminal Drivers.

TEXT BOOKS

1. Maurice J. Bach, "The Design of the Unix Operating System", Pearson Education 2002.

REFERENCES

1. UreshVahalia, "UNIX Internals: The New Frontiers", Prentice Hall, 2000.
2. John Lion, "Lion's Commentary on UNIX", 6th edition, Peer-to-Peer Communications, 2004.
3. Daniel P. Bovet & Marco Cesati, “Understanding the Linux Kernel”, O’REILLY, Shroff Publishers &Distributors Pvt. Ltd, 2000.
4. M. Beck et al, “Linux Kernel Programming

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35021P36	WIRELESS AND SENSOR NETWORKS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to learn about wireless and sensor networks. This syllabus helps the students to study and identify different issues in wireless and sensor networks, to analyze protocols developed for wireless and sensor networks, to Identify different issues in wireless ad hoc and sensor networks and to Identify and critique security issues in wireless and sensor networks.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Understand the architecture, standards and applications of wireless sensor networks(WSN)
2	Analyze the need and structure of MAC protocol for WSN
3	Develop WSN protocols and analyze their performance
4	Identify the need and selection of operating system for WSN

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Describe the type of sensor networks, protocols and applications of WSN	Understand
CO2: Identify various hardware, software platforms for sensor networks	Knowledge
CO3: Analyze the design issues of MAC and Physical layers of WSN	Analyze
CO4: Create architecture and Identify need and selection of protocols for WSN	Understand & Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	COs	PO1	PO2
CO1	L	L	S	S	--	--	--	M	M	--	--	--	**CO1**	L	L
CO2	S	S	S	S	--	--	--	S	M	--	--	--	**CO2**	L	L
CO3	L	M	S	S	--	--	--	M	M	--	--	--	**CO3**	S	L
CO4		M	S	S	--	--	--	M	M	--	--	--	**CO4**	M	L

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION OVERVIEW AND APPLICATIONS OF WIRELESS SENSOR NETWORK

Introduction, Basic overview of the Technology, Applications of Wireless Sensor Networks: Introduction, Background, Range of Applications, Examples of Category 2 WSN Applications, Examples of Category 1 WSN Applications, Another Taxonomy of WSN Technology.

BASIC WIRELESS SENSOR TECHNOLOGY AND SYSTEMS:

Introduction, Sensor Node Technology, Sensor Taxonomy, WN Operating Environment, WN Trends, Wireless Transmission Technology and Systems: Introduction, Radio Technology Primer, Available Wireless Technologies

SENSOR NETWORKS – INTRODUCTION & ARCHITECTURES

Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN application examples, Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes, Network Architecture – Sensor Network Scenarios, Transceiver Design Considerations, Optimization Goals and Figures of Merit.

TRANSPORT CONTROL AND MIDDLEWARE FOR WIRELESS SENSOR NETWORKS

Traditional Transport Control Protocols, Transport Protocol Design Issues, Examples of Existing Transport Control Protocols, Performance of Transport Control Protocols.

Middleware for Wireless Sensor Networks: Introduction, WSN Middleware Principles, Middleware Architecture, Existing Middleware.

SENSOR NETWORK SECURITY

Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Layer wise attacks in wireless sensor networks, possible solutions for jamming, tampering, black hole attack, flooding attack. Key Distribution and Management, Secure Routing – SPINS, reliability requirements in sensor networks..

TEXT BOOKS

1. Kazem Sohraby, Daniel Minoli, TaiebZnati, "Wireless Sensor Networks: Technology, Protocols and Applications:, Wiley , 2nd Edition (Indian) , 2014.

REFERENCES

1. Ian F. Akyildiz, Mehmet Can Vuran "Wireless Sensor Networks", Wiley, 2010.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

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35021P32	SOFT COMPUTING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to lean about Artificial Intelligence. This syllabus contain intelligent agent, Knowledge Representation and Machine learning, and application. Which is useful to how represent knowledge and in machine learning contain some important prediction method. Thus, this syllabus focus on to know about AI and its concepts, application.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To give an understanding on the fundamentals of non-traditional technologies and approaches to solving hard real-world problems
2	Fundamentals of artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms. Use of ANN, Fuzzy sets to solve hard real-world problems
3	To give an overview of Genetic algorithms and machine learning techniques to solving hard real-world problems
4	To study about Algorithm

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Identify the different agent and its types to solve the problems	Understand
CO2: know about the problem solving technique in Artificial Intelligence	Apply
CO3: Construct the normal form and represent the knowledge	Apply
CO4: Identify the extension of condition probability and how to apply in the real time environment.	Analyze
CO5: Apply the Information Retrieval and Speech Recognition in the real-world problems	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	L	S	S	M
CO2	S	M	L	-	-	-	-	-	-	-	-	L	M	S	M
CO3	S	M	S	-	-	-	-	-	-	-	-	-	S	-	M
CO4	S	S	S	-	-	-	-	-	-	-	-	M	M	M	M
CO5	S	M	M	-	-	-	-	-	-	-	-	-	M	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

FUZZY SET THEORY

Introduction-Definition-History of Artificial Intelligence-Intelligent Agents-Types Of Agents-Problem Solving Approach To AI Problems-Problem Formulation

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OPTIMIZATION

Problem Solving Methods-Search Strategies-Uninformed Search Strategies-Comparison of Uninformed Search Algorithms-Informed Search Strategies-Local Search Algorithms-Searching With Partial Information-Constraint Satisfaction Problem

NEURAL NETWORKS

Propositional Logic-First Order Predicate Logic-Prolog Programming-Unification-Forward Chaining-Backward Chaining-Ontological Engineering-Categories and Objects-Events-Mental Events and Mental Objects.

NEURO FUZZY MODELING

Conditional Probability-Joint probability, Prior Probability- Bayes Rule and Its Applications-Bayesian Networks-Inferences in Bayesian Networks- Morkov chain, Hidden Markov Models- Learning from Observation-Supervised Learning.

APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOKS

1.J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2011

REFERENCES

1. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
2. DavisE.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 2005

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35021P05	C# AND .NET APPLICATION DEVELOPMENT	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To provide an introduction to the .NET framework and enable the student to program in C#.

PREREQUISITE:

OBJECT ORIENTED PROGRAMMING

COURSE OBJECTIVES

1.	To study basic and advanced features of the C# language
2.	To create form based and web based applications
3.	To study the internals of the .NET framework
4.	To learn about ADO.Net
5.	To learn about different web services

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. To learn the basics of .net Frame work and C# language	Understand
CO2. To learn C# elements and OOPS concepts	Apply
CO3. To learn interface and inheritance concepts in C# language	Analyze
CO4. To learn fundamentals of window application programming and create a window application	Apply
CO5. To develop web applications and learn advanced	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1.	S	M	M	M	M	-	-	-	-	-	-	-	M	-	-
CO2.	S	M	M	L	L	-	-	-	-	-	-	-	M	M	M
CO3.	S	M	S		M	-	-	-	-	-	-	-	M	M	M
CO4.	S	M	L		M	-	-	-	-	-	-	-	M	M	-
CO5.	S	M	L	L	M	-	-	-	-	-	-	-	S	M	-

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION:

Overview Of .Net-Advantages Of .Net Over Other Languages-Assemblies-.Net Architecture-The Role of C# In The .Net Enterprise Architecture-The Common Language Runtime-C# Basics-Objects And Types-Inheritance –Arrays

OBJECT ORIENTED ASPECTS OF C#:

Operators and Casts: Operators - Type Safety - Operator Overloading - User-Defined Casts. Delegates and Events: Delegates – Events. Strings and Regular Expressions: System.String -Regular Expressions. Collections: Collection Interfaces and Types – Lists - Queues – Stacks -Linked Lists - Sorted Lists – Dictionaries – Hash Set - Bit Arrays – Performance-Indexers

I/O AND NETWORK PROGRAMMING:

Tracing and events - threading and synchronization - .Net security – localization –Manipulating XML - Managing the file system – basic network programming.

ADO.NET: #:

Data Access: ADO.NET Overview - Using Database Connections – Commands - Fast Data Access: The Data Reader - Managing Data and Relationships: The DataSet Class – XML Schemas: Generating Code with XSD – Working with ADO.NET. Windows Forms: Creating a Windows Form Application - Control Class - Standard Controls and Components – Forms. Data Binding: The Data Grid View Control - Data Grid View Class Hierarchy - Data Binding - Visual Studio .NET and Data Access.

ASP.NET AND WEB SERVICES:

ASP.NET Pages: ASP.NET Introduction - ASP.NET Web Forms - ADO.NET and Data Binding.ASP.NET Development: User and Custom Controls - Master Pages - Site Navigation – Security –Themes- Web Parts. ASP.NET AJAX: What Is Ajax - What Is ASP.NET AJAX - Using ASP.NET AJAX.

TEXT BOOK

1. Christian Nagel, Bill Evjen, Jay Glynn, Morgan Skinner, Karli Watson, Professional C# 2008, Wiley Publishing, Inc., 2008. ISBN: 978-8-126-51627-8.

REFERENCE BOOKS

1. Andrew Troelsen, "C# and the .NET Platform", A! Press, 2005.
2. Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, 2004.
3. Kevin Hoffman, "Visual C# 2005", Pearson Education, 2006.

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35021P06	CLOUD COMPUTING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To study and understand the concepts in cloud computing and apply them practically.

PREREQUISITE NIL

COURSE OBJECTIVES

1.	To understand cloud computing concepts.
2.	To study various cloud services.
3.	To apply cloud computing in collaboration with other services.
4.	To Apply cloud computing services.
5.	To apply cloud computing online.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Able to Understand basics in Cloud Computing	Understand
CO2: Able to apply cloud computing concepts in real time	Apply
CO3: Able to develop cloud computing projects	Apply
CO4: Able to apply cloud services	Apply
CO5: *Able to collaborate cloud services with other applications*	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION
Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage –Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services.
DEVELOPING CLOUD SERVICES
Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.
CLOUD COMPUTING FOR EVERYONE
Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.
USING CLOUD SERVICES
Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files.
COLLABORATING ONLINE
Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services –Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware –Collaborating via Blogs and Wikis.
TEXT BOOKS
1. Rajkumar Buyya, James Broberg, Andzej M.Goscinski, "Cloud Computing –Principles and Paradigms",John Wiley & Sons, 2010. 2. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2008.
REFERENCES
1. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring. Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, July 2008.

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35021P02	AGILE METHODOLOGIES	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

Software Development is an umbrella term for an arrangement of strategies and practices in light of the qualities and standards communicated in the Agile Manifesto. Arrangements advance through coordinated effort between self-sorting out, cross-utilitarian groups using the suitable practices for their specific circumstance.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand the background and driving forces for taking an Agile approach to software development
2	To obtain practical knowledge of agile development frameworks and be able to distinguish between agile and traditional project management methodologies.
3	To Examine various metrics for adopting agile software engineering
4	Describe how an unit tests is executed from beginning to end.
5	Identify the approaches, tools and scenarios to introduce Agile to your organization effectively
6	To design automated build tools, version control and continuous integration

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Identify the fundamentals of agile and scrum framework	Understand
CO2: Apply design principles and refactoring to achieve Agility.	Apply
CO3: Reduce the risks in Test driven approach in agile projects	Analyze
CO4: Implement a real software project that implements agile execution techniques	Apply
CO5: Deploy a firm basis for adopting agile methodology, regardless of the industry/professional sector.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

FUNDAMENTALS OF AGILE

The Genesis of Agile- Introduction and background- Agile Manifesto and Principles- Overview of Scrum- Extreme Programming- Feature Driven development- Lean Software Development- Agile project management- Design and development practices in Agile projects- Test Driven Development- Continuous Integration- Refactoring- Pair Programming- Simple Design- User Stories- Agile Testing- Agile Tools.

AGILE SCRUM FRAMEWORK

Introduction to Scrum- Project phases- Agile Estimation- Planning game- Product backlog- Sprint backlog- Iteration planning- User story definition- Characteristics and content of user stories- Acceptance tests and Verifying stories- Project velocity- Burn down chart- Sprint planning and retrospective- Daily scrum- Scrum roles – Product Owner- Scrum Master- Scrum Team- Scrum case study- Tools for Agile project management.

AGILE TESTING

The Agile lifecycle and its impact on testing- Test-Driven Development (TDD)- xUnit framework and tools for TDD- Testing user stories - acceptance tests and scenarios- Planning and managing testing cycle- Exploratory testing- Risk based testing- Regression tests- Test Automation- Tools to support the Agile tester.

AGILE SOFTWARE DESIGN AND DEVELOPMENT

Agile design practices- Role of design Principles including Single Responsibility Principle- Open Closed Principle- Liskov Substitution Principle- Interface Segregation Principles- Dependency Inversion Principle in Agile Design- Need and significance of Refactoring- Refactoring Techniques- Continuous Integration- Automated build tools- Version control.

INDUSTRY TRENDS

Market scenario and adoption of Agile- Agile ALM- Roles in an Agile project- Agile applicability- Agile in Distributed teams- Business benefits- Challenges in Agile- Risks and Mitigation- Agile projects on Cloud- Balancing Agility with Discipline- Agile rapid development technologies

TEXT BOOKS

1. Ken Schawber, Mike Beedle, "Agile Software Development with Scrum", Pearson, 21 Mar 2008.
2. Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices", Prentice Hall, 25 Oct 2002.
3. Lisa Crispin, Janet Gregory, "Agile Testing: A Practical Guide for Testers and Agile Teams", Addison Wesley, 30 Dec 2008
4. www.it-ebooks.info/tag/agile
5. http://martinfowler.com/agile.html

REFERENCES

1. Alistair Cockburn, "Agile Software Development: The Cooperative Game", Addison Wesley, 19 Oct 2006.
2. Mike Cohn Publisher, "User Stories Applied: For Agile Software", Addison Wesley, 1 Mar 2004

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35021P23	MACHINE LEARNING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To provide an in-depth knowledge about machine learning concepts and identify applications suitable for different types of machine learning with suitable justification.

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To study the outline the key concepts of machine learning
2	To understand the supervised learning and classification techniques
3	To apply the concept of unsupervised learning and Clustering for applications
4	To learn theoretical and practical aspects of dimensionality reduction
5	To learn theoretical and practical aspects of reinforcement learning

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the key concepts of machine learning	Understand
CO2: Understand and apply supervised learning and classification techniques	Understand
CO3: Apply the concept of unsupervised learning and Clustering for applications	Apply
CO4: Unerstand theoretical and practical aspects o dimensionality reduction	Understand
CO5: Understand theoretical and practical aspects of reinforcement learning	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	-	L	-	-	-	-	-	L	L	-	-
CO2	S	S	S	L	-	L	-	L	L	-	L	L	S	M	L
CO3	S	S	M	L	-	L	-	L	L	-	L	L	S	M	L
CO4	S	L	M	L	-	L	-	-	-	-	-	L	-	-	-
CO5	S	L	S	-	-	L	-	L	-	-	-	L	-	L	-

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Machine Learning - Examples of machine learning applications- Types of machine learning –Model selection and generalization – Guidelines for Machine Learning Experiments

SUPERVISED LEARNING

Classification - Decision Trees – Univariate Tree –Multivariate Tree - Pruning –Perceptron – Multilayer Perceptron - Back Propagation – Cross Validation and Resampling Methods

UNSUPERVISED LEARNING

Clustering- Mixture densities -K-means - EM Algorithm – Supervised Learning After Clustering- Hierarchical Clustering

DIMENSIONALITY REDUCTION

The Curse of Dimensionality –Subset Collection - Principal Component Analysis - Factor Analysis – Linear Discriminant Analysis, Accuracy, Precision, recall, F measure.

REINFORCEMENT LEARNING

Single State Case – Elements of Reinforcement Learning - Model Based Learning – Temporal Difference Learning – Generalization in Reinforcement Learning - Policy Search

TEXT BOOKS

1. EthemAlpaydin, Introduction to Machine Learning MIT Press, 2014.

REFERENCES

1. Tom M Mitchell, Machine Learning, First Edition, McGraw Hill Education, 2013
2. Richard S. Sutton and Andrew G. Barto: Reinforcement Learning: An Introduction. MIT Press

COURSE DESIGNER

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35021P13	DEEP LEARNING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This course provides an introduction to the basics of machine learning, neural networks, and Deep learning techniques. This course also provides the learning practice and acquires knowledge on deep learning tools.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To study the basics of machine learning, neural networks and deep learning
2	To study the present the mathematical, statistical and computational challenges of building deep neural networks
3	To study the dimensionality reduction techniques
4	To know deep learning techniques to support real-time applications
5	To examine the case studies of deep learning techniques

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand basics of machine learning, neural networks and deep learning	Understand
CO2: Implement various deep learning models	Apply
CO3: Realign high dimensional data using reduction techniques	Apply
CO4:Understand and apply scaling up machine learning techniques and associated computing techniques and technologies	Apply
CO5: Analyze optimization and generalization in deep learning	Apply
CO6: Explore the deep learning application	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	S	M	-	M	-	-	M	M	-	M	M	M	-	-
CO2	S	S	S	S	M	-	-	M	M	-	M	M	-	-	M
CO3	S	M	M	S	M	-	-	M	M	-	M	M	M	-	-
CO4	S	M	M	S	M	-	-	M	M	-	M	M	M	-	-
CO5	S	M	M	S	M	-	-	M	M	-	M	M	M	-	-
CO6	S	M	M	S	M	-	-	M	M	-	M	M	-	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Introduction to machine learning- Linear models (SVMs and Perceptions, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximate.

DEEP NETWORKS

History of Deep Learning- A Probabilistic Theory of Deep Learning- Backpropagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks Convolutional Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning.

DIMENSIONALITY REDUCTION

Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization.

OPTIMIZATION AND GENERALIZATION

Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization- Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience.

CASE STUDY AND APPLICATIONS

Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec - Joint DetectionBioInformatics- Face Recognition- Scene Understanding- Gathering Image Captions.

REFERENCE BOOKS

1. CosmaRohillaShalizi, Advanced Data Analysis from an Elementary Point of View, 2015.
2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
3. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning, MIT Press, 2016.
4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.

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35021P12	DATA VIRTUALIZATION	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This course focuses on the challenges in setting up a data center. Resource monitoring using hypervisors and access control to virtual machines will be covered in depth in this course. Setting up of a virtual data center and how to manage them with software interfaces will be discussed in detail

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To learn the concepts of Web design patterns and page design
2	To understand and learn the scripting languages with design of web applications
3	To learn the maintenance and evaluation of web design
4	To learn about Resource monitoring and virtual machine data Protection

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Explain the concept of data center and Evolution of Data Centre	Understand
CO2: Apply enterprise-level virtualization machines through software management interfaces, Environments connectivity.	Apply
CO3: Illustrate the virtualization deployment, modification, management; monitoring and migration methodologies	Apply
CO4: Analyze the utility in Windows Vista and later, displays information about the use of hardware and software resources in real time.	Analyze
CO5: Develop the resource monitoring and virtual machine data Protection skills.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	-
CO2	S	L	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	-	M
CO4	S	M	L	-	L	-	-	-	-	-	-	M	**S**	M	M
CO5	S	L	L	-	M	-	-	-	-	-	-	M	**S**	M	-

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SYLLABUS

DATA CENTER CHALLENGES

How server, desktop, network Virtualization and cloud computing reduce data centre footprint, environmental impact and power requirements by driving server consolidation; Evolution of Data Centres: The evolution of computing infrastructures and architectures from standalone servers to rack optimized blade servers and unified computing systems (UCS).

ENTERPRISE-LEVEL VIRTUALIZATION

Provision, monitoring and management of a virtual datacenter and multiple enterprise-level virtual servers and virtual machines through software management interfaces; Networking and Storage in Enterprise Virtualized Environments - Connectivity to storage area and IP networks from within virtualized environments using industry standard protocols

VIRTUAL MACHINES & ACCESS CONTROL

Virtual machine deployment, modification, management; monitoring and migration methodologies.

RESOURCE MONITORING

Physical and virtual machine memory, CPU management and abstraction techniques using a hypervisor

VIRTUAL MACHINE DATA PROTECTION

Backup and recovery of virtual machines using data recovery techniques; Scalability - Scalability features within Enterprise virtualized environments using advanced management applications that enable clustering, distributed network switches for clustering, network and storage expansion; High Availability : Virtualization high availability and redundancy techniques.

TEXT BOOKS

1. Mickey Iqbal, "IT Virtualization Best Practices: A Lean, Green Virtualized Data Center Approach", MC Press [ISBN: 978-1583473542] 2012.

2. Mike Laverick, "VMware vSphere 4 Implementation" Tata McGraw-Hill Osborne Media; 1 edition [ISBN: 978-0071664523], 2012.

3. Jason W. McCarty, Scott Lowe, Matthew K. Johnson, "VMware vSphere 4 Administration Instant

REFERENCES

1. Brian Perry, Chris Huss, Jeantet Fields, "VCP VMware Certified Professional on vSphere 4 Study Guide" Sybex; edition [ISBN: 978-0470569610], 2013.

2. Jason Kappel, Anthony Velte, Toby Velte, "Microsoft Virtualization with Hyper-V: Manage Your Datacenter with Hyper-V, Virtual PC, Virtual Server, and Application Virtualization" McGraw-Hill Osborne [ISBN: 978- 007161

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	K.Karthik	Assistant Professor	CSE	karthik@avit.ac.in
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35021P10	DATA MINING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

Data warehousing and data mining is one of the most advanced fields of computer science which involves use of Mathematics, Statistics, Information Technology and information Sciences in discovering new information and knowledge from large databases It is a new emerging interdisciplinary area of research and development which has created interest among scientists of various disciplines.

PREREQUISITE

Database Management System

COURSE OBJECTIVES

1.	Distinguish a data warehouse from an operational database system, and appreciate the needs for developing a data warehouse for large corporation.
2.	Describe the problems and processes involved in the development of a data warehouse
3.	To explain the process of data mining and its importance.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1:. Understand the basics of data warehousing and mining	Understand
CO2: Apply the data preprocessing, language, architectures, concept description.	Apply
CO3: Understand association rules and its algorithms.	Understand
CO4: Classify and clustering rules and the respective algorithms	Apply
CO5: Understand the latest trends about the data warehousing and mining	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L		M	-	-	-	-	-	-	-	-	M	M	M
CO2	S	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	S	L		L	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	L	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION AND DATA WAREHOUSING

Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation, Further Development, Data Warehousing to Data Mining.

DATA PREPROCESSING, LANGUAGE, ARCHITECTURES, CONCEPT DESCRIPTION

Why Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

ASSOCIATION RULES

Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases.

CLASSIFICATION AND CLUSTERING

Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, Outlier Analysis.

RECENT TRENDS

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining.

TEXT BOOK

1. J. Han, M. Kamber, “Data Mining: Concepts and Techniques”, Harcourt India / Morgan Kauffman, 2001.

REFERENCES

1. Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education 2004.
2. Sam Anahory, Dennis Murry, "Data Warehousing in the real world", Pearson Education 2003.
3. David Hand, Heikki Manila, Padhraic Symth, "Principles of Data Mining", PHI 2004.
4. W.H.Inmon, "Building the Data Warehouse", 3rd Edition, Wiley, 2003.
5. Alex Bezon, Stephen J.Smith, "Data Warehousing, Data Mining & OLAP", MeGraw-Hill Edition, 2001.
6. Paulraj Ponniah, "Data Warehousing Fundamentals", Wiley-Interscience Publication, 2003.

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35021P08	COMPUTER GRAPHICS AND MULTIMEDIA	Category	L	T	P	Credit
		EC-PS	3	0	0	3

Preamble

Computer Graphics is referred as language of engineers. An engineer needs to understand the physical geometry of any object through its orthographic or pictorial projections. The knowledge on Computer graphics is essential in proposing new product through drawings and interpreting data from existing drawings. This course deals with orthographic and pictorial projections, sectional views and development ofsurfaces.

Prerequisite NIL

Course Objective

	To implement the orthographic projections of points, straight lines, plane surfaces and solids.
	To construct the orthographic projections of sectioned solids and true shape of the sections.
	To develop lateral surfaces of the uncut and cut solids.
	To draw the pictorial projections (isometric and perspective) of simple solids.
	To sketch by free hand the orthographic views from the given pictorial view.

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	Execute in the form of drawing of the orthographic projections of points, straight lines, plane surfaces andsolids.	Apply
CO2.	Demonstrate in the form of drawing of the orthographic projections of sectioned solids and true shape of the sections.	Apply
CO3.	Develop lateral surfaces of the solid section and cut section of solids.	Apply
CO4.	Draw the pictorial projections (isometric and perspective) of simple solids.	Apply
CO5.	Implement the free hand sketch of the orthographic views from the given pictorialview.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L		M	-	-	-	-	-	-	-	-	M	M	M
CO2	S	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	S	L		L	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	L	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

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Syllabus:

Unit 1: INTRODUCTION TO COMPUTER GRAPHICS : Brief Survey of Computer Graphics – Graphics Systems: Video Display Devices – Types – Raster-Scan Systems and Random-Scan Systems – Input Devices – Hard-Copy Devices – Graphics Software.

Unit-2: OUTPUT PRIMITIVES AND THEIR ATTRIBUTES Line-Drawing (DDA and Bresenham's) Algorithms – Circle-Generating (Midpoint) Algorithm – Ellipse-Generating (Midpoint) Algorithms- Area-Filling (Boundary-Fill and Flood-Fill) Algorithms - Line Attributes - Color and Grayscale Levels – Character Attributes – Inquiry Functions.

Unit 3: TWO-DIMENSIONAL TRANSFORMATIONS AND VIEWING: Basic Transformations - Matrix Representations and Homogeneous Coordinates – Composite Transformations - Other Transformations – Window-to- Viewport Coordinate Transformation – Clipping Algorithms: Cohen-Sutherland Line Clipping and Sutherland- Hodgeman Polygon Clipping – Basic Modeling Concepts - Interactive Input Methods: Logical Classification of Input Devices – Interactive Picture-Construction Techniques.

Unit-4: THREE-DIMENSIONAL CONCEPTS: Three-Dimensional Display Methods: Parallel and Perspective Projections – Depth Cueing - Visible Line and Surface Identification – Polygon Surfaces: Polygon Tables, Plane Equations and Polygon Meshes - Three-Dimensional Transformations: Basic, Other and Composite Transformations.

Unit-5 : THREE-DIMENSIONAL VIEWING : Viewing Pipeline and Coordinates – Transformation from World to Viewing Coordinates – Projection Transformations - Matrices - View Volumes - Hidden Surface and Hidden Line Elimination Methods: Back-Face Detection , Depth-Buffer and A-Buffer Methods –Wireframe Methods- Light Sources – RGB,CMY and HLS Color Models – Computer Animation: Design of its Sequences and Language

Text Books

1. **Donald Hearn and Pauline Baker M, "Computer Graphics", Prentice Hall, New Delhi, 2007 (UNIT V).**
2. **Elements of Multimedia *By Sreeparna Banerjee*Published May 8, 2019 by Chapman and Hall/CRC 203 Pages 49 B/W Illustrations**

Reference Books

1. **Introduction to Computer Graphics and Multimedia by Anirban Mukhopadhyay**
2. Introduction to Computer Graphics

COURSE DESIGNERS

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35021P16	E-LEARNING TECHNIQUES	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

It is used to reducethe communication gap between students and tutors, without time and location constraints.

PREREQUISITE–NIL

COURSEOBJECTIVES

1.	To enable the students to understand the concept of e-learning
2.	To make the students to understand the technology mediated communication
3.	To make the students to understand the role of information technology in virtual classroom and university.

COURSEOUTCOMES

On the successful completion of the course, students will be able to

Understand the phases of activities in models of E-learning	Understand
Identify appropriate E-Learning instructional methods and delivery strategies	Analysis
Choose appropriate E-learning Authoring tools	Understand & Apply
Design a simple web page with animated web advertisement	Design
Evaluate the future of e-learning technology	Evaluate

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	M	L	S	S	M	S	L	S	-	-	-	-
CO2	M	S	M	M	M	S	S	M	S	M	M	-	-	-	-
CO3	S	S	S	S	M	S	S	S	S	M	S	-	-	-	-
CO4	S	S	S	M	M	S	S	S	S	L	S	-	-	-	-
CO5	S	S	M	M	L	S	M	M	S	L	M	-	-	-	-

S-Strong;M-Medium;L-Low

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SYLLABUS

CONCEPT OF E-LEARNING

Nature, Scope, History – Evolution of E-Learning –Components of ELearning – Virtual classroom: Teleconferencing, Audio and Video conferencing.

STRATEGIES OF E-LEARNING

Process of E-Learning: Knowledge Acquisition– Sharing of Knowledge – Utilization of Knowledge – E-Learning Instructional Grounds: Behaviorism, Cognitivism and Constructivism

MODELS OF E-LEARNING

Role of Web-Based Instruction in Learning – Models of WBI: Instructional Design Model (ISD) & Hyper Media Design Model (HMD) – Computer Languages for Designing WBI

MULTI/HYPER MEDIA FOR E-LEARNING CONCEPT

Characteristics and Applications – Teaching Techniques through Multi/Hyper Media – Multimedia & Learning – Multimedia for Co-operative and Collaborative Learning Strategies – Advantages & Disadvantages of Multi/Hyper Media.

FUTURE OF E-LEARNING TECHNOLOGY

Challenges of Distance Education – Electronic Media in Distance Education – Open Educational Resources / Open Learning – Internet in Distance Education – Virtual University System.

TEXTBOOKS

1. Integrating Technology into Teaching and Learning: Concepts and Applications, Michael D. Wiliams, Prentice Hall,2000.

REFERENCES

1. The Integrated Technology Classroom, Joan Riedl, Allyn and Bacon, 1995.
2. E-Learning Concepts and Practice, Bryn Holmes and John Gardiner,Pine Forge Press, 2006.

CourseDesigners:

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35021P26	NETWORK DESIGN AND MANAGEMENT	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

Ability to access, compile and use MIBs, to implement a Network Management System, and to formulate SLAs and Policies for Network Management.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Appreciate methods of analysis and problem-solving techniques for network management
2	Understand SNMP message formats
3	Integrate SNMP, SMI, and Web-based management
4	Understand the importance of SLAs and Policies in Network Management
5	To understand the concept of MPLS

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Realize the methods of analysis and problem-solving techniques for network management	Apply
CO2: Describe the tools and applications used for network management	Apply
CO3: The ability to make a critical evaluation of the theories, techniques and systems used in planning, design, implementation and security of modern communication networks as well as the services they support	Analyze
CO4: Configure Protocol, methods and Policies to deploy the Network Management Architecture	Analyze
CO5: Examines broader issues associated with network management including Models Provisioning Issues, Mechanisms and Management Interfaces	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	M	-	-	-	-	-	-	-	M	S	M	M
CO2	M	S	S	M	L	-	-	-	-	-	-	M	S	M	-
CO3	S	M	M	M	M	-	-	-	-	-	-	M	S	M	M
CO4	M	M	M	M	L	-	-	-	-	-	-	M	M	-	-
CO5	M	S	M	S	M	-	-	-	-	-	-	M	M	S	M

S- Strong; M-Medium; L-Low

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SYLLABUS

OVERVIEW

Requirements for the Management of Networked Systems, Management Scenarios, Management Functions, Organizational Aspects of Management, Time Aspects of Management, Network Management Standards and Models.

IP Network Management

Introduction, Configuration Methods, Management Information Base, Simple Network Management Protocol, Extensible Markup Language, Common Object Request Broker Architecture, Configuration Protocols, Statistics collection, Policy Control, IP-Based Service Implementation, OSS, Provisioning Issues, Network Management Issues, OSS Architecture

SNMP & RMON

Organization and Information Models, Communication and Functional Models, Features of SNMPv1, SPMPv2 and SNMPv3, RMON SMI and MIB, Features of RMON1 and RMON2.

Network Management Architecture

Introduction, Defining Network Management, Network Management Mechanisms, Architectural Considerations.

MPLS Network Management

Introduction to MPLS, MPLS Applications, Key Aspects of MPLS Network Management, MIB Modules for MPLS, Overview of MPLS Management Interfaces, SNMP support for MPLS.

TEXT BOOKS

1. Farrel et al., "Network Management - know it all", Morgan Kauffman Publishers, Elsevier Press.
2. Subramanian Mani, "Network Management – Principles and Practice", Pearson Education India.
3. Burke Richard, "Network Management – Concepts and Practice", Pearson Education India.

REFERENCES

1. An Engineering Approach to Computer Networks-S.Keshav,2ndEdition,Pearson Education.
2. Understanding communications and Networks,3rd Edition, W.A.Shay,Cengage Learning

COURSE DESIGNERS

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35021P34	SOFTWARE TESTING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

The rapid development of automated aids to development and testing increases the need of change from manual testing to automated testing. Effective software testing maintains software quality. Software quality assurance starts from the beginning of a project, right from the analysis phase and thus understanding the role of software testing is very much mandatory. The primary outcome of the course is to provide exposure on research trends in Software Test Automation and Quality Assurance by sharing the research expertise with peers and gain research competence from Industry and Academicians.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	The students will be able to differentiate between quality control, quality management and quality assurance
2	The students will be able to discuss the different components of SQA system
3	The students will be able to discuss different software quality factors models
4	The students will be able to understand the rational for the SE code of ethics and discuss them

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Various test procesess and continuous quality improvement	Understand
CO2: Methods of test generation from requirements	Apply
CO3: Test adequacy assessment using: control flow, data flow, and program mutations	Apply
CO4: Combinatorial test generation	Analyze
CO5: Application of software testing techniques in commercial environments	Evaluate

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	S				L				L		M	L			
CO2		S					L								
CO3			S		L			L			M				
CO4		S		L						M					
CO5					S						M	S			

S- Strong; M-Medium; L-Low

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SYLLABUS

PRINCIPLES OF TESTING

Need for Testing—Psychology of testing—Testing economics—white box testing , Black box testing, Grey box Testing—Retesting regression Testing—Verification and Validation Testing Strategies—Levels of Testing—Unit, Integration ,System Testing, Acceptance Testing .

TEST CASE DESIGN

Test case Design Strategies – Using Black Bod Approach to Test Case Design – Random Testing – Requirements based testing – Boundary Value Analysis – Equivalence Class Partitioning – State-based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing – Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Evaluating Test Adequacy Criteria

LEVELS OF TESTING

The need for Levers of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing – Compatibility testing – Testing the documentation – Website testing.

TEST MANAGEMENT

People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

AUTOMATED TESTING AND TEST TOOLS & BUG REPORTING

Automated Testing and Test Tools: -benefits-Test Tools-Software Test Automation-Bug Bashes and Beta Testing-Writing and Tracking Test Cases: Goals-Test Case Planning Overview-Bug's Life cycle-Bug-Tracking System-Software Quality Assurance.

9 - hours

TEXT BOOKS

1. Srinivasan Desikan and Gopalaswamy Ramesh, " Software Testing – Principles and Practices", Pearson education, 2006.
2. Aditya P.Mathur, "Foundations of Software Testing", Pearson Education,2008.
3. William Perry, "Effective Methods for Software Testing", Second Edition, John Willey & Sons, 2000.

REFERENCES

1. Boris Beizer, "Software Testing Techniques", Second Edition,Dreamtech, 2003
2. Elfriede Dustin, "Effective Software Testing", First Edition, Pearson Education, 2003.
3. RenuRajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2004..

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35021P22	IT INFRASTRUCTURE MANAGEMENT	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

The proposed course exposes the students to understand the features of different technologies involved in IT infrastructure and management.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand the basics of IT infrastructure
2	To understand the current computing techniques in IT fields
3	To explore the business models
4	To understand the different security management and storage management in IT infrastructure
5	To understand the service delivery concept in IT field

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the basics of IT infrastructure	Understand
CO2: Understand the current computing techniques in IT fields	Understand
CO3: Explore the business models	Apply
CO4: Apply the different security management and storage management in IT infrastructure	Apply
CO5: Understand the service delivery concept in IT field	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	M	S	-	-	-	-	-	M	M	S	S
CO2	S	-	S	-	M	S	-	-	-	-	-	M	M	M	-
CO3	S	M	S	-	M	S	-	-	-	-	-	M	M	S	S
CO4	S	L	S	M	M	M	-	-	-	-	-	L	S	M	-
CO5	S	S	S	M	M	M	-	-	-	-	-	M	M	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

IT system Management

Common tasks in IT system management, approaches for organization Management, Models in IT system design, IT management systems context diagram, patterns for IT system Management.

IT Infrastructure Management

Factors to consider in designing IT organizations and IT infrastructure, Determining customer's Requirements, Identifying System Components to manage, Exist Processes, Data, applications, Tools and their integration, Patterns for IT systems management, Introduction to the design process for information systems, Models, Information Technology Infrastructure Library (ITIL).

Establishing business value of information system

Information system costs and benefits, Capital budgeting for information system, Real Options pricing models, Limitation of financial models.

Service Delivery and Service Support Management

Service-level management, financial management and advantages of financial management -Service support process, Configuration Management-Incident management.

Storage Management and Security Management

Types of Storage management, Benefits of storage management, backups, Archive, Recovery, Disaster recovery-Introduction Security, Identity management, Single sign-on, Access Management.

TEXT BOOKS

1. A. S. Goodman and M. Hastak, Infrastructure planning handbook: Planning, engineering, and economics, McGraw- Hill, New York, 2006.
2. J. Parkin and D. Sharma, Infrastructure planning, Thomas Telford, London, 1999

REFERENCES

1. P. Chandra, Projects: Planning, analysis, selection, financing, implementation, and review, Tata McGraw-Hill, New Delhi, 2009.
2. J. D. Finnerty, Project financing - Asset-based financial engineering, John Wiley & Sons, New York, 1996.
3. A. S. Goodman and M. Hastak, Infrastructure planning handbook: Planning, engineering, and economics, McGraw-Hill, New York, 2006.

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35021P04	BLOCK CHAIN TECHNOLOGY	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

Blockchain has the potential to change almost every industry. It can create a more efficient and prosperous world where people can connect with each other without the need for intermediariesThiscoursewillgiveawareness of the new challenges that exist in monetizing businesses around block chains and smart contracts

PREREQUISITE–NIL

COURSEOBJECTIVES

1.	It provides the function of Blockchains as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable
2.	It covers the technological underpinnings of blockchain operations as distributed data structures and decision making systems.
3.	It provides a critical evaluation of existing "smart contract" capabilities and platforms.

COURSEOUTCOMES

Onthesuccessfulcompletionofthecourse,studentswillbeableto

Understand the structure of a blockchain	Understand
Understand what constitutes a "smart" contract, what are its legal implications and what it can and cannot do, now and in the near future,	Understand & Apply
Evaluate the setting where a blockchain based structure may be applied, its potential and its limitations	Evaluate
Analyze the incentive structure in a block chain based system and critically assess its functions, benefits and vulnerabilities;	Analyze
Analyze to what extent smart and self-executing contracts can benefit automation, governance, transparency and the Internet of Things (IOT),	Analyze

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S-Strong;M-Medium;L-Low

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SYLLABUS

INTRODUCTION

An Overview of Bit coin -Alternative coins and networks-Bit coin versus Cryptocurrencies versus Block chain-Distributed Ledger Technology (DLT)- HyperLedger-Ethereum.

TRUST AND VUNERABILITY

Short history of the scaling out of human trust, high and Low trust societies, Types of Trust model: Peer-to-Peer, Leviathan, and Intermediary, Cryptocurrency and Markets.

BLOCKCHAIN AND ITS TYPES

How Blockchain (and Bitcoin) Work, Peer to Peer network, Bitcoin and block sizes, Mining and Cryptocurrencies, Types of Blockchain and Enterprise, Public and Private Blockchains.

CONSENSUS

Consensus Building, Problems with Blockchain, Bitcoin and Ethereum

BLOCKCHAIN APPLICATIONS

Use Cases: Open Bazaar and Safe market as decentralized information and reputation (super) marketplaces, reputation brokerages and smart dark net marketplaces (Daemon), Additional functions of decentralized markets
beyond mere products.

TEXTBOOKS

1.Block chain: Blueprint for a New Economy 1st Editionby Melanie Swan

REFERENCES

1. "Mastering Bitcoin: Unlocking digital cryptocurrencies", by Andreas M.AntonopoulosJamesDoveyandAshFurrow,"BeginningObjectiveC",Apress,2012.
2. "Ethereum: Blockchains, Digital Assets, Smart Contracts, Decentralized Autonomous Organizations", by Henning Diedrich

CourseDesigners:

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1.	V.Subapriya	Assistant Professor	CSE/AVIT	subapriyacse@avit.ac.in
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35021P19	GO PROGRAMMING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE:

GO Programming Language for statistical data manipulation and analysis. It was inspired by and is most compatible with the statistical language.

PREREQUISITE:

NIL

COURSE OBJECTIVES

1	To learn GO Programming Language
2	To Study Object Oriented Programming
3	To Study Functional Programming

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: To Understand the basics in GO programming language in terms of constructs, control statements, string functions	Understand & Apply
CO2: To Understand the use of GO Programming fundamentals.	Understand & Apply
CO3: Learn to apply GO programming for Communicating Sequential Process	Understand & Apply
CO4: Able to appreciate and apply the GO programming from a statistical perspective	Understand & Apply
CO5: To learn GO programming Variables	Understand & Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO3
CO1	S	S	M	M	L	S	S	M	S	L	S	S	-	-	-
CO2	M	S	M	M	M	S	S	M	S	M	M	M	-	-	-
CO3	S	S	S	S	M	S	S	S	S	M	S	S	-	-	-
CO4	S	S	S	M	M	S	S	S	S	L	S	S	-	-	-
CO5	S	S	M	M	L	S	M	M	S	L	M	S	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introducing to Go Programming – Command-Line Arguments – Finding Duplicate Lines – Animated GIFs – Fetching a URL – Fetching URLs Concurrently – A Web Server – Loose Ends – Names – Declarations – Variables – Integers – Floating-Point Numbers - Complex Numbers – Booleans – Strings.

FUNCTIONS

Function Declarations - Arrays – Slices – Maps – Structs – JSON – Text and HTML Templates – Recursion – Multiple Return Values – Function Values – Anonymous Functions – Variadic Functions – Deferred Function Calls – Methods and Declarations - Encapsultion

INTERFACES, GOROUTINES & CHANNELS

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Interfaces Types, Contracts, Satification – Interface Values – Assertions Types – Discriminating Errors with Type Assertions – Querying Behaviours with Interface Type Assertions – Types of Switches – Goroutines – Goroutines Channel – Looping in Parallel - Multiplexing.

CONCURRENCY WITH SHARED VARIABLES, PACKAGES , THE GO TOOL

Race Conditions – Mutual Exclusion – Read/Write Mutexes, Memory Synchronization – Lazy Initialization – The Race Detector – Grountines and Threads – Import Paths – The Package Declaration – Blank Reports – Packages and Naming – The Go Tools.

REFLECTION, LOW-LEVEL PROGRAMMING

Introduction – A recursive value printer – Setting Variables – Accessing Struct Field Tags – Displaying the Methods of a Type – A Word of Caution.

TEXT BOOKS:

1. The Go Programming Language, Alan A.A. Donovan, Brian W. Kernighan , Addison – Welsey Professional Computing Series, 2015.
2. The Go Programming Language, David Chisnall , 2012.

REFERENCES:

1. Cocoa Programming Developer's,Pearson Education, 2009.
2. Introducing GO, Caleb Doxey, O'Reilly Media, 2016

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35021P28	R PROGRAMMING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE:
R is a scripting language for statistical data manipulation and analysis. It was inspired by and is most compatible with the statistical language.

PREREQUISITE:
NIL

COURSE OBJECTIVES

1	To learn R Programming
2	To Study Object Oriented Programming
3	To Study Functional Programming

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: To Understand the basics in R programming in terms of constructs, control statements, string functions	Understand & Apply
CO2: To Understand the use of R for Big Data analytics	Understand & Apply
CO3: Learn to apply R programming for Text processing	Understand & Apply
CO4: Able to appreciate and apply the R programming from a statistical perspective	Understand & Apply
CO5: To learn Big Data	Understand & Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	M	L	S	S	M	S	L	S	-	-	-	-
CO2	M	S	M	M	M	S	S	M	S	M	M	-	-	-	-
CO3	S	S	S	S	M	S	S	S	S	M	S	-	-	-	-
CO4	S	S	S	M	M	S	S	S	S	L	S	-	-	-	-
CO5	S	S	M	M	L	S	M	M	S	L	M	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introducing to R – R Data Structures – Help functions in R – Vectors – Scalars – Declarations – recycling – Common Vector operations – Using all and any – Vectorized operations – NA and NULL values – Filtering – Vectorised if-then else – Vector Equality – Vector Element names

MATRICES, ARRAYS AND LISTS

Creating matrices – Matrix operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector/Matrix Distinction – Avoiding Dimension Reduction – Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists

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DATA FRAMES

Creating Data Frames – Matrix-like operations in frames – Merging Data Frames – Applying functions to Data frames – Factors and Tables – factors and levels – Common functions used with factors – Working with tables - Other factors and table related functions - Control statements – Arithmetic and Boolean operators and values – Default values for arguments - Returning Boolean values – functions are objects – Environment and Scope issues – Writing Upstairs - Recursion – Replacement functions – Tools for composing function code – Math and Simulations in R

OOP

S3 Classes – S4 Classes – Managing your objects – Input/Output – accessing keyboard and monitor – reading and writing files – accessing the internet – String Manipulation – Graphics – Creating Graphs – Customizing Graphs – Saving graphs to files – Creating three-dimensional plots

INTERFACING

Interfacing R to other languages – Parallel R – Basic Statistics – Linear Model – Generalized Linear models – Non-linear models – Time Series and Auto-correlation – Clustering

TEXT BOOKS:

1. The Art of R Programming: A Tour of Statistical Software Design, Norman Matloff, No Starch Press, 2011
2. R for Everyone: Advanced Analytics and Graphics, Jared P. Lander, Addison-Wesley Data & Analytics Series, 2013.

REFERENCES:

1. Beginning R – The Statistical Programming Language, Mark Gardener, Wiley, 2013.
2. Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R, Robert Knell, Amazon Digital South Asia Services Inc, 2013

1.

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35021P30	RICH INTERNET APPLICATION	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

Uses of web sites and portals have become common for knowledge sharing and business. The course focuses on the fundamentals of CGI, SCRIPTING LANGUAGES, Web Applications.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To learn CGI Concepts & CGI Programming
2.	To Study DHTML, XML,AJAX
3.	To Study On-Line web application & Internet Concepts

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Uunderstand the basic concept of HTML and Scripting Language	Understand
CO2: Understand the HTML, Common Gateway Interface.	Apply
CO3: Apply the Java Script and AJAX	Apply
CO4: apply learn the Server side programming	Apply
CO5: Apply the database connectivity.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Internet Principles – Basic Web Concepts – Client/Server model – retrieving data from Internet – HTML and Scripting Languages – Standard Generalized Mark –up languages – Next Generation – Internet –Protocols and Applications

COMMON GATEWAY INTERFACE PROGRAMMING

HTML forms – CGI Concepts – HTML tags Emulation – Server – Browser Communication – E-mail generation – CGI client Side applets – CGI server applets – authorization and security. Introduction to PERL

SCRIPTING LANGUAGES

Java Script Programming-Dynamic HTML-Cascading style sheets-Object model and Event model- Filters and Transitions-Active X Controls-Multimedia-Client side script.- Traditional web application vs AJAX application – creating full scale AJAX application - Forms – Scripting Object

SERVER SIDE PROGRAMMING

Dynamic Web content – cascading style sheets – DHTML – XML – Server side includes – communication – Active and Java Server Pages - Ruby enabled applications

ONLINE

Simple applications – on-line databases – monitoring user events – plug-ins –database connectivity – Internet Information Systems – MICROSOFT IIS - EDI application in business – Internet Commerce – Customization of Internet Commerce

TEXT BOOK

1. Jason Hunter, William Crawford, "Java Servlet Programming", O' Reilly Publications, 1999.
2. Ravi Kalakota and Andrew B Whinston, "Frontiers of Electronic Commerce", Addison Wesley, 1996
3. Eric Ladd, Jim O' Donnel, "Using HTML 4, XML and Java", Prentice Hall of India – QUE,1999
4. Paul JDeitel and Harvey M Deitel, "AJAX, Rich Internet appliactions and web development", Prentice Hall, 2008.

REFERENCES

1. Jeffy Dwight, Michael Erwin and Robert Niles, "Using CGI", Prentice Hall of India QUE, 2010
2. Scot Johnson, Keith Ballinger, Davis Chapman, "Using Active server Pages", Prentice Hall of India, 1999
3. Ted coombs, Jason coombs , Brewer, " Active X source book", John wiley, 1999
4. Evangelos Petroutsos , " Mastering Visual Basic 6", BPB Publications, 1998

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35021P27	OBJECT ORIENTED ANALYSIS AND DESIGN	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to lean about basic concepts of designing object oriented systems and its application in Programming. This syllabus helps the students to develop software by identifying and implementing a set of objects and their interactions to meet the desired objectives.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To impart basic knowledge in analyzing the software systems so that the student will understand the object oriented concepts and they can design the object oriented systems effectively.
2.	To inculcate the knowledge of various UML (Unified Modeling language)diagrams
3.	To lay foundation for practical applications of object oriented concepts in programming aspects

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand various UML diagrams and design patterns	Understand
CO2: Understtand case study on various real time systems and applying design patterns	Apply
CO4: Practice the for the basic concepts	Apply
CO4: implement the design to code and perform testing	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	L	M	-	-	-	-	-	-	M	S	M	-
CO2	S	M	M	M	M	-	-	-	M	-	-	M	S	M	M
CO3	S	M	S	S	M	-	-	-	-	-	-	L	S	M	M
CO4	S	M	M		M	-	-	-	L	-	M	L	S	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION TO OOAD

Introduction to OOAD – Unified Process - UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

DESIGN PATTERNS

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller – Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioral – Strategy – observer

CASE STUDY

Case study – the Next Gen POS system, Inception –Use case Modeling – Relating Use cases – include, extend and generalization – Elaboration – Domain Models – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition

APPLYING DESIGN PATTERNS

System sequence diagrams – Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement – UML class diagrams – UML interaction diagrams – Applying GoF design patterns

CODING AND TESTING

Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing

TEXT BOOKS

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development‖, Third Edition, Pearson Education

2.Object Oriented Analysis And Design By Brahama Dathan & Sranath Ramnath

REFERENCES

1. Simon Bennett, Steve Mc Robb and Ray Farmer, ―Object Oriented Systems Analysis and Design Using UML‖, Fourth Edition, Mc-Graw Hill Education
2. . Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable Object-Oriented Software‖, Addison-Wesley

Martin Fowler, ―UML Distilled: A Brief Guide to the Standard Object Modeling Language‖, Third edition, Addison Wesley

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35021P18	GAME THEORY	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to understand the basics of Game Theory

PREREQUISITE: ENGINEERING MATHEMATICS

COURSE OBJECTIVES

1	To introduce the student to the notion of a game, its solutions concepts, and other basic notions and
2	To study tools of game theory, and the main applications for which they are appropriate, including electronic trading markets
3	To formalize the notion of strategic thinking and rational choice by using the tools of game theory, and to provide insights into using game theory in modeling applications
4	To draw the connections between game theory, computer science, and economics, especially emphasizing the computational issues
5	To introduce contemporary topics in the intersection of game theory, computer science, and economics

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Explain the concept of basic notion of a game, its solutions concepts, and other issues	Understand
CO2: Develop a strategic game theory with perfect information	Apply
CO3: Analyze a formal notion of strategic thinking and rational choice by using tools of game theory	Analyze
CO4: Indentify the non-cooperative game theory form.	Apply
CO5: Analyze the connections between game theory, computer science, and economics, especially emphasizing the computational issues	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	M	M	-	-	L	-	L	-	-	**S**	M	M
CO2	M	-	-	M	L	-	S	-	-	M	-	-	**S**	-	-
CO3	S	M	M	M	L	-	-	-	-	L	S	L	-	S	-
CO4	S	M	M	S	M	-	-	M	-	M	-	-	-	-	M
CO5	S	M	M	M	M	-	-	-	-	M	-	L	M	S	-

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Making rational choices: basics of Games – strategy - preferences – payoffs – Mathematical basics - Game theory – Rational Choice - Basic solution concepts-noncooperative versus cooperative games - Basic computational issues - finding equilibria and learning in games- Typical application areas for game theory (e.g. Google's sponsored search, eBay auctions, electricity trading markets).

GAMES WITH PERFECT INFORMATION

Games with Perfect Information - Strategic games - prisoner's dilemma, matching pennies Nash equilibria-theory and illustrations - Cournot's and Bertrand's models of oligopoly- auctions mixed strategy equilibrium-zero-sum games- Extensive Games with Perfect Information repeated games (prisoner's dilemma)- subgame perfect Nash equilibrium; computational issues.

GAMES WITH IMPERFECT INFORMATION

Games with Imperfect Information - Bayesian Games – Motivational Examples – General Definitions – Information aspects – Illustrations - Extensive Games with Imperfect -Information - Strategies- Nash Equilibrium – Beliefs and sequential equilibrium – Illustrations - Repeated Games – The Prisoner's Dilemma – Bargaining.

NON-COOPERATIVE GAME THEORY

Non-cooperative Game Theory - Self-interested agents- Games in normal form - Analyzing games: from optimality to equilibrium - Computing Solution Concepts of Normal-Form Games – Computing Nash equilibria of two-player, zero-sum games -Computing Nash equilibria of twoplayer, general-sum games - Identifying dominated strategies.

MECHANISM DESIGN

Aggregating Preferences-Social Choice – Formal Model- Voting - Existence of social functions - Ranking systems - Protocols for Strategic Agents: Mechanism Design - Mechanism design with unrestricted preferences- Efficient mechanisms - Vickrey and VCG mechanisms (shortest paths) - Combinatorial auctions - profit maximization Computational applications of mechanism design - applications in Computer Science - Google's sponsored search - eBay auctions.

TEXT BOOKS

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth Edition, Sun Microsystems Press, 2008.

REFERENCES

1. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005.

2. David Marshall, Wade A. Reynolds, “Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center”, Auerbach Publications, 2006.

3. Kumar Reddy, Victor Moreno, “Network virtualization”, Cisco Press, July, 2006.

4. Chris Wolf, Erick M. Halter, “Virtualization: From the Desktop to the Enterprise”, APress 2005.

5. Kenneth Hess , Amy Newman, “Practical Virtualization Solutions: Virtualization from the Trenches”, Prentice Hall, 2010.

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35021P20	INFORMATION RETRIEVAL TECHNIQUES	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to understand the basics of Information Retrieval with pertinence to modeling, query operations and indexing.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To learn about the basic concepts, practical issues and impact of the web on Information Retrieval
2	To understand about the various IR models
3	To get an understanding of machine learning techniques for text classification and clustering
4	To understand the various applications of Information Retrieval giving emphasis to Multimedia IR
5	To lay foundation for learning the concepts of digital libraries

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Describe the objectives of information retrieval systems	Understand
CO2: Understand about the various IR models	Apply
CO3: Understand the static and dynamic indices and query operations	Apply
CO4: implement clustering algorithms like hierarchical clustering and classification	Apply
CO5: Understand searching ,ranking and digital libraries	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	M	M	M	-	-	-	-	-	M	S	S	S
CO2	S	S	S	M	M	L	-	M	-	-	-	M	S	M	M
CO3	S	L	L	-	L	-	-	-	-	-	-	S	M	S	S
CO4	S	S	S	M	M	M	-	M	-	-	-	M	S	-	S
CO5	S	S	M	M	M	L	-	-	-	-	-	M	M	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Motivation – Basic Concepts – Practical Issues - Retrieval Process – Architecture - Boolean Retrieval – Retrieval Evaluation – Open Source IR Systems–History of Web Search – Web Characteristics–The impact of the web on IR —IR Versus Web Search–Components of a Search engine.

MODELING

Taxonomy and Characterization of IR Models – Boolean Model – Vector Model - Term Weighting – Scoring and Ranking –Language Models – Set Theoretic Models - Probabilistic Models – Algebraic Models – Structured Text Retrieval Models – Models for Browsing.

INDEXING

Static and Dynamic Inverted Indices – Index Construction and Index Compression. Searching - Sequential Searching and Pattern Matching. Query Operations -Query Languages – Query Processing - Relevance Feedback and Query Expansion - Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency.

CLASSIFICATION AND CLUSTERING

Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering –Matrix decompositions and latent semantic indexing – Fusion and Meta learning.

SEARCHING AND RANKING

Searching the Web –Structure of the Web –IR and web search – Static and Dynamic Ranking - Web Crawling and Indexing – Link Analysis - XML Retrieval Multimedia IR: Models and Languages – Indexing and Searching Parallel and Distributed IR – Digital Libraries.

TEXT BOOKS

1. Ricardo Baeza – Yates, BerthierRibeiro – Neto, Modern Information Retrieval: The concepts and Technology behind Search (ACM Press Books), Second Edition
2. Textbook Retrieval Systems In Information Management by GG Chowdhury

REFERENCES

1. Christopher D. Manning, PrabhakarRaghavan, HinrichSchutze, Introduction to Information Retrieval, Cambridge University Press, First South Asian Edition
2. Stefan Buttcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval Implementing and Evaluating Search Engines, The MIT Press, Cambridge.

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35021P33	SOFTWARE QUALITY MANAGEMENT	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

Software Testing and Quality Assurance is predominant for the smartness of the Software system. Software testing is a critical element of software quality assurance and represents the ultimate review of specification, design and coding. The real challenge to deliver successful software product relies on sound testing strategies and tools.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	The students will be able to differentiate between quality control, quality management and quality assurance
2	The students will be able to discuss the different components of SQA system
3	The students will be able to discuss different software quality factors models
4	The students will be able to understand the rational for the SE code of ethics and discuss them

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Ability to understand the quality management in software	Understand
CO2: Analyze the different types of models for quality assurance	Analyze
CO3: Demonstrate software quality infrastructures.	Apply
CO4: Measure various business process reengineering.	Apply
CO5: Know how to prevent the defects.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3
CO1	S	M	-	M	M	-	-	-	-	-	-	S	-	S	S
CO2	S	S	S	M	M	-	-	M	-	-	-	S	-	M	S
CO3	S	M	S	M	M	-	-	-	-	-	-	S	-	M	S
CO4	S	M	S	-	L	-	-	L	-	-	-	S	-	M	S
CO5	S	M	S	-	M	-	-	L	-	-	-	S	-	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION TO SOFTWARE QUALITY & ARCHITECTURE

Need for Software quality – Quality challenges – Software quality assurance (SQA) – Definition and objectives – Software quality factors- McCall‟s quality model – SQA system and architecture – Software Project life cycle Components – Pre project quality components – Development and quality plans

SQA COMPONENTS AND PROJECT LIFE CYCLE

Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – CASE tools for software quality – Software maintenance quality – Project Management

SOFTWARE QUALITY INFRASTRUCTURE

Procedures and work instructions – Templates – Checklists – 3S developmenting – Staff training and certification Corrective and preventive actions – Configuration management – Software change control – Configuration management audit -Documentation control – Storage and retrieval.

SOFTWARE QUALITY MANAGEMENT & METRICS

Project process control – Computerized tools – Software quality metrics – Objectives of quality measurement – Process metrics – Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model.

STANDARDS, CERTIFICATIONS & ASSESSMENTS

Quality manangement standards – ISO 9001 and ISO 9000-3 – capability Maturity Models – CMM and CMMI assessment methodologies – Bootstrap methodology – SPICE Project – SQA project process standards – IEEE st 1012 & 1028 – Organization of Quality Assurance – Department management responsibilities – Project management responsibilities – SQA units and other actors in SQA systems.

TEXT BOOKS

1. DanielGalin, “Software Quality Assurance”, Pearson Publication, 2009.

REFERENCES

1. Alan C. Gillies, “Software Quality: Theory and Management”, International Thomson Computer Press, 1997.

2. Mordechai Ben-Menachem “Software Quality: Producing Practical Consistent Software”, International Thompson Computer Press, 1997.

COURSE DESIGNERS

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35021P25	NATURAL LANGUAGE PROCESSING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To familiarize the concepts and techniques of Natural language Process of Human Languages such as English and other Indian Languages using computers

PREREQUISITE

nil

COURSE OBJECTIVES

1.	Map the appropriate processing technique to a problem and implement the technique
2.	Demonstrate required design skills for large collection sets
3.	Analyze the theoretical formulation of the natural language processing techniques.
4.	Comprehend the state-of-the-art advanced NLP research articles and present them to an audience.
5.	Propose extension of existing NLP techniques for solving a range of problems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Identify the different linguistic components of natural language	Understand
CO2: Design a morphological analyser for a given natural language	Analyze
CO3: Decide on the appropriate parsing techniques necessary for a given language	Apply
CO4: Understand the role of semantics of sentences and pragmatics	Apply
CO5: Design applications involving natural language	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	M	M	M	-	-	-	-	-	-	-	S	M	M
CO2	S	S	M	M	M	-	-	-	-	-	-	-	S	M	M
CO3	S	S	S		L	-	-	-	-	-	-	-	S	-	M
CO4	S	M	M		L	-	-	-	-	-	-	-	S	M	S
CO5	S	S	M	M	L	-	-	-	-	-	-	-	S	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Introduction to Natural Language Processing, Origins and challenges of NLP -Language and Grammar, Information Retrieval. Language Modeling: Various Grammar-based Language Models -Statistical Language Model, Representation and understanding, Linguistic background.

MORPHOLOGY AND PART-OF-SPEECH PROCESSING

Morphology and Part-Of-Speech Processing Introduction –Regular Expressions and Automata-Non-Deterministic FSAs. Transducers –English Morphology -Finite-State Morphological Parsing -Porter Stemmer -Tokenization-Detection and Correction of Spelling Errors. N-grams –Perplexity - Smoothing - Interpolation -Backoff. Part-of-Speech.

SYNTAX ANALYSIS

Syntax Analysis Finite-State and Context-Free Grammars -Dependency Grammars. Syntactic Parsing – Ambiguity -Dynamic Programming Parsing Methods –CKY-Earley and Chart Parsing-Partial Parsing-Evaluation. Statistical Parsing –Probabilistic Context-Free Grammars –Probabilistic CKY Parsing of PCFGs –Probabilistic Lexicalized CFGs – Collins Parser – Shallow parsers – Dependency parsing.

SEMANTIC ANALYSIS & PRAGMATICS

Semantic and Pragmatic Interpretation Representation of Meaning –Desirable Properties -Computational Semantics -Word Senses -Relations Between Senses –WordNet -Event Participants-Proposition Bank - Frame Net -–Metaphor. Computational Lexical Semantics –Word Sense Disambiguation-Supervised Word Sense Disambiguation -Dictionary and Thesaurus Methods – Word Similarity - Minimally Supervised WSD - Hyponymy and Other Word Relations - Semantic Role Labeling -Unsupervised Sense Disambiguation. Computational Discourse - Discourse Segmentation - Unsupervised Discourse - Segmentation - Text Coherence -Reference Resolution – Phenomena – Features and algorithms - Pronominal Anaphora Resolution.

APPLICATIONS

Applications Information Extraction –Named Entity Recognition -Relation Detection and Classification – Temporal and Event Processing -Template-Filling -Biomedical Information Extraction. Question Answering and Summarization - Information Retrieval -Factoid Question Answering -Summarization -Single andMulti-Document Summarization - Focused Summarization -Evaluation. Dialog and Conversational Agents – Properties of Human Conversations -Basic Dialogue Systems.

TEXT BOOK

1. Sowmya Vajjala, Bodhisattwa Majumder and Anuj Gupta," Practical Natural Language Processing: A Comprehensive Guide to Building Real-World NLP Systems", O" Reilly, 1st Edition, 2020.
2. Emily M. Bender and Alex Lascarides "Linguistic Fundamentals for Natural Language Processing II: 100 Essentials from Semantics and Pragmatics", Morgan and Claypool , 1st Edition, 2019.
3. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Pearson Publication, 1st Edition, 2014.
4. James Allen "Natural Language Understanding", Pearson Publication 8th Edition, 2012.

REFERENCES

1. NitinIndurkhya, Fred J. Damerau, "Handbook of Natural Language Processing", (Chapman & Hall/CRC Machine Learning & Pattern Recognition), 2nd Edition, 2010.
2. Alexander Clark, Chris Fox, Shalom Lappin, "The Handbook of Computational Linguistics and Natural Language Processing", Wiley-Blackwell, 2nd Edition, 2010.
3. https://nptel.ac.in/courses/106/105/106105158/

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4. https://www.coursera.org/learn/language-processing

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35021P31	SCALA PROGRAMMING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

The purpose of this course is to introduce scala programming a remarkably powerful functional programming language to write code for data analysis and machine learning, distributed computing and web development.

PRERQUISITE : JAVA programming

COURSE OBJECTIVES

1.	To provide basic knowledge on scala programming concepts.
2.	To evaluate the different operations of functions
3.	To Create lists and tuples, evaluate its operations
4.	To Create patterns and match the same with traits and case classes
5.	To learn about monads and functors

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Comprehend the usage of of basic constructs of a functional programming language	Understand
CO2. Apply the different operations involved in functional data structures .	Apply
CO3. Evaluate the operations on lists and tuples.	Apply.
CO4. Apply the traits and case classes operations.	Apply.
CO5. Comprehend about monads and functors	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	M	-	-	-	-	-	-	-	M	S	M
CO2	S	S	M	M	M	-	-	-	-	-	-	-	M	S	M
CO3	M	S	S	M	M	-	-	-	-	-	-	-	M	M	S
CO4	S	S	M	S	M	-	-	-	-	-	-	-	S	S	M
CO5	S	S	S	M	M	-	-	-	-	-	-	-	S	S	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Non- Functional programming -Functional programming-Benefits of Functional Programming in Scala-Referential Transparency- Modules- Objects-Namespaces -Basic Functions-Polymorphic functions-Tail calls

PATTERN MATCHING

Defining functional data structures-Pattern Matching-Variadic functions in Scala-Data sharing in functional data structures-Recursion over lists-Generalizing to higher order functions

LISTS AND TUPLES

Basic operations on lists- Strict and non-strict functions-Lazy Lists Example- Infinite Steams and co recursion- Tuples-Basic operations on tuples.

TRAITS

Traits – Purpose and Syntax- Interface types- Ordered trait- Traits for modifying interfaces- Stacking modifications- Traits and operations

MONADS AND FUNCTORS

Monad Laws-Generalizing monads-Applicative trait Monads vs Applicative functors- Functor Laws -Traversable functors-Uses of Traverse.

TEXT BOOKS:

1. Paul Chiusano and Rúnar Bjarnason, "Functional Programming in Scala", Manning Publishers, 2014.

2. Dean Wampler, Alex Payne, "Programming Scala", O'Reilly Media, 2009.

REFERENCES:

1. Oderskey M,SpoonL,VennersB,—ProgramminginScala‖,Thirdedition.
2. Hortsmann, C., Scala for the Impatient, 2nd ed., Addison-Wesley,2016.

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35021P35	THEORITICAL APPROACH FOR WEB APPLICATION DEVELOPMENT	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To understand the concepts of web design tools and to design and develop web-pages professionally.

PREREQUISITE

nil

COURSE OBJECTIVES

1.	Developing the various web pages through implementation skills of interactive approaches
2.	Demonstrate the required skills for Web design Languages and web-designing tools.
3.	Understand the need, design approaches for software architecture to bridge the dynamic requirements and implementation.
4.	Learn the design principles of interactive web pages , integration of data bases and servers for large scale system.
5.	Build design knowledge on service oriented and model driven architectures for the enterprise applications.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Able to define client side scripting and make use of JavaScript and AJAX to validate at client side.	Understand
CO2: Understand the usage of various data bases for web application development	Understand
CO3: Able demonstrate Server side programming and adopt to build applications with java Servlets and JSP's.	Apply
CO4: Decide on the appropriate framework and architecture of Struts	Apply
CO5: Design Web applications involving Integrating and validating the input of all form design	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	S	M	M	-	-	-	-	-	-	-	S	S	M
CO2	S	M	M	M	M	-	-	-	-	-	-	-	S	M	M
CO3	S	M	S		L	-	-	-	-	-	-	-	M	-	S
CO4	S	M	M		L	-	-	-	-	-	-	-	M	M	S
CO5	S	S	M	M	L	-	-	-	-	-	-	-	S	M	S

S- Strong; M-Medium; L-Low

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INTRODUCTION:

Rich Internet Applications-Introduction to HTML-Responsive web design-Introduction to CSS- CSS types-Introduction to JavaScript-Control structure-Objects-Events-Basic AJAX-XML- and DOM , creating a full scaled web design.

DATABASE

Introduction Angular to JS-Expression-Module -Directive Data binding Controllers Scope-Filter -Introduction to Mongo- DB-Documents Collection-Database Creating, Updating, Deleting documents-Querying.

OVERVIEW OF JSP2

Overview of SERVLET-Creating dynamic web pages using JSP Standard- Introduction to MYSQL -Connection Management-Resultset, Statements-Prepared statement, Callable Statement.

STRUTS ARCHITECTURE

Struts classes- Understanding struts-Understanding Action Mappings- Struts flow with an example application-Struts Tiles Framework-Struts Validation Framework.

WEB SERVICES

Validating form input-Handling form submission-Creation of Batch Service-Securing web application-Integrating Data- Creating asynchronous method-Using Web Socket to build an interactive web application

TEXT BOOKS:

1. Deitel ,Deitel and Nieto, ―Internet and World Wide Web – How to program‖,4th Edition, Pearson Education Publishers,2009

2. EricFreeman,Elisabeth Robson,―HTML5Programming‖,firstedition,O'ReillyPublishers, 2011.

3. RobinNixon,"LearningPHP,My SQL, JavaScript, CSS & HTML5 "ThirdEdition, O'REILLY, 2014.

REFERENCES:

1. OderskeyM,SpoonL,VennersB,―ProgramminginScala‖,Thirdedition.

2. Hortsmann, C., Scala for the Impatient, 2nd ed., Addison-Wesley,2016.

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35021P11	DATA SCIENCE IN PYTHON	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This will introduce the learner to the basics of the python programming environment, including fundamental python programming techniques such as lambdas, reading and manipulating csv files, and the numpy library. The course will introduce data manipulation and cleaning techniques using the popular python pandas data science library and introduce the abstraction of the Series and DataFrame as the central data structures for data analysis, along with tutorials on how to use functions such as groupby, merge, and pivot tables effectively.

PREREQUISITE

- NIL

COURSE OBJECTIVES

1.	To provide knowledge of python programming paradigms required for Data Science.
2.	Produce Python code to statistically analyze a dataset.
3.	To provide the knowledge of NumPy Packages
4.	To provide the knowledge of Pandas, MatplotLib
5.	Critically evaluate data visualizations based on their design and use for communicating stories from data.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand and demonstrate the usage of built-in objects in Python	Understand
CO2: Analyze the significance of python program development environment and apply it to solve real world applications	Analyze
CO3: Implement numerical programming.	Apply
CO4: Implement data handling visualization through NumPy	Apply
CO5: Implement Pandas and MatplotLib modules.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	S										M		
CO2	M	M	S		M	M							M	M	M
CO3	S	M	M	M	M	L							M		
CO4	S	M	M	M	M								M	M	M
CO5	S	M	S	M	M	M							M		

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT I INTRODUCTION TO PYTHON

Structure of Python Program-Underlying mechanism of Module Execution-Branching and Looping-Problem Solving Using Branches and Loops-Functions - Lists and Mutability- Problem Solving Using Lists and Functions

UNIT II SEQUENCE DATATYPES AND OBJECT-ORIENTED PROGRAMMING

Sequences, Mapping and Sets- Dictionaries- -Classes: Classes and Instances-Inheritance- Exceptional Handling- Introduction to Regular Expressions using "re" module.

UNIT III USING NUMPY

Basics of NumPy-Computation on NumPy-Aggregations-Computation on Arrays- Comparisons, Masks and Boolean Arrays-Fancy Indexing-Sorting Arrays-Structured Data: NumPy's Structured Array.

UNIT IV DATA MANIPULATION WITH PANDAS –I

Introduction to Pandas Objects-Data indexing and Selection-Operating on Data in Pandas- Handling Missing Data-Hierarchical Indexing - Combining Data Sets - Aggregation and Grouping-Pivot Tables-Vectorized String Operations - Working with Time Series-High Performance Pandas- and query()

UNIT V VISUALIZATION AND MATPLOTLIB

Basic functions of matplotlib-Simple Line Plot, Scatter Plot-Density and Contour Plots- Histograms, Binnings and Density-Customizing Plot Legends, Colour Bars-Three- Dimensional Plotting in Matplotlib

TEXT BOOK:

1. Jake VanderPlas ,Python Data Science Handbook - Essential Tools for Working with Data, O'Reily Media,Inc, 2016
2. Zhang.Y ,An Introduction to Python and Computer Programming, Springer Publications,2016

REFERENCES:

1. Joel Grus ,Data Science from Scratch First Principles with Python, O'Reilly Media,2016.
2. T.R.Padmanabhan, Programming with Python,Springer Publications,2016
3. "CS41 - The Python Programming Language", *Stanfordpython.com*, 2019. [Online]. Available: https://stanfordpython.com/#overview. [Accessed: 20- Jun- 2019].
4. "Python for Data Science", *Cognitive Class*, 2019. [Online]. Available: https://cognitiveclass.ai/courses/python-for-data-science/. [Accessed: 20- Jun- 2019].

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35021P14	DIGITAL MARKETING	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This course will acquaint the learners to create a structured digital marketing plan and budget, Identify the correct measures to set objectives and evaluate digital marketing, Review and prioritize the strategic options for boosting customer acquisition, conversion, and retention using digital marketing.

PREREQUISITE

- NIL

COURSE OBJECTIVES

1.	To give the brief introduction of digital marketing
2.	To discuss the Service engine advertising and display marketing in internet marketing
3.	To overview the creating of concepts and types of Social media marketing
4.	To discuss the details of Search Engine Optimization and Web analytics
5.	To manage the advancement social media and maintaining the online reputation

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the concepts of digital marketing.	Understand
CO2: Understand the skills required for digital marketing	Understand
CO3: Analyze the Digital Marketing Platforms like Facebook, Twitter, Linkedin, and etc.,	Analyze
CO4: Apply Search Engine Optimization (SEO) and Web analytics	Apply
CO5: Understand and develop the digital marketing capstone	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	-	M	M							M		
CO2	M	M	S		M	M							M	M	M
CO3	S	M	M	M	M	M			M				M		
CO4	S	M	M	M	M	M			M				M	M	M
CO5	S	M	S	M	M	M		M	M				M		

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT I INTRODUCTION TO DIGITAL MARKETING

What is Digital Marketing - Why Digital Marketing - Digital Marketing Platforms - Organic and Paid Digital Marketing - Difference between Traditional Marketing and digital Marketing - types and channels of digital marketing - tools of digital marketing - Advantage and Disadvantage of Digital Marketing - Skills required in Digital Marketing - Digital Marketing Plan.

UNIT II INTERNET MARKETING

Internet Marketing opportunities and challenges - Digital marketing framework - **Search Engine Advertising:** - Pay for Search Advertisements - Ad Placement - Ad Ranks - Creating Ad Campaigns - Campaign Report Generation - **Display marketing:** - Types of Display Ads - Buying Models - Programmable Digital Marketing - Analytical Tools - YouTube marketing

UNIT III SOCIAL MEDIA MARKETING

Introduction to social media platforms, penetration & characteristics - Building a successful social media marketing strategy - Facebook Marketing: - Business through Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook Marketing Tools - Linkedin Marketing: - Introduction and Importance of Linkedin Marketing, Framing Linkedin Strategy, Lead Generation through Linkedin, Content Strategy, Analytics andTargeting - Twitter Marketing: - Introduction to Twitter Marketing, how twitter Marketing is different than other forms of digital marketing, framing content strategy, Twitter Advertising Campaigns - Instagram and Snapchat: - Digital Marketing Strategies through Instagram and Snapchat - Mobile Marketing: - Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics.

UNIT IV SEO, WEB ANALYTICS

Introduction and need for SEO - How to use internet & search engines - search engine and its working pattern - On-page and off-page optimization - SEO Tactics - Planning A New Website - Market Your Optimized Website - Analytics and Measurement. - Introduction to Digital Analytics - Building Blocks - Fundamentals of Digital Analytics - Business Perspective - Data Analysis Fundamentals - Analysis Perspective: Providing Insights - Enabling Capabilities - Managing Analytics - Audience - Acquisition - Behavior - Conversions Onboarding - Retention and Expansion - Advocacy - Privacy and Ethics - Wrapping Up

UNIT V ADVANCED SOCIAL MEDIA

Understanding Paid Earned and Owned Social Media - Social Sharing - Blogging for Business - Finding and Communicating with Influencers - Online Reputation Management - Social Media Measurement - Social Media Analytics - Pinterest Marketing - Digital Marketing Capstone.

TEXT BOOK:

1. Ryan, D. (2014). Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan Page Limited.

REFERENCES:

1. Jan Zimmerman, Deborah Ng - Social Media Marketing All-in-One For Dummies - 4th Edition – John Wiley &Sons Inc.
2. The Beginner's Guide to Digital Marketing (2015). Digital Marketer. Pulizzi,J.(2014) Epic Content Marketing, Mcgraw Hill Education.
3. Dave Chaffey & Fiona Ellis , Digital Marketing: Strategy, Implementation & Practice – 6 th Edition, Pearson.
4. Eric Enge , Art of SEO (3rd edition) - O'Reilly.

COURSE DESIGNERS

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35021P09	CYBER SECURITY PRINCIPLES	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To understand the need for Cyber Security in real time and to study techniques involved in it.

PREREQUISITE : NIL

COURSE OBJECTIVES

1.	To understand the fundamentals of Cyber Security and issues
2.	To study various cyber crimes and legal remedies
3.	To apply various privacy and security
4.	To study E-Commerce and digital payments
5.	To study the basic security aspects related to Computer and Mobiles

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: understand the concept of Cyber security and issues and challenges associa with it.	Understand
CO2: understand the cyber crimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures	Apply
CO3: Apply various privacy and security concerns on online Social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms.	Apply
CO4: Apply the basic concepts related to E-Commerce and digital payments.	Apply
CO5: Apply the basic security aspects related to Computer and Mobiles.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	M	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	M	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M		-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	S	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

INTRODUCTION TO CYBER SECURITY

Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.

CYBER CRIME AND CYBER LAW

Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organisations dealing with Cyber crime and Cyber security in India, Case studies.

SOCIAL MEDIA OVERVIEW AND SECURITY

Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring,

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Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.

E - C O M M E R C E AND DIGITAL PAYMENTS

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payament Settlement Act,2007.

DIGITAL DEVICES S E C U R I T Y , TOOLS AND TECHNOLOGIES FOR CYBER SECURITY

End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.

REFERENCES

1. Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)
4. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
5. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
6. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd. 7. Fundamentals of Network Security by E. Maiwald, McGraw Hill

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Assistant professor G-II	CSE	rjaichandran@avit.ac.in
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35021P21	INTERNET OF THINGS AND ITS APPLICATIONS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To study and understand the technologies involved in Internet of Things (IoT) and apply them practically.

PREREQUISITE :NIL

COURSE OBJECTIVES

1.	To understand the basic concepts of IOT
2.	To study the methodology of IOT
3.	To Develop IOT applications using Raspberry PI
4.	To Develop IOT applications using Arduino and Intel Edison
5.	To apply cloud concepts in IOT

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Able to understand basics in IOT	Understand
CO2: Able to understand Methodology in IOT	Apply
CO3: Able to design IOT applications using Raspberry	Analyze
CO4: Able to design IOT applications using Aurdino and Intel Edison	Analyze
CO5: Able to apply Cloud computing in IOT	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**M**	**M**	**M**	**M**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**M**	**M**	**M**
CO2	**M**	**M**	**M**	**M**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**M**	**M**	**M**
CO3	**M**	**M**	**S**	**M**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**M**	**M**	**M**
CO4	**S**	**M**	**M**	**M**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**M**	**M**	**S**
CO5	**S**	**M**	**M**	**M**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**M**	**M**	**S**

S- Strong; M-Medium; L-Low

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Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.
IOT METHODOLOGY
IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.
IOT WITH RASPBERRY
Bascis of Raspberry PI, Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services
IOT WITH AURDINO AND INTEL EDISON
Basics of Aurdino, Intel Edison with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks
APPLICATIONS
Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for Iot – Data Analytics for IoT – Software & Management Tools for IoT.
TEXT BOOKS
1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015. **2.** Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
REFERENCES
1. Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014

COURSE DESIGNERS

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34121I07	BUSINESS INTELLIGENCE AND ITS APPLICATIONS	Category	L	T	P	Credit
		EC-IE	3	0	0	3

PREAMBLE

Business Intelligence (BI) refers to the tools, technologies, applications and practices used to collect, integrate, analyze, and present an organization's raw data in order to create insightful and actionable business information in Data mining.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To Introduce students to various business intelligence concepts
2	To learn the concepts of data integration used to develop intelligent systems for decision support
3	To introduce visualization tool for prepare the enterprise reporting
4	To learn analytical components and technologies used to create dashboards and scorecards, data/text/Web mining methods
4	To gain new insights into organizational operations in implementation of systems for Business Intelligence (BI)

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Learn about the concepts of OLTP and OLAP for BI infrastructure development	Understand
CO2. Gained an understanding of how business professionals can use analytics techniques to formulate and solve relevant problems and how they use analytics to support decision making	Analyze
CO3. Apply Clustering, Association and Classification techniques for Data Integration	Apply
CO4. Assess BI tools to solve problems, issues, and trends using predictive analysis	Apply
CO5. Develop systems to measure, monitor and predict the enterprise variables and performance indicators for business decision-making process	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO BUSINESS INTELLLIGENCE

Introduction to OLTP AND OLAP – BI Definition and BI Concepts – Business Applications of BI - BI

Framework- Role of Data Warehousing in BI –BI Infrastructure Components- BI Process – Developing Data Warehouse – Management Framework – Business driven approach –BI Technology — BI Roles & Responsibilities.

BASICS OF DATA INTEGRATION

Concepts of Data Integration need and advantages of using Data Integration – Introduction to common data integration approaches – Introduction to ETL using SSIS – Introduction to Data Quality – Data Profiling Concepts and Applications.

INTRODUCTION TO MULTIDIMENSIONAL DATA MODELING

Introduction to Data and Dimensional Modeling – Multi Dimensional Data Model – ER modeling Vs Multi Dimensional Model – Concepts of Dimensions - facts - cubes- attributes- hierarchies- star and snowflake schema – Introduction to Business Metrics and KPIs – Creating Cubes using SSAS.

BASICS OF ENTERPRISE REPORTING

Introduction to Enterprise Reporting - Concepts of dashboards - balanced scorecards – Introduction to SSRS Architecture– Enterprise Reporting using SSRS reporting service

BI ROAD AHEAD

BI and Mobility – BI and cloud computing – BI for ERP systems - Benefits of BI in ERP-NorthWind_Traders Data-Data Analyses through Excel-Kettle Tool – Conversion of data using Kettle Tool.

TEXT BOOKS

1.RN Prasad, Seema Acharya, ”Fundamentals Of Business Analytics” Wiley India,2011

REFERENCES

1.Soumendra Mohanty, “Data Warehousing Design, Development and Best Practices”, Tata McGraw-Hill, New Delhi, 2007.

2.David Loshin, “Business Intelligence”, Morgan Kaufmann Publishsers, San Francisco, Fifth edition, 2007.

3.Larissa Terpeluk Moss and Shaku Atre, “Business Intelligence Roadmap”, Pearson Education, 2007

COURSE DESIGNERS

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34121I06	BUILDING ENTERPRISE APPLICATIONS	Category	L	T	P	Credit
		EC-IE	3	0	0	3

PREAMBLE

Enterprise Applications are complex systems. They require delicate planning and expertise for the right type of development Enterprise Applications are the instruments of administration, management, and planning for an enterprise

PREREQUISITE – Nil

COURSE OBJECTIVES

1	To teach the students about various ways to build enterprise applications
2	At the completion of the class, they should understand how to deploy systems to a number of different host platforms
3	They develop graphical user interfaces, as well as character-oriented screens. They test and debug their system

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Familiarize with concept of Enterprise Analysis and Business Modeling.	Understand
CO2. Understand requirements validation, planning and estimation. Design and document the application architecture.	Understand
CO3. Understand the importance of application framework and designing other application components	Apply
CO4. Construct and develop different solution layers.	Apply
CO5. Perform Code review, Code analysis, build process.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	M	-	-	-	M	-	M	-	**S**	M	M
CO2	S	M	M	M	M	-	-	-	M	-	-	-	**S**	M	M
CO3	S	-	M	M	M	-	-	-	M	-	-	M	**S**	-	M
CO4	S	M	S	M	S	-	-	-	S	M	M	M	**S**	M	M
CO5	S	M	S	M	S	-	-	-	S	S	S	M	**S**	M	-

S- Strong; M-Medium; L-Low

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SYLLABUS

Introduction

enterprise applications and their types, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise application

Incepting of enterprise applications

Enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non functional requirements, requirements validation, planning and estimation

Architecting and Designing enterprise applications

Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture- design, different technical layers, best practices, data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design

Constructing of enterprise applications

Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage

Testing and Rolling out enterprise applications

Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.

TEXT BOOKS

1. Raising Enterprise Applications – Published by John Wiley, authored by Anubhav Pradhan, Satheesha B. Nanjappa, Senthil K. Nallasamy, Veerakumar Esakimuthu
2. Building Java Enterprise Applications – Published by O'Reilly Media, authored by Brett McLaughlin

REFERENCE BOOK

1. Software Requirements: Styles & Techniques – published by Addison-Wesley Professional
2. Software Systems Requirements Engineering: In Practice – published by McGraw-Hill/Osborne Media
3. Managing Software Requirements: A Use Case Approach, 2/e – published by Pearson
4. Software Architecture: A Case Based Approach – published by Pearson

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34121I15	INTERNET AND WEB TECHNOLOGY	Category	L	T	P	Credit
		EC-IE	3	0	0	3

PREAMBLE

This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To introduce basic concepts of internet
2	To learn about HTML & XML
3	To learn about internet security

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 . Analyze a web page and identify its elements and attributes.	Analyze
CO2. Create web pages using XHTML and Cascading Style Sheets.	Apply
CO3. Build dynamic web pages using JavaScript (Client side programming).	Apply
CO4. Create XML documents and Schemas	Apply
CO5. Build interactive web applications using JSP	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	M	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	-	M	-	-	-	**S**	M	M
CO3	S	M	L	-	L	-	-	-	M	-	-	L	**S**	M	M
CO4	S	M	L	-	M	-	-	-	M	-	-	-	**S**	M	M
CO5	S	M	L	-	M	-	-	-	M	-	-	L	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO INTERNET

Introduction, Evolution of Internet, Internet Applications, Internet Protocol -TCP/IP, UDP, HTTP, Secure Http(Shttp) Internet Addressing – Addressing Scheme – Ipv4 & IPv6, Network Byte Order, Domain Name Server and IP Addresses, Mapping . Internet Service Providers, Types Of Connectivity Such As Dial-Up Leaded Vsat Etc. Web Technologies: Three Tier Web Based Architecture; Jsp, Asp, J2ee, .Net Systems

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HTML CSS AND SCRIPTING

HTML – Introduction, Sgml, Dtd(Document Type Definition, Basic Html Elements, Tags and usages, HTML Standards , Issues in HTML Dhtml: Introduction Cascading Style Sheets: Syntax ,Class Selector, Id Selector Dom (Document Object Model) & Dso (Data Source Object) Approaches To Dynamic Pages: Cgi, Java Applets, Plug Ins, Active X, Java Script – Java Script Object Model, Variables-Constant – Expressions, Conditions- Relational Operators- Data Types – Flow Control – Functions & Objects-events and event handlers – Data type Conversion & Equality – Accessing HTML form elements

XML

What is XML – Basic Standards, Schema Standards, Linking & Presentation Standards, Standards that build on XML, Generating XML data, Writing a simple XML File, Creating a Document type definition, Documents & Data ,Defining Attributes & Entities in the DTD ,Defining Parameter Entities & conditional Sections, Resolving a naming conflict, Using Namespaces, Designing an XML data structure, Normalizing Data, Normalizing DTDS

INTERNET SECURITY & FIREWALLS

Security Threats From Mobile Codes, Types Of Viruses, Client Server Security Threats, Data & Message Security, Various electronic payment systems, Introduction to EDI,Challenges–Response System, Encrypted Documents And Emails , Firewalls: Hardened Firewall Hosts, Ip- Packet Screening, Proxy Application Gateways, Aaa (Authentication ,Authorization And Accounting).

WEBSITE PLANNING & HOSTING

Introduction, Web Page Lay-Outing, Where To Host Site, Maintenance Of Site, Registration Of Site On Search Engines And Indexes, Introduction To File Transfer Protocol, Public Domain Software, Types Of Ftp Servers (Including Anonymous),FtpClients Common Command. Telnet Protocol, Server Domain, Telnet Client, Terminal Emulation. Usenet And Internet Relay Chat.

TEXT BOOKS

1. Internet & Intranet Engineering,- Daniel Minoli, TMH.

2 .Alexis Leon and Mathews Leon – Internet for Every One, Tech World.

REFERENCES

1. Eric Ladd, Jim O'Donnel –"Using HTML 4, XML and JAVA"-Prentice Hall of India -1999.

2. "Beginning Java Script "– Paul Wilton – SPD Publications –2001

Course Designers:

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35021I01	LEARNING IT ESSENTIALS BY DOING	Category	L	T	P	Credit
		EC-IE	3	0	0	3

PREAMBLE

The proposed elective course exposes the non-CS/IT students to IT Essentials. The core modules of this Elective includes programming , Database and web Technology amongst other related topics. This course refers to the basic tools and technologies for the right type of website development and enable student to create simple web applications

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To learn about the essentials of Information Technology
2	To get an idea about the scripting languages.
3	To get an idea about the internet protocols

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 Understand the networking concept internet protocols, network routing	Understand
CO2. Understand the fundamentals of web applications and its modeling	Understand
CO3. Understand and learn the scripting languages with design of web applications	Understand
CO4. Analyze the process of mobile communication and network technologies	Analyze
CO5. Build simple interactive applications, database applications and multimedia applications.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	-	-	-	-	-	-	-	M	**S**	M	M
CO2	S	M	M	M	-	-	-	-	-	-	-	M	**S**	-	M
CO3	S	M	M	M	-	-	-	-	-	-	-	M	**S**	M	M
CO4	M	M	M	M	M	-	-	-	-	-	-	M	**S**	M	-
CO5	M	M	M	M	S	-	-	-	-	-	-	M	**-**	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

Fundamentals of Computer architecture

introduction-organization of a small computer -Central Processing Unit - Execution cycle – Instruction categories – measure of CPU performance Memory – Input/output devices - BUS-addressing modes. System Software – Assemblers – Loaders and linkers – Compilers and interpreters

Operating system

Introduction – memory management schemes Process management Scheduling – threads. Problem solving with algorithms- Programming styles – Coding Standards and Best practices - Introduction to C -Programming Testing and Debugging. Code reviews -System Development Methodologies – Software development Models -User interface Design – introduction – The process – Elements of UI design & reports.

RDBMS

Data processing – the database technology – data models-ER modeling concept –notations – Extended ER features -Logical database design - normalization -SQL – DDL statements – DML statements – DCL statements

Writing Simple queries – SQL Tuning techniques – Embedded SQL - OLTP

Objected oriented concepts

Object oriented programming -UML Class Diagrams– relationship – Inheritance – Abstract classes – polymorphism-Object Oriented Design methodology - Common Base class -Alice Tool – Application of OOC using Alice tool.

Client server computing

Internetworking – Computer Networks – Working with TCP/IP – IP address – Sub netting – DNS – VPN – proxy servers World Wide Web – Components of web application - browsers and Web Servers

URL – HTML – HTTP protocol – Web Applications - Application servers – Web Security.

REFERENCES

1. Andrew S. Tanenbaum, Structured Computer Organization, PHI, 3rd ed., 1991
2. Silberschatz and Galvin, Operating System Concepts, 4th ed., Addision-Wesley, 1995
3. Dromey R.G., How to solve it by Computers, PHI, 1994
4. Kernighan, Ritchie, ANSI C language PHI,1992
5. Wilbert O. Galitz, Essential Guide to User Interface Design, John Wiley, 1997
6. Alex Berson, Client server Architecture, Mc Grew Hill International, 1994
7. Rojer Pressman, Software Engineering-A Practitioners approach, McGraw Hill, 5th ed., 2001
8. Alfred V Aho, John E Hopcroft, Jeffrey D Ullman, Design and Analysis of Computer Algorithms, Addison Wesley Publishing Co., 1998
9. Henry F Korth, Abraham Silberschatz, Database System Concept, 2nd ed. McGraw-Hill International editions, 1991
10. Brad J Cox, Andrew J.Novobilski, Object – Oriented Programming – An evolutionary approach, Addison – Wesley, 1991

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34121I13	ESSENTIALS OF INFORMATION TECHNOLOGY	Category	L	T	P	Credit
		EC-IE	3	0	0	3

PREAMBLE

This course aims to provide the fundamental concepts of Computer operations like hardware and software installation, and emphasizing principles application packages. This course aims at facilitating the student to understand the various concepts and functionalities of Database Management Systems, the method and model to store data and how to manipulate them through query languages, the effective designing of relational database and how the system manages the concurrent usage of data in multi user environment..

PREREQUISITE – Nil

COURSE OBJECTIVES

1	To provide basic knowledge of hardware and software components of computers.
2	To study Problem solving Techniques and program development cycle.
3	Design and test simple programs in C language
4	Document artifacts using common quality standards
5	Design simple data store using RDBMS concepts and implement

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 Understand the Basic knowledge on hardware and software terminologies.	Understand
CO2. Apply the knowledge of mathematics, science and computing in the core information technologies	Apply
CO3. Understand Program Devolvement Cycle and apply various Problem Solving Techniques	Apply
CO4. Develop the function programs with all the concepts in c	Analyze
CO5. Build and manipulate relational database using Structured Query Language and relational languages	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	M	-	-	-	-	-	-	-	**S**	M	M
CO2	S	M	M	M	M	-	-	-	-	-	-	-	**S**	M	M
CO3	S	M	M	M	M	-	-	-	-	-	-	-	**S**	M	M
CO4	S	M	M	M	M	-	-	-	-	-	-	-	**S**	M	M
CO5	S	M	M	M	M	-	-	-	-	-	-	-	**S**	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

Introduction

Basics of computer systems - Various hardware components - Data storage and various Memory units - Central Processing Unit - Execution cycle - Introduce to software and its classifications. Operating system concepts– Introduction – Memory management - Process management - Intercrosses Communication – Deadlocks - File management -Device management.

Problem Solving Techniques

Introduction to problem solving - Computational problem and it's classification - Logic and its types - Introduction to algorithms - Implementation of algorithms using flowchart - Flowcharts implementation through RAPTOR tool - Searching and sorting algorithms - Introduction and classification to Data Structures - Basic Data Structures - Advanced Data Structures

Programming Basics

Introduction to Programming Paradigms and Pseudo Code - Basic programming concepts - Program Life Cycle - Control Structures - Introduction and Demonstration of 1-D Array and 2-D Array - Searching and Sorting techniques - Demonstration Concept of memory references in arrays –Strings - Compiler Concepts - Code Optimization techniques. Structured Programming – Functions – Structures - File Handling - Introduction to Software Development Life Cycle - Industry Coding Standards and Best Practices - Testing and Debugging - Code Review

Project Preparation

Project Specification - Preparation of High level design and Detailed design document, Unit Test Plan and Integrated Test Plan - Coding and Unit Testing activities - Integration Testing.

RDBMS

Data processing – the database technology – data models-ER modeling concept –notations – Extended ER features-Logical database design - normalization -SQL – DDL statements – DML statements – DCL statements -Joins - Sub queries – Views-Database design Issues.

TEXT BOOKS

1. Information Technology Planning, Blokdyk Gerardus , Pearson 3rd Edition .

REFERENCES

1. "Computer Organization and Architecture" – William Stallings , Pearson 8th Edition
2. "Database System Concepts"- Abraham Silberschatz , Hendry F Korth – Indian 6th Edition.
3. "Computing Fundamentals and C Programming" Paperback – 1 Jul 2017 by E Balagurusamy (Author)
4. "How to solve it by computer " – R G Dromey, Pearson Edition 2006.
5. " Software testing "Principle and Practices - Desikan Srinivasan , Gopalaswamy Ramesh, Pearson Edition 2005.

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34121I16	INTRODUCTION TO MAIN FRAMES	Category	L	T	P	Credit
		EC-IE	3	0	0	3

PREAMBLE

The mainframe hardware and z/OS operating system grew up together and are highly complementary for reliability, availability, serviceability, scalability, security, and performance. The operating system taught in this course is z/OS, a widely used mainframe operating system. z/OS is known for its ability to serve thousands of users concurrently and for processing very large workloads in a secure, reliable, and expedient manner..

PREREQUISITE –

NIL

COURSE OBJECTIVES

1	To get an idea about the mainframe hardware
2	To get an idea about z/OS
3	To learn about JCL

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 Understand Concept of Computer Architecture ,Mainframes OS and Terminology	Understand
CO2. Understand Concept of virtual storage and its use in z/OS..	Understand
CO3 Understand Job Control language- Various statements in JCL- JCL procedures	Understand and Apply
CO4. Build and manipulate relational database using Structured Query Language and relational languages	Apply
CO5. Analyze various forms of data representation and structures supported by the COBOL language	Apply and Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	-	-	-	-	-	-	-	-	**S**	M	M
CO2	S	M	M	M	-	-	-	-	-	-	-	-	**S**	-	M
CO3	S	L	M	M	-	-	-	-	-	-	-	-	**S**	M	-
CO4	S	M	M	M	-	-	-	-	-	-	-	-	**S**	M	M
CO5	S	M	M	M	-	-	-	-	-	-	-	-	**S**	M	-

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT –I EVOLUTION OF MAINFRAME HARDWARE

Overview of Computer Architecture - Classification of Computers - micro, mini, mainframes and super computer – Mainframe computer - key features - benefits - Evolution of Mainframes - Different hardware systems. Mainframes OS and Terminology: Operating systems on mainframes, Batch processing vs. online processing - mainframe operating system. - evolution - concepts of Address space, Buffer management - Virtual storage - paging - swapping – Dataset management in mainframes.

UNIT-II Z/OS AND ITS FEATURES

Z-operating system (Z/OS) - Virtual storage - Paging process - storage Managers - Program execution modes - Address space - Multiple virtual system(MVS) , MVS address space, Z/OS address space - Dataset - sequential and partial dataset - Direct access storage device(DASD) -Access methods - Record formats - Introduction to virtual storage access methods(VSAM) - Catalog – VTOC.

UNIT-III INTRODUCTION TO JCL

Introduction to Job Control language - Job processing – structure of JCL statements - Various statements in JCL - JOB statement - EXEC statement – DD statement - JCL procedures and IBM utility programs.

UNIT-IV COBOL PROGRAMMING

Introduction – History, evolution and Features, COBOL program Structure, steps in executing COBOL. Language Fundamentals – Divisions, sections, paragraphs, sections, sentences and statements, character set, literals, words, figurative constants, rules for forming user defined words, COBOL coding sheet.. Data division – Data names, level numbers, PIC and VALUE clause, REDEIFNES, RENAMES and USAGE clause. Procedure Division – Input / Output verbs, INITIALIZE verb, data movement verbs, arithmetic verbs, sequence control verbs.

UNIT-V OVERVIEW OF DB2

Introduction to DB2 – System Service component, Database Service component, Locking Service component, Distributed Data Facility Services component, Stored Procedure component, catalogs and optimizer. DB2 Objects and Data Types - DB2 Objects Hierarchy, Storage groups, Database, Table space, Table, Index, Clustered index, Synonyms and aliases, Views, Data Types. DB2 SQL programming – Types of SQL statements, DCL, DDL, DML, SPUFI utility. Embedded SQL programming – Host variable, DECLGEN utility, SQLCA, single/multiple row manipulation, cursors, and scrollable cursors.

TEXT BOOKS

1. Gabrielle Wiorkowski & David Kull, DB2 Design & Development Guide, Addison Wesley, 1992.
2. Gary DeWard Brown, JCL Programming Bible (with z/OS) fifth edition, Wiley India Dream Tech, 2002.
3. M.K. Roy and D. Ghosh Dastidar, “Cobol Programming”, Tata McGraw Hill, New York, 1973.

REFERENCES

1. MVS JCL, Doug Lowe, Mike Murach and Associates.
2. AS/400 Architecture and Application – The Database Machine by Jill T. Lawrence (SPD Publications)

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3. Gary DeWard Brown, JCL Programming Bible (with z/OS) fifth edition, Wiley India Dream Tech, 2002.

4.z/OS V1R4.0 MVS JCL Reference found online at

http://www-.ibm.com/support/docview.wss?uid=pub1sa22759706

5.z/OS V1R1.0 MVS JCL Reference found online at

http://publibz.boulder.ibm.com/cgibin/bookmgr_OS390/BOOKS/iea2b600/CCONTENTS

6. COBOL - Language Reference, Ver 3, Release 2, IBM Redbook.

7. COBOL - Programming Guide, Ver 3, Release 2, IBM Redbook.

8. Complete CL The Definitive Control Language Programming Guide by Ted Holt and Ernie Malaga (SPD Publication).

9. Nancy Stern & Robert A Stern, "Structured Cobol Programming", John Wiley & Sons, New York, 1973.

10. M.K. Roy and D. Ghosh Dastidar, "Cobol Programming", Tata McGraw Hill, New York, 1973.

11. Newcomer and Lawrence, Programming with Structured COBOL, McGraw Hill Books, New York, 1973.

12. Craig S Mullins, DB2 Developer's Guide, Sams Publishing, 1992.

13. Gabrielle Wiorkowski & David Kull, DB2 Design & Development Guide, Addison Wesley, 1992.

14. C J Date & Colin J White, A Guide to DB2, Addison Wesley.

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34121I20	MOBILE APPLICATION DEVELOPMENT	Category	L	T	P	Credit
		EC-IE	3	0	0	3

PREAMBLE

In this modern era almost every hands has a handheld devices. Each handheld device have the computing capability to meet the half the needs of user such as banking, browsing, education and emergency etc. It is a must for a computer engineer to have some basic knowledge about the handheld devices platform and its supporting software development. This course will give adequate knowledge in developing a mobile applications for different such as Android, iOS, Windows.

PRE REQUISITE – NIL

COURSE OBJECTIVES

1.	Understand system requirements for mobile applications
2.	Generate suitable design using specific mobile development frameworks
3.	Generate mobile application design
4.	Implement the design using specific mobile development frameworks
5.	Deploy the mobile applications in marketplace for distribution

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Expose to technology and business trends impacting mobile applications	Understand
CO2.Understand enterprise scale requirements of mobile applications	Understand
CO3. Familiarize in the Graphics used for Android application development	Apply
CO4. Competent with the characterization and architecture of mobile applications	Apply
CO5. Competent with designing and developing mobile applications using one application development framework.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	M	-	-	M	-	-	-	M	**S**	M	M
CO2	S	M	M	M	M	-	-	M	-	-	-	M	**S**	M	M
CO3	S	M	L	M	L	-	-	M	-	-	-	L	**S**	M	M
CO4	S	M	M	M	M	-	-	M	-	-	-	M	**S**	M	M
CO5	S	M	M	M	L	-	-	M	-	-	-	L	**S**	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT I INTRODUCTION

Introduction to mobile applications –Embedded systems -Market and business drivers for mobile applications –Publishing and delivery of mobile applications –Requirements gathering and validation for mobile applications

UNIT II BASIC DESIGN

Introduction –Basics of embedded systems design –Embedded OS -Design constraints for mobile applications, both hardware and software related –Architecting mobile applications –User interfaces for mobile applications –touch events and gestures –Achieving quality constraints –performance, usability, security, availability and modifiability.

UNIT III ADVANCED DESIGN

Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

UNIT IV TECHNOLOGY I – ANDROID

Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI –Persisting data using SQLite–Packaging and deployment –Interaction with server side applications –Using Google Maps, GPS and Wifi –Integration with social media applications.

UNIT V TECHNOLOGY II –IOS

Introduction to Objective C –iOS features –UI implementation –Touch frameworks –Data persistence using Core Data and SQLite –Location aware applications using Core Location and Map Kit –Integrating calendar and address book with social media application –Using Wifi -iPhone marketplace.

TEXT BOOKS

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012.

REFERENCES

1. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech, 2012.

2. James Dovey and Ash Furrow, “Beginning Objective C”, Apress, 2012.

3. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS 6 Development: Exploring the iOS SDK”, Apress, 2013

Course Designers:

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34121I10	CYBER FORENSICS	Category	L	T	P	Credit
		EC-IE	3	0	0	3

PREAMBLE:

To learn computer forensics and • To become familiar with forensics tools and learn to analyze and validate forensics data

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To learn computer forensics
2	To become familiar with forensics tools
3	To learn to analyze and validate forensics data
4	To learn Identify the vulnerabilities in a given network infrastructure
5	To Implement real-world hacking techniques to test system security

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the basics of computer forensics	Understand
CO2. Apply a number of different computer forensic tools to a given scenario	Apply
CO3. Analyze and validate forensics data.	Apply
CO4:. Identify the vulnerabilities in a given network infrastructure	Apply
CO5: Implement real-world hacking techniques to test system security	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	L	L	-	-	-	-	-	L	-	L	S	L	L
CO2	S	S	M	-	-	M	M	L	-	L	-	-	S	L	L
CO3	S	S	M	L	-	M	M	L	-	-	L	-	S	L	-
CO4	S	S	M	L	L	L	M	M	M	M	L	L	S	S	-
CO5	S	S	M	M	M	L	M	M	L	M	M	M	S	S	L
CO6	S	S	L	-	-	L	M	L	-	-	-	L	S	L	-

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT I INTRODUCTION TO COMPUTER FORENSICS

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT II EVIDENCE COLLECTION AND FORENSICS TOOLS

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

UNIT III ANALYSIS AND VALIDATION

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

UNIT-IV ETHICAL HACKING

Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing

UNIT V ETHICAL HACKING IN WEB

Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

TEXT BOOKS:

1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, ―Computer Forensics and Investigations‖, Cengage Learning, India Edition, 2016.
2. CEH official Certfied Ethical Hacking Review Guide, Wiley India Edition, 2015.

REFERENCES

1. John R.Vacca, ―Computer Forensics‖, Cengage Learning, 2005
2. MarjieT.Britz, ―Computer Forensics and Cyber Crime‖: An Introduction‖, 3rd Edition, Prentice Hall, 2013.
3. AnkitFadia ― Ethical Hacking‖ Second Edition, Macmillan India Ltd, 2006
4. Kenneth C.Brancik ―Insider Computer Fraud‖ Auerbach Publications Taylor & Francis Group–2008.

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34121I09	CRYPTOGRAPHY AND NETWORK SECURITY	Category	L	T	P	Credit
		EC-IE	3	0	0	3

PREAMBLE:
To understand Cryptography Theories, Algorithms and Systems. and necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks

PREREQUISITE:
NIL

COURSE OBJECTIVES

1	To understand Cryptography Theories, Algorithms and Systems.
2	To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks
3	To Understand different cryptographic operations of symmetric cryptographic algorithms.
4	To Understand various Authentication schemes to simulate different applications
5	To Understand various Security practices and System security standards.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities	Understand
CO2. Apply the different cryptographic operations of symmetric cryptographic algorithms.	Apply
CO3. Apply the different cryptographic operations of public key cryptography.	Apply
CO4:. Apply the various Authentication schemes to simulate different applications.	Apply
CO5: Understand various Security practices and System security standards.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	L	L	-	-	-	-	-	L	-	L	S	L	L
CO2	S	S	M	-	-	M	M	L	-	L	-	-	S	L	L
CO3	S	S	M	L	-	M	M	L	-	-	L	-	S	L	-
CO4	S	S	M	L	L	L	M	M	M	M	L	L	S	S	-
CO5	S	S	M	M	M	L	M	M	L	M	M	M	S	S	L
CO6	S	S	L	-	-	L	M	L	-	-	-	L	S	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT 1 INTRODUCTION

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography.- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

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UNITII - SYMMETRIC CRYPTOGRAPHY

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures - Modular arithmetic-Euclid's algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution.

UNITIII - PUBLIC KEY CRYPTOGRAPHY

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT IV - MESSAGE AUTHENTICATION AND INTEGRITY

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509

UNIT V SECURITY PRACTICE AND SYSTEM SECURITY

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

REFERENCES:

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd

2. BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.

3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

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34121I08	CLOUD DATABASE MANAGEMENT AND SECURITY	Category	L	T	P	Credit
		EC-IE	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enables them to lean about Cloud Database Management and Security. This syllabus contains introduction about the cloud computing, sales force architectures, sales force UI and building blocks. Thus, this syllabus focuses on to know about Cloud Database Management and Security.

PREREQUISITE :NIL

COURSE OBJECTIVES

1.	To understand cloud computing security concepts
2.	To study various cloud services
3.	To apply cloud computing in collaboration with other services
4.	To understand the cloud Database management
5.	To apply cloud computing online

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand basic service concepts of cloud computing	Understand
CO2: Understand and apply sales force architecture	Understand
CO3: Apply virtualization techniques	Apply
CO4: apply the attacks concepts in Salesforce Building Blocks	Apply
CO5: Understand and apply legal issues in cloud services	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M		M		M	-	-	-	-	-	-		S	M	-
CO2		M	L		L	-	-	-	-	-	M	M	S		M
CO3			S	M		-	-	-	-	-	-			-	
CO4	S			M		-	-	-	-	-	-	M	S	M	M
CO5		M			M	-	-	-	-	-	-	M	S		-

S- Strong; M-Medium; L-Low

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Course Curriculum

Cloud Database Management and Security

Unit 1: **(9)**

Introduction to Cloud computing – CRM – Problems faced by the IT industry – Introduction to SaaS – PaaS - IaaS - What is Salesforce.

Practical: Introduction to JAVA programming.

Unit 2: **(9)**

Salesforce Architecture – Conventional Database tables and objects – Standard and Custom objects – Objects and Fields – Datatypes – Aggregating and Validating Data - Relational Data Modelling

Practical: Learning and Building of Schemas

Unit 3: **(9)**

What is UI – Introduction to salesforce UI - Customizing the salesforce UI – Salesforce terminology – Page layouts – App builder – Automating Business Process – Workflow rule – Process builder – Email Templates – Salesforce Application elements

Practical: Salesforce Building Blocks

Unit 4: **(9)**

Data Security – Profiles and Roles – Audit and Troubleshooting: Audit logs – Debug logs –Email logs.

Practical: Creating users, Profiles, Roles and Groups.

Unit 5: **(9)**

Database management – Reports and Dashboard management - Data loader – Uploading Relational Data – Standard and Custom Report types – Scheduling Report and Dashboards.

Practical (sample):

- Create an app for Event Management that takes care of – Event Registrations, Confirmations, Cancellations, Speaker associations, and other event-related activities.
- Ticket booking system.

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34121O03	FINANCE AND ACCOUNTING FOR ENGINEERS	Category	L	T	P	Credit
		OE-IE	3	0	0	3

PREAMBLE: Engineers are in a position to do Decision Making during every activity in the industry. The activities ranging from Operation to Non-Operation during the routine functions of the organization. Especially, Finance and Accounting also becomes the part of responsibility of every engineer to do data analysis activities. His interpretation through data analysis and reporting in every transaction helps the organization to do decision making to run the organization effectively and efficiently. Finance and Accounting Practices enable the engineers to handle the resources to do cost and Financial decisions with optimum resources for the betterment of the organization.

PREREQUISITE: Not Required

COURSE OBJECTIVES:

1. To understand the concepts and conventions to prepare Income Statement, and Balance Sheet.
2. To apply the various methods to claim depreciation and
3. To practice fundamental investment decision through capital budgeting techniques.
4. To analyse cost-volume profit analysis for decision making and analyse standard costing techniques.
5. To estimate the working capital requirements for day-to-day activities and handling inventories with economic ordering quantities.

COURSE OUTCOMES:

After successful completion of the course, students will be able to

CO1: Understand the importance of recording, book keeping and reporting of the business transaction.	Understand
CO2: Identify and Apply suitable method for charging depreciation on fixed assets.	Apply
CO3: Analyse the various methods of capital budgeting techniques for investment decision.	Apply
CO4: Justify the scope of cost-volume-profit analysis, standard costing, and marginal costing techniques for decision making.	Analyse
CO5: Estimation of working capital requirements of the organization.	Evaluate

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	M	L	S	M	-	S	-	M	M	L	M	L	M
CO2	L	-	-	L	M	-	L	L	-	-	L	M	L	L	-
CO3	-	M	-	M	L	-	-	L	S	M	-	L	-	L	M
CO4	L	L	-	S	-	-	L	-	-	L	M	L	M	L	M
CO5	L	-	L	S	L	-	-	M	M	L	-	L	M	M	-

S- Strong; M-Medium; L-Low

SYLLABUS:

Introduction: Business Environment – Book Keeping and Accounting – Accounting Concepts and Conventions – Double entry system – Preparation of journal, ledger and Trial balance – Final Accounts.

Deprecation: Meaning – Causes - Methods of Calculating Depreciation: Straight Line Method, Diminishing Balance Method and Annuity Method.

Capital Budgeting Decisions: Meaning – Nature & Importance of Investment Decisions – Types - Financial statement

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analysis and interpretation - Types of Analysis - Objectives - Tools of Analysis - Ratio Analysis: Objectives, Uses and Limitations - Classification of Ratios: Liquidity, Profitability, Financial and Turnover Ratios - Funds Flow Analysis and Cash Flow Analysis: Sources and Uses of Funds, Preparation of Funds Flow statement, Uses and Limitations: Pay Back Period – Accounting Rate of Return – NPV – IRR - Profitability Index.

Marginal Costing: Marginal Cost - Breakeven Analysis - Cost Volume Profit Relationship - Applications of Standard and marginal Costing Techniques.

Working Capital Management: – Types of Working Capital – Operating Cycle – Determinants of Working Capital - Receivables Management – Inventory Management – Need for holding inventories – Objectives – Inventory Management Techniques: EOQ & Reorder point – ABC Analysis - Cash Management – Motives for holding cash.

Text Book

1. Kesavan, C. Elenchezhian, and T. Sunder Selwyan, "Engineering Economics and Financial Accounting", Firewall Media, 2005.
2. Kasi Reddy .M and Saraswathi .S, "Managerial Economics and Financial Accounting", PHI Learning Pvt., Ltd. 2007.

Reference Book

1. Periyasamy .P, "A Textbook of Financial, Cost and Management Accounting", Himalaya Publishing House, 2010.
2. Palanivelu V.R., "Accounting for Managers", Lakshmi Publications, 2005.
1. Mark S Bettner, Susan Haka, Jan Williams, Joseph V Carcello, "Financial and Management Accounting", Mc-Graw-Hill Education, 2017

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	M.Manickam	Associate Professor	Management Studies	manickam@vmkec.edu.in
2.	Dr. Rajeshkumar	Assistant Professor	Management Studies	rajesh.mba@avit.ac.in

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34121O04	INNOVATION, PRODUCT DEVELOPMENT AND COMMERCIALIZATION	Category	L	T	P	Credit
		OE-IE	3	0	0	3

PREAMBLE

commercialization of innovation and new products in fast-paced, high-tech markets and matching technological innovation to market opportunities.

PREREQUISITE - Not Required

COURSE OBJECTIVES

1	To make students understand multiple-perspective approach in organization to capture knowledge and creativity to develop successful products and services for Volatile, Uncertain, Complex and Ambiguous (VUCA) world.
2	Inculcate a disruptive thought process to generate ideas for concurrent and futuristic problems of society in general and markets in particular which focus on commercialization
3	Improved understanding of organizational best practices to transform exciting technology into successful products and services
4	Critically assess and evaluate innovation policies and practices in organizations especially from a cultural and leadership point of view
5	Explain why innovation isessential to organizational strategy – especially in a global environment

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the role of innovation in gaining and maintaining competitive advantage	Understand
CO2: Integrate the innovation basis and its role in decision making especially under uncertainty	Apply
CO3: Analyze business challenges involving innovation management	Apply
CO4: Having problem solving ability – solving social issues and business problems	Apply
CO5: Comprehend the different sources of innovation	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P012
CO1	M	-	-	-	-	M	S	S	-	M	-	-
CO2	S	S	S	M	M	M	-	-	-	-	-	-
CO3	S	S	S	M	M	M	-	-	-	-	-	-
CO4	S	S	S	M	M	M	-	-	-	-	-	-
CO5	S	S	S	M	M	M	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS:

Introduction to Innovation Management - Innovation – What it is? Why it Matters? - Innovation as a Core Business Process – system thinking for innovation – Framework for System Thinking - system thinking tools

Creating New Products and Services - Product and Service Innovation – Exploiting Open Innovation and Collaboration –The Concept of Design Thinking and Its Role within NPD and Innovation – framework for design thinking

Creating New Products and Services - Product and Service Innovation – Exploiting Open Innovation and Collaboration –The Concept of Design Thinking and Its Role within NPD and Innovation – framework for design thinking

Capturing Innovation Outcome - New Venture – Benefits of Innovation, and Learning from Innovation –

Building Innovative Organization and Developing Innovation Strategy - Globalization for Innovations, Innovating for Emerging Economies and Role of National Governments in Innovation

New Product Brand Development and Pricing Strategies - Importance of Brand decisions and Brand identity development; Pricing of a new product, Pre-test Marketing

The Product offer Selecting Market opportunity and Designing new market offers-Concept Generation and Evaluation, Developing and Testing Physical offers - Pre-launch, during launch and Post launch preparations;

Text Book:

1. Joe Tidd, John Bessant (2013), Managing Innovation: Integrating Technological, Market and Organizational Change, 5th edition, Wiley.

Reference Books:

1. Schilling, M (2013), Strategic management of technological innovation, 4th edition, McGraw Hill Irwin.
2. Allan Afuah (2003), Innovation Management: Strategies, Implementation and Profits, 2nd edition, Oxford University Press.
3. Michael G. Luchs, Scott Swan, Abbie Griffin (2015), Design Thinking: New Product Development Essentials from the PDMA, Wiley-Blackwell.
4. John Boardman, Brian Sauser (2013), Systemic Thinking: Building Maps for Worlds of Systems, 1st edition, Wiley.
5. Rich Jolly (2015), Systems Thinking for Business: Capitalize on Structures Hidden in Plain Sight, Systems Solutions Press

COURSE DESIGNERS:

S.No	Name of the faculty	Designation	Department	E-Mail Id
1	Dr.B.Rajnarayanan	Professor	Management Studies	rajnarayanan@vmkvec.edu.in
2	Dr. Rajeshkumar	Associate Professor	Management Studies	rajesh.mba@avit.ac.in

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34121O07	SOCIAL ENTREPRENEURSHIP	Category	L	T	P	Credit
		OE-IE	3	0	0	3

PREAMBLE

Social entrepreneurship involves the creativity, imagination and innovation often associated with entrepreneurship.

PREREQUISITE - Not Required

COURSE OBJECTIVES

1	To provide students with a working knowledge of the concepts, opportunities and challenges of social entrepreneurship..
2	To demonstrate the role of social entrepreneurship in creating innovative responses to critical social needs (e.g., hunger, poverty, inner city education, global warming, etc)..
3	To engage in a collaborative learning process to develop a better understanding of the context and domain of social entrepreneurship..
4	To help prepare you personally and professionally for meaningful employment by reflecting on the issues of social entrepreneurship.
5	Engage with a diverse group of social entrepreneurs

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Explain the concept social entrepreneurship and distinguish its elements from across a continuum of organizational structures from traditional nonprofits to social enterprises to traditional for profits	Understand
CO2: Analyze the operations of a human service organization using social entrepreneurial orientation and industry assessment and diagnostic tools.	Apply
CO3: Apply the Social Business Model Canvas and lean startup methods for planning, developing, testing, launching and evaluating social change ventures.	Apply
CO4: Compare funding options for social change ventures.	Apply
CO5: The outcomes of social entrepreneurship are focused on addressing persistent social problems particularly to those who are marginalized or poor.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO9	PO10	PO11	P012
CO1	M	-	-	-	-	M	S	S	-	M	-	-
CO2	S	S	S	M	M	M	-	-	-	-	-	-
CO3	S	S	S	M	M	M	-	-	-	-	-	-
CO4	S	S	S	M	M	M	-	-	-	-	-	-
CO5	S	S	S	M	M	M	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

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SYLLABUS:

Social entrepreneurship – dimensions of social entrepreneurship – social change theories – equilibrium and complexity – theory of social emergence

Social entrepreneurs – mindset, characteristics and competencies – developing a social venture sustainability model – feasibility study – planning – marketing challenges for social ventures

Microfinance– MFI (Micro Finance Institutions) in India – regulatory framework of MFI – Banks and MFIs – sustainability of MFI – Self Help Groups– successful MFI models

Angel Investors & Venture Capitalists – difference – valuation of firm – negotiating the funding agreement – pitching idea to the investor

Corporate entrepreneurship – behavioral aspects – identifying, evaluating and selecting the opportunity – venture– location – organization – control – developing business plan – funding the venture – implementing corporate venturing in organization.

Text Book:

1. Constant Beugré, Social Entrepreneurship: Managing the Creation of Social Value, Routledge, 2016.

2. Björn Bjerke, Mathias Karlsson, Social Entrepreneurship: To Act as If and Make a Difference, Edward Elgar Publishing, 2013.

Reference Books:

1. Wei-Skillern, J., Austin, J., Leonard, H., & Stevenson, H. (2007). Entrepreneurship in the Social Sector (ESS). Sage Publications.

2. Janus, K. K. (2017). Social startup success. New York, NY: Lifelong Books.

3. Dancin, T. M., Dancin, P. A., & Tracey, P. (2011). Social entrepreneurship: A critique and future directions.

4. Alex Nicholls, Social Entrepreneurship: New Models of Sustainable Social Change, OUP Oxford, 2008.

5. David Bornstein, Susan Davis, Social Entrepreneurship: What Everyone Needs to Know, Oxford University Press, 2010.

COURSE DESIGNERS

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1	Dr.B.Rajnarayanan	Assistant Professor	Management Studies	rajnarayanan@vmkec.edu.in

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34121O01	ENGINEERING STARTUPS AND ENTREPRENEURIAL MANAGEMENT	Category	L	T	P	Credit
		OE-IE	3	0	0	3

PREAMBLE:

A startup means company initiated by individual innovator or entrepreneurs to search for a repeatable and scalable business model. More specifically, a startup is a newly emerged business venture that aims to develop a viable business model to meet a marketplace needs or wants in an optimum manner.

PREREQUISITE: Not Required

COURSE OBJECTIVES:

1. To understand the basics of Startups Management and components.

2. To analyze the startups fund management practices

3. To practice the various kinds of stocks and employment considerations in startups.

4. To apply the importance of intellectual property rights and its procedures.

5. To explore the entrepreneurial mindset and culture.

COURSE OUTCOMES:

After successful completion of the course, students will be able to

CO1: Explain the concept of engineering startups, objectives and functions and its components.	Understand
CO2: Analyze the startups funding issues and remuneration practices in startups business.	Analyse
CO3: Analyze the various kinds of stocks and employment opportunities and consideration in startups business.	Analyse
CO4: Compare and contrast the various forms of intellectual property protection and practice.	Analyse
CO5: Explore the entrepreneurial mindset and culture that has been developing in companies of all sizes and industries.	Evaluates

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	-	-	-	-	M	M	S	-	M	-	M	-	L	L
CO2	S	S	M	M	M	L	-	-	-	-	-	M	L	L	-
CO3	S	S	S	M	M	M	-	-	-	-	-	M	L	-	M
CO4	S	S	S	M	M	M	-	-	-	-	-	M	-	M	L
CO5	S	S	-	M	M	M	-	-	-	-	-	M	M	M	M

S- Strong; M-Medium; L-Low

SYLLABUS:

Elements of a successful Start up: Startup Process – Create Management Team and Board of Directors – Evaluate market and Target Customers – Define your product or service – preparation of business plan - specific problems and challenge in startup.

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Funding Issues and Remuneration Practices: Funding Issues: Investment Criteria – Looking for seed cash – Seed, Startup, and subsequent Funding Rounds – Milestone Funding - Remuneration Practices for your Start –up : Salaries – Equity Ownership – Other compensation – Employment Contracts

Stock Ownership & startup Employment Considerations: Stock ownership: Risk- Reward Scale – Ownership Interest over time – Common and preferred stock – Authorized and outstanding shares – Acquiring stock – Restricted Stock Grants – Future Tax Liability on Restricted Shares - Compensation and startup Employment Considerations : Entrepreneurs Need Insurance – Do Fringe benefits – outsourcing your benefits work – Life Insurance – Health Insurance – Disability Insurance

Protecting Intellectual Property: Protecting your intellectual property: Copyrights - patents–Trade secrets – Trademarks - The Legal Form of your Startup: Corporation – Partnership – Limited Liability Company – Sole Proprietorship - – Making the startup decision: commitment – Leaving a current employer - stay fit.

Startup Capital Requirements and Legal Environment:

Identifying Startup capital Resource requirements - estimating Startup cash requirements - Develop financial assumptions- Constructing a Process Map - Positioning the venture in the value chain - Launch strategy to reduce risks- Startup financing metrics - The Legal Environment- Approval for New Ventures- Taxes or duties payable for new ventures..

Text Book:

1. James A. Swanson & Michael L. Baird, "Engineering your start-up: A Guide for the High-Tech Entrepreneur" 2nd ed, Professional Publications.inc
2. Donald F Kuratko, " Entrepreneurship – Theory, Process and Practice", 9th Edition, Cengage Learning 2014.

Reference Books:

1. Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill, 2013.
2. Mathew J Manimala, "Enterprenuership theory at cross roads: paradigms and praxis" 2nd Edition Dream tech, 2005.
3. Rajeev Roy, 'Entrepreneurship' 2nd Edition, Oxford University Press, 2011.
4. EDII "Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development", Institute of India, Ahmadabad, 1986.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr. G. Murugesan	Professor	Management Studies	murugesan@vmkvec.edu.in
2	Mr. T. Thangaraja	Assistant Professor	Management Studies	thangaraja@avit.ac.in

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34121O06	NEW VENTURE PLANNING AND MANAGEMENT	Category	L	T	P	Credit
		OE-IE	3	0	0	3

PREAMBLE

Contemporary methods and best practices for the entrepreneur to plan, launch, and operate a new venture and creation of a business plan

PREREQUISITE - Not Required

COURSE OBJECTIVES

1	An opportunity for self-analysis, and how this relates to success in an entrepreneurial environment.
2	Information and understanding necessary to launch and grow an entrepreneurial venture.
3	A realistic preview of owning and operating an entrepreneurial venture.
4	An entrepreneur must understand the diversity, emotional involvement, and workload necessary to succeed.
5	The opportunity to develop a business plan.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Explain the concept of new venture planning, objectives and functions and its components.	Understand
CO2: Analyze the business plan issues and remuneration practices in startups business.	Apply
CO3: Explore an entrepreneurial idea to the point where you can intelligently and decide whether to "go for it" or not.	Apply
CO4: Compare and contrast the different forms entrepreneurial environment in terms of their key differences and similarities.	Apply
CO5: Explore the business plan and business model canvas for your idea.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P012
CO1	M	-	-	-	-	M	S	S	-	M	-	-
CO2	S	S	S	M	M	M	-	-	-	-	-	-
CO3	S	S	S	M	M	M	-	-	-	-	-	-
CO4	S	S	S	M	M	M	-	-	-	-	-	-
CO5	S	S	S	M	M	M	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

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SYLLABUS:

STARTING NEW VENTURE: Opportunity identification - Search for new ideas - Sources of innovative ideas - Techniques for generating ideas - Entrepreneurial imagination &creativity - The role of creative thinking - Developing your creativity - Impediments to creativity.

METHODS TO INITIATE VENTURES: Pathways to new venture - Creating new ventures - Acquiring an existing venture - Advantages of acquiring an established venture - Examination of key issues – Franchising - How a franchise works and franchise law - Evaluating franchising opportunity.

THE SEARCH FOR ENTREPRENEURIAL CAPITAL: The venture capital market - Criteria for evaluating new venture proposals - Evaluating venture capitalists - stage of venture capital financing - Alternate sources of financing for Indian entrepreneurs - Bank funding - State financial corporations - Business incubators and facilitators - Informal risk capital - Angel investors.

THE MARKETING ASPECTS OF NEW VENTURE: Developing a marketing plan - Customer analysis - Sales analysis - Competition analysis - Market research - Sales forecasting - Sales Evaluation - Pricing decisions.

BUSINESS PLAN PREPARATION FOR NEW VENTURE: Business plan concept - Pitfalls to avoid in business plan - Developing a well conceived business plan - Elements of a business plan - Harvest strategy - Form of business organization - Legal acts governing businesses in India .

Text Book:

1. The Successful Business Plan, Secrets & Strategies, Rhonda Abrams, Published by The Planning Shop Titan, Ron Chernow, Random House

2. Osterwalder, A. and Pigneur, Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Hoboken, NJ: John Wiley & Sons

Reference Books:

1. Blackwell, E. (2011). How to Prepare a Business Plan: Create Your Strategy; Forecast Your Finances; Produce That Persuasive Plan. Kogan Page Publishers.

2. Levi, D. (2014). Group Dynamics for Teams. Sage Publications, Inc. Thousand Oaks.

3. Rajeev Roy, 'Entrepreneurship' 2nd Edition, Oxford University Press, 2011.

4. Business Model Generation by Osterwalder and Pigneur.

COURSE DESIGNERS

S.No	Name of the faculty	Designation	Department	E-Mail Id
1	M.Manickam	Associate Professor	Management Studies	manickam@vmkec.edu.in

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34121O02	INTELLECTUAL PROPERTY RIGHTS	Category	L	T	P	Credit
		OE-IE	3	0	0	3

PREAMBLE: The course is designed to introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.

PREREQUISITE: NIL

COURSE OBJECTIVES:

1. To introduce fundamental aspects of Intellectual property Rights
2. To disseminate knowledge on patents and copyrights
3. To disseminate knowledge on trademarks, Design and Geographical Indication (GI),
4. To disseminate knowledge on Plant Variet, Layout Design Protection and create awareness about current trends in IPR
5. To disseminate knowledge on Legislation of IPRs and Alternate Dispute Resolution

COURSE OUTCOMES:

After successful completion of the course, students will be able to

CO1: Understand the important of intellectual property rights	Understand
CO2: Apply for the patents	Apply
CO3: Understand and apply for the copyrights	Understand
CO4: Understand the important of trademarks	Apply
CO5: Appreciate the importance of IPR and its related issues	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	L	-	-	-	-	L	S	L	-	L	-	L	L	M	-
CO2	L	S	S	M	M	L	-	-	-	-	-	L	M	L	-
CO3	L	S	L	M	M	L	-	-	-	-	-	L	M	L	-
CO4	L	S	S	S	M	L	-	-	-	-	-	L	L	L	-
CO5	L	S	S	M	-	L	-	-	-	-	-	L	M	L	-

S- Strong; M-Medium; L-Low

SYLLABUS:

Unit 1 - Overview of Intellectual Property

Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge – Trade Secret - IPR in India : Genesis and development – IPR in abroad - Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, the Berne Convention, 1886, the Universal Copyright Convention, 1952, the WIPO Convention, 1967,the Patent Co-operation Treaty, 1970, the TRIPS Agreement, 1994.

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Unit 2 - Patents & Copyright

Patents - Elements of Patentability: Novelty , Non Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties - Patent office and Appellate Board

Copyright - Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights

Unit 3 – Trademarks, Design and Geographical Indication (GI)

Trademarks: Concept of Trademarks - Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties - Trademarks registry and appellate board

Design: Meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection

Geographical Indication (GI): Meaning, and difference between GI and trademarks - Procedure for registration, effect of registration and term of protection

Unit 4 - Plant Varieties, Layout Design and Indian National Intellectual Property Policy

Plant Variety Protection: Plant variety protection: meaning and benefit sharing and farmers' rights – Procedure for registration, effect of registration and term of protection.

Layout Design Protection: Layout Design protection: meaning – Procedure for registration, effect of registration and term of protection.

Indian National Intellectual Property Policy: India`s New National IP Policy, 2016 – Govt. of India step towards promoting IPR – Govt. Schemes in IPR – Career Opportunities in IP - IPR in current scenario with case studies

UNIT – V: Legislation of IPRs and Alternate Dispute Resolution

Legislation of IPRs: The Patent Act of India, Patent Amendment Act (2005), Design Act, Trademark Act, Geographical Indication Act, Bayh- Dole Act - Patent Ownership and Transfer, Patent Infringement, International Patent Law

Alternate Dispute Resolution: Alternate Dispute Resolution and Arbitration – ADR Initiatives –Reason for Choosing ADR – Advantages and Disadvantages of ADR – Assessment of ADR's – Litigation – Arbitration - Effective Mechanism for Business Issues.

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Text Books:

1. Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management. India, IN: Cengage Learning India Private Limited.
2. Neeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning Private Limited.

Reference Book:

1. Ahuja, V K. (2017). Law relating to Intellectual Property Rights. India, IN: Lexis Nexis.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department/ Name of the College	Mail ID
1	P. S.Balaganapathy	Associate Professor	Management / AVIT	dydirectormanagementstudies@avit.ac.in
2	A. Mani	Associate Professor	Management / VMKVEC	mani@vmkvec.edu.in

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34421O01	3D PRINTING AND ITS APPLICATIONS	Category	L	T	P	Credit
		OE-EA	3	0	0	3

Preamble

The course is designed to impart knowledge and skills related to 3D printing technologies, selection of material and equipment and develop a product using this technique in Industry 4.0 environment.

Prerequisite – NIL

Course Objective

1	To discuss the basic concepts and procedure followed in 3D printing methods
2	To construct a CAD model for a required product
3	To identify the use of different material and support structures
4	To experiment with different 3d printing process
5	To identify the defects.

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	Demonstrate the various 3D Printing methods	Understand
CO2.	Develop CAD Models ,Import and Export CAD data and generate .STL file.	Apply
CO3.	Select a specific material for the given application.	Apply
CO4.	Select a 3D printing process for an application.	Apply
CO5.	Able to identify the Product defects after post processing	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	L	-	-	-	-	-	-	-	-	-	-	M	-	-
CO2	S	S	M	-	M	-	-	-	-	-	-	-	M	-	-
CO3	M	M	L	L	L	-	-	-	-	-	-	-	M	-	-
CO4	S	M	-	-	M	-	-	-	-	-	-	-	M	-	-
CO5	M	S	M	M	-	-	-	-	-	-	-	-	L	-	L

S- Strong; M-Medium; L-Low

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SYLLABUS

3D PRINTING & CAD FOR ADDITIVE MANUFACTURING (7 Hrs.)

Introduction, Process, Classification, Advantages, Additive V/s Conventional Manufacturing processes, Applications. CAD Data formats, Data translation, Data loss, STL format.
ADDITIVE MANUFACTURING TECHNIQUES (12Hrs.)
Stereo- Lithography, LOM, FDM, SLS, SLM, Binder Jet technology. Process, Process parameter, Process Selection for various applications. Additive Manufacturing Application Domains: Aerospace, Electronics, HealthCare, Defence, Automotive, Construction, Food Processing, Machine Tools
MATERIALS (8 Hrs.)
Polymers, Metals, Non-Metals, Ceramics. Various forms of raw material- Liquid, Solid, Wire, Powder; Powder Preparation and their desired properties, Polymers and their properties. Support Materials
ADDITIVE MANUFACTURING EQUIPMENT (10 Hrs.)
Process Equipment- Design and process parameters, Governing Bonding Mechanism Common faults and troubleshooting, Process Design
POST PROCESSING & PRODUCT QUALITY (8 Hrs.)
Post Processing Requirement and Techniques , Product Quality Inspection and testing , Defects and their causes

Text Books

1	Lan Gibson, David W. Rosen and Brent Stucker, "Additive Manufacturing Technologies:Rapid Prototyping to Direct Digital Manufacturing", Springer, 2010.
2	Khanna Editorial, "3D Printing and Design", Khanna Publishing House, Delhi.

Reference Books

1	CK Chua, Kah Fai Leong, "3D Printing and Rapid Prototyping- Principles and Applications", World Scientific, 2017.
2	Andreas Gebhardt, "Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooling, Rapid Manufacturing", Hanser Publisher, 2011.
3	J.D. Majumdar and I. Manna, "Laser-Assisted Fabrication of Materials", Springer Series in Material Science, 2013.

Course Designers

S.No	Faculty Name	Designation	Department/Name of the	Email id
1	L.Prabhu	Associate Professor	Mech / AVIT	prabhu@avit.ac.in

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34421O012	INDUSTRIAL ROBOTICS	Category	L	T	P	Credit
		OE-EA	3	0	0	3

Preamble

The objective of this course is to impart knowledge about industrial robots for their control and design.

Prerequisite :

NIL

Course Objective

1	Be exposed to the fundamentals of robots
2	To learn about Robot kinematics and dynamics
3	To learn different types of sensors used in robots and its control
4	To understand the different types of actuation systems used in robots
5	To understand the robot control hardware and their interfacing and programming of robots.

Course Outcomes: On the successful completion of the course, students will be able to

CO1.	Understand the basic configurations and kinematic systems of robots	Understand
CO2.	Solve problems of robot kinematics and dynamics	Apply

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CO3.	Understand the different types of sensors used in robot systems and their applications, different types of control systems used in robots	Understand
CO4.	Understand and applications of the different types of actuators used in robot systems	Apply
CO5.	Understand the robot control hardware systems and their interfaces, different robot programming techniques for various applications.	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	L	-	-	-	-	-	-	S	-	L
CO2	S	S	M	M	-	M	-	-	-	-	-	-	S	-	L
CO3	S	M	M	M	-	M	-	-	-	-	-	-	S	-	L
CO4	S	S	M	M	-	L	-	-	-	-	-	-	S	-	L
CO5	S	S	L	S	-	S	-	-	-	-	-	-	S	-	L

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO ROBOTICS

Types and components of a robot, Classification of robots, closed-loop and open loop control systems. Kinematics systems; Definition of mechanisms and manipulators, Social issues and safety.

ROBOT KINEMATICS AND DYNAMICS

Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, DH parameters, Jacobian, Singularity, and Statics - Dynamic Modelling: Equations of motion: Euler-Lagrange formulation.

SENSORS AND VISION SYSTEM and ROBOT CONTROL

Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc. - Introduction to Cameras, Camera calibration, Geometry of Image formation, Euclidean/ Similarity/Affine/Projective transformations - Vision applications in robotics.
Basics of Robot control: Transfer functions, Control laws: P, PD, PID. - Non-linear and advanced controls.

ROBOT ACTUATION SYSTEMS

Actuators: Electric, Hydraulic and Pneumatic; Transmission: Gears, Timing Belts and Bearings, Parameters for selection of actuators.

CONTROL HARDWARE AND INTERFACING

Embedded systems: Architecture and integration with sensors, actuators, components, Programming for Robot Applications.

Text Books

1	Saha, S.K., "Introduction to Robotics, 2nd Edition, McGraw-Hill Higher Education, New Delhi, 2014.

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2	Mittal R.K. and Nagrath I.J., "Robotics and Control", Tata McGraw Hill.
Reference Books	
1	Ghosal, A., "Robotics", Oxford, New Delhi, 2006.
2	Niku Saeed B., "Introduction to Robotics: Analysis, Systems, Applications", PHI, New Delhi.
3	Steve Heath, "Embedded System Design", 2nd Edition, Newnes, Burlington, 2003
4	Merzouki R., Samantaray A.K., Phathak P.M. and Bouamama B. Ould, "Intelligent Mechatronic System: Modeling, Control and Diagnosis", Springer.

Course Designers

S.No	Faculty Name	Designation	Department/Name of the College	Email id
1	Prof. J.Satheesbabu	Associate Professor	Mech/VMKVEC	satheesbabu@vmkvec.edu.in

36921O01	BIOMOLECULES - STRUCTURE AND FUNCTION	Category	L	T	P	C
		OE-EA	3	0	0	3

PREAMBLE

Biomolecules like carbohydrates, proteins, fat are vital components of any living system. Basic knowledge about them helps in maintaining a healthy lifestyle, free of sickness and a general awareness about hygiene.

PREREQUISITE NIL

COURSE OBJECTIVES

1	To give an overview of importance of biomolecules
2	To elaborate the structure of proteins and nucleic acids and its role in disease.
3	To enumerate the role of carbohydrates and their cellular function in physiology and pathology
4	To enumerate the role of lipids and their cellular function in physiology and pathology.
5	To briefly cholesterol and its role in diseases

COURSE OUTCOMES

After the successful completion of the course, learner will be able to

CO1. Relate the basics of biomolecules in and around him	Understand
CO2. Understand the structure of biomolecules such as proteins and nucleic acids	Understand
CO3. Discover the role of carbohydrates in healthy and diseased conditions	Apply
CO4. Relate disfunctioning of lipids with disease	Analyse

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CO5. Criticize the role of cholesterol in diseases.	Evaluate

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	L	L	-	-	L	-	-	-	-	-	-	-	L	-
CO2	S	M	S	-	-	M	-	-	-	-	-	-	-	L	-
CO3	M	L	M	M	-	S	-	-	-	-	-	-	-	L	-
CO4	L	L	L	L	S	L	-	-	S	-	-	M	L	M	M
CO5	S	-	L	L	-	M	-	-	-	-	-	S	S	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

PROTEINS

Protein – Structure – primary, secondary, tertiary. Types of proteins and their function. Role of each type of Protein in Health and Disease.

NUCLEIC ACIDS

Nucleic Acids – Components of nucleic acids, Conformational parameters. Nucleic acids – Types of DNA and RNA. DNA Polymorphism, Circular DNA, Supercoil DNA, DNA-Protein interactions. Role of nucelic acids in Health and disease

CARBOHYDRATES

Carbohydrates – Introduction. Types – monosaccharide, disaccharide, oligosaccharide and polysaccharides. Structure of each type. Artificial sugars. Role of carbohydrates in Health and Disease

FATTYACIDS AND LIPIDS

Fatty acids- Introduction, nomenclature, types - Saturated and unsaturated fatty acids, Essential and non-essential fatty acids.

Lipids – Introduction, Classification - simple and compound lipids, phospholipids, Cholesterol and its role in health and disease, Micelles and Liposomes : Applications in biology and medicine

CELL MEMBRANE AND CELL SIGNALING

Cell membrane - components and architecture, Various membrane models including Fluid-mosaic model. Ion channels, Receptors, Signaling molecules, Signaling mechanism, Role of cell signaling in Health and Disease. Inter-relationship of biomolecules.

TEXTBOOKS

1. Biophysical Chemistry, Part II, Techniques for the study of biological structure and function, by Cantor C.R. and Schimmel P R., W.H. Freeman and Company, 1980.
2. Nucleic Acids in chemistry and Biology, by Blackburn G.M. and gait M.J., IRL Press, 1990.
3. Biochemistry, by Voet D. and Voet J.G., John Wiley and sons, 1995.
4. Physical Biochemistry, by Freifelder D., W.H. Freeman and company, 1976-1982.

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COURSE DESIGNERS				
S.No.	**Name of the Faculty**	**Designation**	**Department**	**Mail ID**
1	Dr.P.David Annaraj	Assistant professor	Pharmaceutical Engineering	davidannaraj@vmkvec.edu.in
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36921O02	PHARMACOGENOMICS	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

Pharmacogenomics involves the study of the relationship between an individual's genetic makeup and his or her response to a drug. Pharmacogenetics, a component of pharmacogenomics, is the study of the relationship between a single gene and its response to a drug.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	Discuss about the basic knowledge about pharmacogenomics and drug design using genomic applications for drug action and toxicity.
2	Perform how individualization of drug therapy can be achieved based on a person's genetic makeup while reducing unwanted drug effects.
3	Outline the Pharmacogenomics studies on how genetic differences between individuals can affect responses to various drugs.
4	Formulate on medicine skills acquired by the student and his action in different pathologies
5	Develop acquire knowledge about the influence of genetic alterations on the therapeutic effect and adverse reactions of the drugs, from a perspective of individualized therapy.

COURSE OUTCOMES

After the successful completion of the course, learner will be able to

CO1.Recognize the effect of genetic differences between individuals in the outcome of drug therapy and in drug efficacy and toxicity.	Remember
CO2. Describe the role of single nucleotide polymorphism as a biomarker for the prediction of risk, therapeutic response and prognosis of malignancies.	Understand
CO3. Utilize and manage the new genomics based tools as they become available as well as make best treatment choices.	Understand
CO4. Examine the applications of genomics principles in drug action and toxicology	Analyze
CO5. Validation of case studies related to pharmacogenomics	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	L	L	L	L	L	L	-	L	L	L	L	L	L	
CO2	M	M	M	M	L	-	-	-	M	-	L	L	L	L	-
CO3	S	S	S	S	L	-	-	-	M	-	L	L	L	L	-
CO4	M	M	M	M	M	-	-	-	S	-	L	L	M	L	-
CO5	L	L	L	L	S	-	-	-	M	-	M	M	S	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

PHARMACOGENOMICS AND PERSONALIZED MEDICINE

Pharmacogenetics - Roots of pharmacogenomics and it is not just pharmacogenomics, Genetic drug response profiles, the effect of drugs on Gene expression, pharmacogenomics in drug discovery and drug development. Concept of individualized drug therapy, Drivers and the promise of personalized medicine, Strategies for application of pharmacogenomics to customize therapy,Barriers.

HUMAN GENOME

Expressed sequence Tags (EST) and computational biology, Microbial genomics, computational analysis of whole genomes, computational genome analysis, Genomic differences that affect the outcome of host pathogen interactions, Protein coding genes, repeat elements, genome duplication, analysis of proteome, DNA variation, Biological complexity. Single nucleotide polymorphisms (SNP's) in Pharmacogenomics - approaches, number and types of SNPs, Study design for analysis, Analytical issues, Development of markers.

ASSOCIATION STUDIES IN PHARMACOGENOMICS

Viability and Adverse drug reaction in drug response, Multiple inherited genetic factors influence the outcome of drug treatments, Association studies in pharmacogenomics, Strategies for pharmacogenomics Association studies, Benefits of Pharmacogenomics in Drug R & D.

GENOMICS APPLICATIONS FOR DRUG ACTION, TOXICITY AND DESIGN

Platform technologies and Pharmaceutical process, its applications to the pharmaceutical industry, Understanding biology and diseases, Target identification and validation, Drug candidate identification and optimization, safety and toxicology studies. The need of protein structure information, protein structure and variation in drug targets-the scale of problem, Mutation of drug targets leading to change in the ligand binding pocket.

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PHARMACOGENOMICS – CASE STUDIES

Study of pharmacogenomics of human P-Glycoprotein, drug transporters, lipid lowering drugs, chemotherapeutic agents for cancer treatment.

TEXT BOOKS

1. Martin M. Zdanowicz, M.M. “Concepts in Pharmacogenomics” Second Edition, American Society of Health-System Pharmacists, 2017.
2. Licinio, J and Wong, Ma-Li. “Pharmacogenomics: The Search for the Individualized Therapies”, Wiley-Blackwell, 2009.
3. Yan Q, “Pharmacogenomics in Drug Discovery and Development” Humana Press, 2nd Edition, 2014.

REFERENCES

1. Brazeau, D.A. and Brazeau, G.A. “Principles of the Human Genome and Pharmacogenomics” American Pharmacist Association, 2011
2. Werner, K., Meyer, U.A., Tyndale, R.F. “Pharmacogenomics”, Second Edition, Taylor and Francis, 2005.
3. Langman, L.J. and Dasgupta, A. "Pharmacogenomics in Clinical Therapeutics", Wiley – Blackwell, 2012

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Ms. R. Jaishri	Assistant Professor	Pharmaceutical Engineering	jaishri@vmkvec.edu.in

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34221O02	MUNICIPAL SOLID AND WASTE MANAGEMENT	Category	L	T	P	Credit
		OE-EA	3	0	0	3

Preamble

Structure is an arrangement and organization of interrelated elements in a material object or system, or the object or system so organized. Material structures include m and e objects such as buildings and machines and natural objects su ch as biological organisms, minerals and chemicals.

Prerequisite: Nil

Course Objectives

1.	The on-site/off-site process in gof the same and the disposal methods.
2.	The student is expected to know about the various effects and disposal options for the municipal solid waste.
3.	The collection and supply of water
4.	The offsite processing involved in site

Course Outcomes

On the successful completion of the course, students will be able to

Co1. Apply about the types of waste & Sources	Analyze
Co2. Apply the on site Storage & Processing	Apply
Co3. Apply about the collection & transfer the waste	Apply
Co4. Apply the process of offsite processing	Apply
CO5. Apply about the solid waste disposal	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	-	-	-	S
CO2	S	M	L	S	-	-	-	-	-	-	-	-	-	-	S
CO3	S	M	M	S	-	-	-	-	-	-	-	-	-	-	S
CO4	S	M	M	M	-	-	-	-	-	-	-	-	-	-	S
CO5	S	M	M	-	-	-	-	-	-	-	-	L	-	-	S

S-Strong; M-Medium; L-Low

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Syllabus

SOURCESANDTYPESOFMUNICIPALSOLIDWASTES

Sources and types of solid wastes-major legislation-monitoring responsibilities-Effects of disposal of solid wastes - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization– public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

ON-SITESTORAGE&PROCESSING

On-sitestoragemethods–materialsusedforcontainers–on-sitesegregationofsolidwastes–publichealth&economicaspectsofstorage–optionsunderIndianconditions–Critical Evaluation of Options.

COLLECTIONANDTRANSFER

Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, Anaerobic digestion, RDF and Incineration and co-generation of energy using waste, Pyrolysis of solid Waste operation & maintenance; options under Indian conditions.

OFF-SITEPROCESSING

Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis –options under Indian conditions- cradle to grave management concept, Prevailing laws of hazardous waste management- Risk assessment.

DISPOSAL

Dumpingofsolidwaste;sanitarylandfills–siteselection,designandoperationofsanitarylandfills–Leachatecollection&treatment.

TextBooks

1. GeorgeTchobanoglouset.al.,"IntegratedSolidWasteManagement",McGraw-HillPublishers,2002.
2. B.Bilitewski,G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, "Waste Management",Springer, 1994.
3. Charles A. Wentz; "Hazardous Waste Management", McGraw-Hill Publication, Latest publication, (1992).

ReferenceBooks

1. R.E.LandrethandP.A.Rebers,"MunicipalSolidWastes–problemsandSolutions",LewisPublishers, 1997.
2. BhideA.D.andSundaresan,B.B.,"SolidWasteManagementinDevelopingCountries",INSDOC,1993.
3. Handbook of Solid Waste Management by Frank Kreith, George Tchobanoglous, McGraw Hill Publication, (2002).
4. Bagchi, A., Design, Construction, and Monitoring of Landfills, (2nd Ed). Wiley Interscience, ISBN: 0-471-30681-9.
5. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, (2000).

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1	Mrs.P.Subathra	AssistantProfessor	Civil/AVIT	subathra@avit.ac.in

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34221O01	DISASTER RISK MANAGEMENT	Category	L	T	P	Credit
		OE-EA	3	0	0	3

Preamble

This course deals with the various disasters and to expose the students about the measures, its effect against built structures, and Hazard Assessment procedure in India. This course also deals with the methods of mitigating various hazards such that their impact on communities is reduced.

Prerequisite

NIL

CourseOutcomes

1	To Understand basic concepts in Disaster Management
2	To Understand Definitions and Terminologies used in Disaster Management
3	To Understand the Challenges posed by Disasters
4	To understand Impacts of Disasters

COURSEOUTCOMES

On the successful completion of the course, students will be able to

CO1.Understand the various types of disaster viz Hydrological, Coastal and Marine Disasters, Atmospheric Disasters, Geological, Mass Movement and Land Disasters, Windand Water Driven Disasters.	Understand
CO2.Identify the potential deficiencies of existing buildings for Earth quake disaster and Suggest suitable remedial measures.	Understand
CO3.Derive the guidelines for the precautionary measures and rehabilitation measures for Earthquake disaster.	Apply
CO4.Derive the protection measures against floods, cyclone, and landslides.	Apply
CO5.Understand the effects of disasters on built structures in India	Understand

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	-	-	L	-	-	-	-	-	-	-	-	L	-	-
CO2	M	M	L	L	-	M	-	-	-	-	-	-	L	-	-
CO3	S	M	S	M	-	L	-	M	-	-	-	-	M	L	-
CO4	S	M	S	-	L	-	-	-	-	-	-	-	M	L	-
CO5	L	L	-	L	-	-	-	-	-	-	-	-	L	-	-

S-Strong;M-Medium;L-Low

SYLLABUS

INTRODUCTION:

Conceptofdisaster; Different approaches; Concept of Risk; Levels of disasters; Disaster phenomena and events (Global, national and regional); Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etcDos and Don'ts during various types of Disasters.

RISKASSESSMENTANDVULNERABILITYANALYSIS:

Responsetime,frequencyandforewarninglevelsofdifferenthazards;Characteristicsanddamage potential of naturalhazards;hazard assessment;Dimensionsofvulnerabilityfactors; Vulnerability assessment; Vulnerability and disaster risk; Vulnerabilities to flood and earthquake hazards.

DISASTER MANAGEMENT MECHANISM:

Concepts of risk management and crisis management ; Disastermanagementcycle;ResponseandRecovery;Development,Prevention,MitigationandPreparedness;Planningf or relief, Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster

DISASTER RESPONSE:

Mass media and disaster management; Disaster Response Plan; Communication, Participation,and Activation of Emergency Preparedness Plan; Logistics Management; Psychological Response; Trauma and StressManagement;RumourandPanicManagement;MinimumStandardsofRelief;ManagingRelief;Funding.

DISASTER MANAGEMENT IN INDIA:

Strategies for disaster management planning; Steps for formulating a disasterriskreductionplan;DisastermanagementActandPolicyinIndia;Organisationalstructurefordisastermanagemen tinIndia;Preparation of state and district disaster management plans, , Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake- holders

TEXTBOOKS:

1. Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423 2.
2. Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10:1259007367, ISBN-13: 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES:

1. AbarquezI.&MurshedZ.CommunityBasedDisasterRiskManagement:FieldPractitioner'sHandbook,AD PC,Bangkok,2004.
2. Goudie,A.GeomorphologicalTechniques,UnwinHyman,London1990.
3. Goswami,S.C.RemoteSensingApplicationinNorthEastIndia,PurbanchalPrakesh,Guwahati,1997.

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4. ManualonNaturalDisasterManagementinIndia,NCDM,NewDelhi,2001.
5. DisasterManagementinIndia,MinistryofHomeAffairs,GovernmentofIndia,NewDelhi,2011.
6. NationalPolicyonDisasterManagement,NDMA,NewDelhi,2009.
7. DisasterManagementAct.(2005),MinistryofHomeAffairs,GovernmentofIndia,NewDelhi,2005.

CourseDesigners

S.No.	NameoftheFaculty	Designation	Department	MailID
1	Ms.S.IsparaXavier	AssistantProfessor	Civil/AVIT	isparaxavier.civil@avit.ac.in

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34621O01	GREEN POWER GENERATION SYSTEMS	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

The course presents the various sources of renewable energy including wind, solar, and biomass as potential sources of energy and investigates the contribution they can make to the energy profile of the nation. The technology used to harness these resources will be presented. Discussions of economic, environment, politics and social policy are integral components of the course.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	Understand the nexus between energy, environment, and sustainable development
2	Appreciate energy ecosystems and its impact on environment
3	Learn basics of various types of renewable and clean energy technologies
4	Serve as bridge to advanced courses in renewable energy

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Explain renewable energy sources & systems.	Understand
CO2: Apply engineering techniques to build solar, wind, tidal, geothermal, biofuel, fuel cell, Hydrogen, and sterling engine.	Apply
CO3: Analyze and evaluate the implication of renewable energy. Concepts in solving numerical problems pertaining to solar radiation geometry and wind energy systems.	Analyze
CO4: Demonstrate self -learning capability to design & establish renewable energy systems.	Analyze
CO5: create experiments to assess the performance of solar PV, solar thermal and biodiesel systems	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	M	-	L	L	-	-	-	-	M	-	-
CO2	S	M	S	L	M	-	L	M	-	M	-	-	-	-	-
CO3	S	-	-	-	M	-	-	M	M	-	-	-	L	-	-
CO4	S	-	-	-	M	-	L	-	-	-	-	M	-	-	-
CO5	S	M	S	L	M	-	L	M	-	M	M	-	M	L	-
CO6	S	-	-	-	M	-	L	L	-	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

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SYLLABUS

ENERGY

Introduction to the nexus between energy, environment and sustainable development, Energy sources overview and classification, sun as the source of energy, fossil fuel reserves and resources - overview of global/ India's energy scenario. Energy consumption models – Specific Energy Consumption

ECOLOGY AND ENVIRONMENT

Concept and theories of ecosystems, - energy flow in major man-made ecosystems- agricultural, industrial and urban ecosystems - sources of pollution from energy technologies and its impact on atmosphere - air, water, soil, and environment - environmental laws on pollution control, The environmental protection act: Effluent standards and ambient air quality, innovation and sustainability, eco-restoration: Phyto-remediation.

RENEWABLE SOURCES OF ENERGY

Solar Energy: Solar radiation: measurements and prediction. Indian's solar energy potential and challenges, solar energy conversion principles and technologies: Photosynthesis, Photovoltaic conversion, and Photo thermal energy conversion. Wind Energy: Atmospheric circulations, atmospheric boundary layers, classification, factors influencing wind, wind shear, turbulence, wind energy basics and power Content, wind speed monitoring, Betz limit, wind energy conversion system: classification, characteristics, and applications. Ocean Energy: Ocean energy resources-ocean energy conversion principles and technologies: ocean thermal, ocean wave & ocean tide

BIOENERGY

Biomass as energy resources; bio-energy potential and challenges, Classification, and estimation of biomass; Source and characteristics of biofuels: Biodiesel, Bioethanol, Biogas. Types of biomass energy conversion systems - waste to energy conversion technologies

OTHER ENERGY SOURCES AND SYSTEMS

Hydropower, Nuclear fission, and fusion-Geothermal energy: Origin, types of geothermal energy sites, site selection, geothermal power plants; hydrogen energy, Magneto-hydro-dynamic (MHD) energy conversion – Radioisotope Thermoelectric Generator (RTG), Bio-solar cells, battery & super capacitor, energy transmission and conversions.

TEXTBOOKS:

3. Energy and the Environment, Ristinen, Robert A. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A., 2nd Edition, John Wiley, 2006,
4. Energy and the Challenge of Sustainability, World Energy assessment, UNDP, N York, 2000.

REFERENCE BOOKS:

3. Ocean Energy: Tide and Tidal Power by R. H. Charlier and Charles W. Finkl, Springer 2010
4. Introduction to Electrodynamics (3rd Edition), David J. Griffiths, Prentice Hall, 2009

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Devarajan	Professor	EEE	devarajan@vmkvec.edu.in
2	Mr. R. Sathish	Assistant Professor	EEE	sathish@vmkvec.edu.in
3	Mr. V.Rattankumar	Assistant Professor	EEE	rattankumar@avit.ac.in

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34621O02	INDUSTRIAL DRIVES AND AUTOMATION	Category	L	T	P	C
		OE-EA	3	0	0	3

Preamble

To introduce foundation on the principles of drives & automation and their elements with the implementation.

PREREQUISITE : NIL

COURSE OBJECTIVES

1	To explore the various AC,DC & Special Machine Drives for industrial Application
2	To study about the various Open loop and closed loop control schemes for drives
3	To know about hardware implementation of the controllers using PLC
4	To study the concepts of Distributed Control System
5	To understand the implementation of SCADA and DCS

COURSE OUTCOMES

On successful completion of the course, the students will be able to

CO 1	To understand working principles of various types of motors, differences, characteristics and selection criteria.	Understand
CO 2	To apply the knowledge in selection of motors, heating effects and braking concepts in various industrial applications	Apply
CO 3	To explain control methods of special drives	Understand
CO 4	To carry out programming using PLC and use of various PLCs to Automation problems in industries.	Understand
CO 5	To discuss supervisory control and data acquisition method and use the same in complex automation areas	Understand
CO6	To understand and use logical elements and use of Human Machine Interfacing devices to enhance control & communication aspects of Automation	Understand

Mapping with Programme outcomes and Programme Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	L	-		S	S	-		L	-	-	-	-	L
CO2	M	-	M	-	S	L	M	-	M	L	-	-	L	-	-
CO3	M	-	M	-	S	L	M	-		L	-	-	-	M	-
CO4	S	-	S	-	S	M	M	L	-	L	M	-	-	-	L
CO5	S	M	S	S	S	M	S		M	L	L	M	-	L	M

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INTRODUCTION

Working principle of synchronous, Asynchronous & stepper motors, Difference between Induction and servo motors, Torque v/s speed characteristics, Power v/s. Speed characteristics, Vector duty induction motors, Concepts of linear and frameless motors, Selection of feedback system, Duty cycle, , V/F control, Flux Vector control.

INDUSTRIAL DRIVES

Electric drive – Definition – Parts – Types -Individual – Group – Multi motor. Stepper motor – Definition – Step angle – Slewing rate -Types -Variable reluctance -Hybrid – Closed loop control of stepper motor – Drive system(any one) – logic sequencer – Optical encoder. Servo motor – Definition – Types -DC servo motor – Permanent magnet DC motors – Brushless motor – AC servo motor -Working of an AC servo motor in control system – Induction motors – Eddy current drive for speed control of induction motors.

PROGRAMMABLE LOGIC CONTROLLER

Definition Conventional Hard wired logicRelays- Features of PLC- Advantages of PLC over relay logic –
Block diagram of PLC -Programming basics of PLC – Ladder logic -Symbols used in ladder logic – Logic functions – Timers – Counters – PLC networking – Steps involved in the development of Ladder logic program – Program execution and run operation by PLC – Ladder logic diagram for liquid level operation. List of various PLCs and their manufactures.

DISTRIBUTED CONTROL SYSTEM

Evolution of distributed control system -Definition of DCS – Functional elements of DCS – Elements of local control unit -Interfaces-Types of information displays – Architecture of anyone commercial DCS – Advantages of DCS -Selection of DCS – List of various DCS and their manufactures.

SUPERVISORY CONTROL & DATA ACQUISITIONS

Introduction to Supervisory control & data Acquisitions, distributed Control System (DCS): computer networks and communication in DCS. different BUS configurations used for industrial automation – GPIB, HART and OLE protocol, Industrial field bus – FIP (Factory Instrumentation Protocol), PROFIBUS (Process field bus), Bit bus. Interfacing of SCADA with controllers, Basic programming of SCADA, SCADA in PC based Controller / HMI.

TEXTBOOK

4. G.K.Dubey, Fundamentals of Electrical Drives', Narosa Publication,2002.
5. FrankD.petruzellaprogrammable logic controlsthird edition TATA mc graw-hill edition 2010.
6. M.S.Berde, Electric Motor Drives Khanna publishers.2008

REFERENCES

7. Pradheepkumarsrivastava, Programmable logic controllers with applications', BPB publications.2004.
8. John W.Webb, Ronald A.Reis, Programmable logic controllers-Principles and Applications', Fifth Edition, Prentice Hall of India.
9. Michel P.Lukas, Distributed Control system', van Nostrand Reinhold Co, 1986
10. R.SrinivasanSpecial electrical Machines lakshmi publication.2012
11. Process Control Instrumentation Technology, Johnson Curties, Prentice hall of India, 8th edition
12. Andrew Parr, Industrial drives, Butterworth – Heineaman

COURSE DESIGNERS

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38121O01	FOOD AND NUTRITION TECHNOLOGY	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

The course aims to enable the students to understand the physicochemical, nutritional, microbiological and sensory aspects, To familiarize the students about the processing and preservation techniques. To emphasize the importance of food safety, food quality, food plant¬ sanitation, food laws and regulations, food engineering and packaging in food industry.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	Understand the tradition food processing techniques and the basics concept of food biochemistry
2	Demonstrate the product development technique, quality and contaminant check
3	To articulate their technical knowledge for industrial purpose
4	Describe national food laws and standards
5	Laws and qualities of standard for food products

COURSE OUTCOMES

After the successful completion of the course, learner will be able to

CO1: Recall the processing techniques practiced in olden days and the biological process	Remember
CO2. Illustrate the methods for animal product development, quality control and also screen the contaminant	Understand
CO3.Transfer the techniques in scaling up for industrial needs	Apply
CO4. Interpret and Troubleshoot instruments to maintain accuracy	Apply
CO5. Develop standards for food additives	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	L	M	S	M	L	-	-	-	-	-	-	-	M	L	-
CO4	M	S	S	M	L	-	-	-	-	-	-	-	S	S	-
CO5	-	S	S	M	M	-	-	-	-	-	-	M	L	S	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO FOOD BIOTECHNOLOGY

Introduction, History and scope of food Biotechnology, development and prospects of biotechnology in animal products, ancient and traditional food processing techniques; Biochemical and metabolic pathways of biological systems used in food production.

METHODS IN FOOD BIOTECHNOLOGY: Role of biotechnology in productivity of livestock, Modern biotechnological methods and processes in animal product development, chemical and physical factors required for growing microbial cultures in nutritive substrate; Meat species identification, Quality control, Screening products for contaminants

BIOTECHNOLOGY METHODS IN FOOD PROCESSING:

Use of biotechnology in the production of food additives, use of biotechnological tools for the processing and preservation and foods of animal origin, use of biotechnology improved enzymes in food processing industry, Basic principles of the industrial use of bio-reactions for production of biomass-upstream and

downstream processing application of microorganisms as starter cultures in meat industry, microbial production of food ingredients; Biosensors and novel tools and their application in food science.

FOOD SAFETY & SECURITY:

Consumer concerns about risks and values, biotechnology & food safety, Ethical issues concerning GM foods; testing for GMOs; current guidelines for the production, release and movement of GMOs; Future and applications of food biotechnology in India.

TEXT BOOKS:

1. Potter, Norman. M. Food Science, 5th Ed. Springer US
2. Manay, S.; Shadakshara Swamy, M., (2004). Foods: Facts and Principles, 4 th Ed. New Age Publishers.
3. B. Srilakshmi., (2002) Food Science, New Age Publishers..

REFERENCES:

1. Meyer, (2004). Food Chemistry. New Age
2. Deman JM. (1990) Principles of Food Chemistry. 2 nd Ed. Van Nostrand Reinhold, NY
3. Ramaswamy H and Marcott M. Food Processing Principles and Applications. CRC Press

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38121O02	INTRODUCTION TO BIOFUELS	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

This course will provide an overview of existing energy utilization, production and infrastructure. We will also cover the consequences of our energy choices on the environment. The topics covered will include the chemistry of biofuels, the biology of important feedstocks, the biochemical, genetic and molecular approaches being developed to advance the next generation of biofuels and the economical and global impacts of biofuel production.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	Students will recognize the types and differences between existing energy resources, understand their procurement and utilization, and their impacts on society and the environment
2	Students will be knowledgeable of the existing and potential future sources of renewable energy, and be able to intelligently analyze reported aspects of the energy and renewable energy fields.

COURSE OUTCOMES

After the successful completion of the course, learner will be able to

CO1. Understand the existing and emerging biomass to energy technologies	Remember
CO2. Understand the concept of 1st generation, 2nd generation and advance biofuels	Understand
CO3. Appraise the techno-economic analyses of biofuel conversion technologies	Understand
CO4. To articulate the concept of a biorefinery system and be able to develop major unit operations of an integrated biorefinery	Apply
CO5. Illustrate the environmental implications	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	L	-	M	-	S	L	-	-	-	-	S	-	L
CO2	-	S	S	-	M	-	L	-	-	-	-	-	-	S	L
CO3	S	M	-	M	-	M	-	L	L	-	-	-	S	-	L
CO4	-	S	M	-	M	L	L	-	-	-	-	-	-	S	M
CO5	-	-	-	-	-	-	-	S	M	-	-	-	-	-	L

S- Strong; M-Medium; L-Low

SYLLABUS

OVERVIEW OF BIOFUELS

Generation of biofuels − Development of biological conversion technologies − Integration of biofuels into biorefineries − Energy security and supply − Environmental sustainability of biofuels − Economic sustainability of biofuels.

BIODIESEL

Biodiesel − Microorganisms and raw materials used for microbial Oil production − Treatment of the feedstocks prior to production of the Biodiesel − Current technologies of biodiesel production − Purification of biodiesel; Industrial production of biodiesel − Biodiesel production from single cell oil.

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BIOETHANOL

Bioethanol – Properties – Feedstocks − Process technology − Pilot plant for ethanol production from lignocellulosic feedstock − Environmental aspects of ethanol as a biofuel.

BIOMETHANE AND BIOHYDROGEN

Biomethanol − Principles, materials and feedstocks − Process technologies and techniques − Advantages and limitations − Biological hydrogen production methods − Fermentative hydrogen production − Hydrogen economy − Advantages and limitations.

OTHER BIOFUELS

Biobutanol production − Principles, materials and feedstocks − Process technologies – Biopropanol – Bioglycerol − Production of bio-oils via catalytic pyrolysis − Life-Cycle environmental impacts of biofuels and Co-products.

TEXT BOOKS:

1. Luque, R., Campelo, J.and Clark, J. Handbook of biofuels production, Woodhead Publishing Limited 2011 2. Gupta, V, K. and Tuohy, M, G. Biofuel Technologies, Springer, 2013 3. Moheimani, N. R., Boer, M, P, M, K, Parisa A. and Bahri, Biofuel and Biorefinery Technologies, Volume 2, Springer, 2015

REFERENCES:

1. Eckert, C, A. and Trinh, C, T. Biotechnology for Biofuel Production and Optimization, Elsevier, 2016 2. Bernardes, M, A, D, S. Biofuel production – recent developments and prospects, InTech, 2011

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35321O03	PRINCIPLES OF BIO MEDICAL INSTRUMENTATION	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

To enable the students to develop knowledge of principles, design and applications of the Biomedical Instruments.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To know about bioelectric signals, electrodes and its types.
2	To know the various Biopotential recording methods.
3	To study about patient monitoring concept and various Physiological measurements methods.
4	To study the principle of operation blood flow meter, blood cells counter.
5	To study about bio chemical measurements and details the concept of biotelemetry and patient safety.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Explain the different Bio signal or biopotential.	Understand
CO2. Discuss the working principles of diagnostic and therapeutic equipments.	Understand
CO3. Examine the various instruments like as ECG, EMG, EEG, X-ray machine.	Apply
CO4. Illustrate medical instruments based on principles and application used in hospital.	Analyze
CO5. Analyze and calibrate fundamental biomedical instrumentation used in hospital.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	--	--	-	--	--	--	--	--	--	--	L	M	--	--
CO2	M	--	--	--	--	--	--	--	L	--	--	L	M	--	--
CO3	S	S	M	S	M	--	--	--	M	--	--	M	M	M	S
CO4	S	M	M	M	L	--	--	L	S	L	--	S	M	S	S
CO5	S	S	M	M	L	M	--	L	S	L	--	S	M	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

BIOELECTRIC SIGNALS AND ELECTRODES

Basic medical instrumentation system, Origin of Bioelectric Potential, Recording electrodes – Electrode Tissue interface, Electrolyte – skin interface, Polarization, Skin contact impedance, motion artifacts. Electrodes – Silver – silver chloride electrodes, electrodes for ECG, electrodes for EEG, electrodes for EMG, Electrical conductivity of electrode jellies and creams, Microelectrodes.

BIO AMPLIFIER AND BIOMEDICAL RECORDERS

Bioamplifier, Need for Bioamplifier, Differential amplifier, Instrumentation amplifier, Chopper amplifier, Isolation Amplifier, ECG, EEG, EMG, PCG, EOG, ERG lead system and recording methods, typical waveform.

PATIENT MONITORING SYSTEM AND NON ELECTRICAL PARAMETERS MEASUREMENTS

System concepts of patient monitoring system, Bedside patient monitoring system, central monitors, Blood pressure measurement, Measurement of temperature, Respiration rate measurement, cardiac output measurement, Measurement of pulse rate, Plethysmography technique.

BLOOD FLOW METERS, BLOOD CELL COUNTERS

Electromagnetic blood flow meter, ultrasonic blood flow meter, Laser Doppler blood flow meter, Types of blood cells, Methods of cell counting, coulter counters, automatic recognition and differential counting.

BIO- CHEMICAL MEASUREMENTS AND BIOTELEMETRY AND PATIENT SAFETY

Ph, Pc02, p02, Phco3 and electrophoresis, colorimeter, spectrophotometer, flame photometer, auto-analyser. Biotelemetry-wireless telemetry, single channel telemetry, multichannel telemetry, multi patient telemetry.

TEXT BOOKS:

1. Khandpur R.S, **"Hand-book of Biomedical Instrumentation"**, Tata McGraw Hill, 2nd Edition, 2003.
2. Leslie Cromwell, Fred Weibell J, Erich Pfeiffer. A, **"Biomedical Instrumentation and Measurements"**, Prentice-Hall India, 2nd Edition, 1997.

REFERENCES:

1. John G. Webster, **"Medical Instrumentation application and design"**, John Wiley, 3rd Edition, 1997.
2. Carr, Joseph J, Brown, John.M, **"Introduction to Biomedical equipment technology"**, John Wiley and sons, New York, 4th Edition, 1997.

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35321O02	BIOSENSORS AND TRANSDUCERS	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

The course is designed to make the student acquire conceptual knowledge of the transducers and biological components used for the detection of an analyte. The relation between sensor concepts and biological concepts is highlighted. The principles of biosensors that are currently deployed in the clinical side are introduced.

PREREQUISITE – Nil

COURSE OBJECTIVES

1	To use the basic concepts of transducers, electrodes and its classification.
2	To discuss the various types of electrodes.
3	To determine the recording of biological components.
4	To employ the knowledge in electrochemical and optical biosensors.
5	To outline the various biological components using biosensors.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Describe the working principles of transducers.	Understand
CO2. Explain the various types of electrodes.	Understand
CO3. Utilize various FET sensors for recording of biological components.	Apply
CO4. Distinguish various biosensors like electrochemical and optical biosensors.	Analyze
CO5. Analyze the biological components using biosensors in various applications.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	L	--	M	--	M	--	--	L	--	--	M	--	M	--
CO2	M	L	--	M	--	M	--	--	L	--	--	M	--	M	--
CO3	S	M	L	S	--	S	M	M	M	--	--	M	M	M	M
CO4	S	S	L	S	--	S	M	M	S	--	--	M	M	M	S
CO5	S	S	L	S	--	S	M	M	S	--	--	S	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION: General measurement system, Transducers and its classification, Resistance transducers, capacitive transducer, Inductive transducer.

TRANSDUCERS:

Temperature transducers, piezoelectric transducers, Piezoresistive transducers, photoelectric transducers.

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BIO POTENTIAL ELECTRODES:
Half cell potential, Types of Electrodes –Micro electrodes, Depth and needle electrodes, Surface electrodes, Chemical electrodes, Catheter type electrodes, stimulation electrodes, electrode paste, electrode material.

BIOSENSORS:
Biological elements, Immobilization of biological components, Chemical Biosensor-ISFET, IMFET, electrochemical sensor, chemical fibro sensors.

APPLICATIONS OF BIOSENSORS:
Bananatrode, blood glucose sensors, non invasive blood gas monitoring, UREASE biosensor, Fermentation process control, Environmental monitoring, Medical applications.

TEXT BOOKS:

1. H.S. Kalsi, **"Electronic Instrumentation & Measurement"**, Tata McGraw HILL, 1995.
2. Brain R Eggins, **"Biosensors: An Introduction",** John Wiley Publication, 1997.
3. Shakthi chatterjee, **"Biomedical Instrumentation"**, Cengage Learning, 2013.
4. John G Webster, **"Medical Instrumentation: Application and design"**, John Wiley Publications, 2001.

REFERENCES:

1. K.Sawhney, **"A course in Electronic Measurements and Instruments"**, Dhapat Rai & sons, 1991.
2. John P Bentley, **"Principles of Measurement Systems"**, 3rd Edition, Pearson Education Asia, (2000 Indian reprint).
3. Geddes and Baker, **"Principles of Applied Biomedical Instrumentation"**, 3rd Edition, John Wiley Publications, 2008.

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34721O02	INTRODUCTION TO INDUSTRY 4.0 ANDINDUSTRIAL INTERNET OF THINGS	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

Industry 4.0 and Industrial Internet of Things is the pioneer of today's modern technology. To match the engineering skills with the industry skills this subject will induce and impart the knowledge among the young professionals.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	Industry 4.0 concerns the transformation of industrial processes through the integration of modern technologies such as sensors, communication, and computational processing.
2	Technologies such as Cyber Physical Systems (CPS), Internet of Things (IoT), Cloud Computing, Machine Learning, and Data Analytics are considered to be the different drivers necessary for the transformation.
3	Industrial Internet of Things (IIoT) is an application of IoT in industries to modify the various existing industrial systems.
4	IIoT links the automation system with enterprise, planning and product lifecycle.
5	Real case studies

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Apply & Analyzing the transformation of industrial process by various techniques.	Analyze
CO2. Evaluate the transformation technologies are considered to be the different drivers.	Apply
CO3. Existing industrial systems will adopt the applications of IIoT.	Apply
CO4. Intensive contributions over automation system with enterprise, planning and product life cycle	Analyze
CO5. Analyze of various Real time case studies.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
CO1	S	S	M	-	M	-	-	-	-	-	-	M	S	M	-
CO2	S	S	S	M	M	-	-	-	-	-	-	M	S	M	M
CO3	S	S	S	M	M	-	-	-	-	-	-	M	S	M	M
CO4	S	S	S	M	M	-	-	-	-	-	-	M	S	M	M
CO5	S	S	S	S	M	-	-	-	-	-	-	M	S	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION TO INDUSTRY 4.0 ANDINDUSTRIAL INTERNET OF THINGS Introduction: Sensing & actuation, Communication-Part I, Part II, Networking-Part I, Part II.Industry 4.0: Globalization, The Fourth Revolution, LEAN Production Systems, Cyber Physical Systems and Next Generation Sensors, Collaborative Platformand Product Lifecycle Management

INDUSTRIAL INTERNET OF THINGS& IT'S LAYERS

Cybersecurity in Industry 4.0, Basics of Industrial IoT: Industrial Processes-Part I, Part II, Industrial Sensing & Actuation. IIoT-Introduction, Industrial IoT: Business Model and Reference Architecture: IIoT-Business Models-Part I, Part II, IIoT Reference Architecture-Part I, Part II, Industrial IoT- Layers: IIoT Sensing-Part I, Part II, IIoT Processing-Part I, Part II.

IIoT COMMUNICATION

Communication-Part I, Industrial IoT- Layers: IIoT Communication, IIoT Networking-Part I, Part II, Part III. Industrial IoT: Big Data Analytics and Software Defined Networks: SDN in IIoT-Part I, Part II, Data Center Networks, Industrial IoT

IIoT BIG DATA & SDN APPLICATIONS

Industrial IoT: Security and Fog Computing - Fog Computing in IIoT, Security in IIoT-Part I, Part II, Industrial IoT- Application Domains. Industrial IoT- Application Domains: Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications), Facility Management.

APPLICATIONS & REAL TIME CASE STUDIES

Industrial IoT- Application Domains: Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries, Real case studies - Virtual reality lab, Manufacturing industries – part one, Manufacturing industries – part two, Milk processing and packaging industries, Steel technology lab, Student projects – part one, Student projects – part two

TEXT BOOKS:

1. Anandarup Misra, Sudip | Roy, Chandana | Mukherjee, "Introduction to Industrial Internet of Things andIndustry 4.0, CRC press, 2003.

REFERENCE BOOKS:

1. Gilchrist, Alasdair, "Introduction to IoT", Apress, 2016
2. Gilchrist, Alasdair "IIoT Reference Architecture", Apress, 2016

COURSE DESIGNERS

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34721O02	DESIGN OF ELECTRONIC EQUIPMENT	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

The objective of this course is to sensitise a registrant to various aspects of an electronics product. Specifically on non-Electrical aspects like mechanical design and detailing. Starting from a need translated into specifications, leading to design and prototyping and ending up in a manufacturable physical prototype.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To understand the various Concept of Industrial Design process.
2	To apply the basic Concept of electronic Product designs methodology.
3	To classify the Concept of Ergonomics & aesthetics in product design.
4	To understand the Knowledge regarding the design of product packaging and working environment.
5	To understand the Knowledge of different industrial standard and value analysis.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Visualize the concept for product design with respect to ergonomics and aesthetics.	Remember
CO2. Analyze, design and implement control panels of electronic equipments.	Apply
CO3. Apply creativity in the design of system by formulating architecture with proper placement of components.	Apply
CO4. Apply the concept of visual communication techniques in product design.	Apply
CO5. Apply the process of value analysis in existing product.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	L	-	-	S	-	-	L	M	L	-	-	S	-	-
CO2	M	L	-	M	S	-	-	L	M	L	-	-	S	-	-
CO3	M	L	-	M	S	-	-	L	M	L	-	L	S	-	M
CO4	S	M	L	-	S	-	-	L	M	L	-	L	S	M	M
CO5	S	M	L	-	S	-	-	M	L	L	-	L	S	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

MODULE 1: INTRODUCTION

Introduction to industrial design, Role of industrial design in the domain of industry, Generic product development process, ID process, Product innovations, tools and methods.

MODULE 2: PRODUCT PROTOTYPES

Management of ID process, Product architecture, Structure: standard and non-standard structures. Product prototypes.

MODULE 3: PRODUCT DESIGN AND PLANNING

Electronic product design and development Methodology, Creativity techniques, brainstorming documentation. Product planning: Defining the task, scheduling the task and its execution. Costing and Pricing of Industrial design,

MODULE 4: ERGONOMICS

Ergonomics: Ergonomics of electronic equipments, Ergonomics of control panel design. Use of ergonomics at work places and plant layout. Aesthetics: Elements of aesthetics, aesthetics of control panel design.

MODULE 5: CASE STUDIES

Value engineering, Product quality and design management. Industrial standards, Graphics and packaging

TEXTBOOKS:

1. Carl T. Ulrich, Steven. D. Eppinger," "Product Design and Development", McGraw Hill Companies.

REFERENCE BOOKS:

1. Ernest J Mccormick ,"Human factors in Engineering and Design" -, McGraw-Hill Co.
2. Yammiyavar P," Control Panel Design and Ergonomics", CEDT/IISc Publication.
3. Murrell K, Chapman," Ergonomics: Man in his Working Environment", &Hall. London. Flurschiem C H, "Industrial Design and Engineering Design Design", Council, London and Springer Verlag, 1983

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3	Mr.G.Murali	Assistant Professor	ECE	muralig@vmkvec.edu.in

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35021R01	PROJECT WORK	Category	L	T	P	Credit
		PI-P	0	0	16	8

PREAMBLE

This course enables the students to exercise some of the knowledge and/or skills developed during the programme to new situation or problem for which there are number of engineering solutions. This course include planning of the tasks which are to be completed within the time allocated, and in turn, helps to develop ability to plan, , use, monitor and control resources optimally and economically. By studying this course abilities like creativity, imitativeness and performance qualities are also developed in students. Leadership development and supervision skills are also integrated objectives of learning this course.

PREREQUISITE – Nil

COURSE OBJECTIVES

1	To develop quality software solution.
2	To involve in all the stages of the software development life cycle like requirements engineering, systems analysis, systems design, software development, testing strategies and documentation.
3	To understand and gain the knowledge of the principles of software engineering practices.
4	To Get good exposure and command in one or more application areas and on the software.
5	To participate and manage a large software engineering projects in future.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

1. Describe the Systems Development Life Cycle (SDLC).	Apply
2. Design of Modules.	Apply
3. Perform coding.	Apply
4. Analyze and Apply various types of testing techniques and prepare documentation.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	L	S	M	-	-	S	-	S	-	M	M	M
CO2	S	S	M	M	S	M	-	-	S	-	M	-	S	S	S
CO3	L	M	L	L	M	M	-	-	M	-	L	-	M	M	M
CO4	S	S	M	L	S	M	-	-	S	-	S	-	M	M	M

S- Strong; M-Medium; L-Low

- Not more than one student is permitted to work on a project.
- Each Student should be involved in each and every phase of Project Development. If it is found that student is not involved in any phase; for example coding phase, it may lead to the rejection/disqualifying of the project at any stage.
- Title of the project should be kept the same throughout the project.

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Guidelines for preparing the Project Dissertation

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Work allocation matrix:

Prepare work allocation matrix along with provision of follow-up remarks and notes.

Project execution:

Execute project preparation activities as per work allocation matrix.

Documentation and presentation:

Documentation of final project report which includes following in sequence.

a. Title page-(Suggested as per Annexure-II.)
b. Certificate –As per Annexure-III.
c. Index.
d. Preface/Acknowledgement.
e. Course outcomes.
f. Project title.
g. Assembly and detail production drawings.
h. List of activities (suggested as per Annexure – IV) and work allocation matrix.
i. Plant layout with dimensions.
j. List and specifications of machineries, equipments and tools.
k. Bill of material with make or buy decision.
l. Specifications of bought out parts.
m. Process sheets-As per format given in course Industrial engineering.
n. Flow process charts.
o. Specification and consumption of consumables.
p. Details of inspection / testing carried out.
q. Details of rework / rectifications carried out.
r. Cost estimation.
s. Monitoring and control report/sheet.
t. Notes on troubleshooting.
u. Notes on individual achievement of skills / experience /problems / solutions.
v. References.
w. Day to day logbook as per Annexure-V.
x. Presentation including moments at work-video/photographs in action

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Notes:

Prepare project report with MS Office with following guidelines.

PAGE:	A4 (ON ONE SIDE).
MARGINN:	TOP :15mm. BOTTOM :15mm. RIGHT :15mm. LEFT :30mm.
FONT:	ARIAL.
SIZE:	12-BOLD, CONTENT12, SPACING 18 POINTS,
HEADER:	TITLE OF THE PROJECT, PAGE NUMBER ON TOP RIGHT.
FOOTER:	ACADEMIC YEAR, SHORT NAME OF THE INSTITUTE

SUGGESTED LEARNING RESOURCES.

1. Use of Library.
2. Reference books.
3. Hand books.
4. Encyclopedia.
5. Magazines.
6. Periodicals.
7. Journals.
8. Visits of industry, organizations related as per the requirement.
9. Internet.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.M.Nithya	Professor	CSE	hodcse@vmkvec.edu.in
2	Dr.S.Rajaprakash	Associate professor	CSE	rajaprakash@avit.ac.in.

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35021M81	MINI PROJECT	Category	L	T	P	Credit
		PI-M	0	0	6	3

PREAMBLE

The primary emphasis of the project work is to understand and gain the knowledge of the principles of software

Engineering practices, so as to participate and manage a large software engineering projects in future.

PREREQUISITE – Nil

COURSE OBJECTIVES

1	To develop quality software solution.
2	To involve in all the stages of the software development life cycle like requirements engineering, systems analysis, systems design, software development, testing strategies and documentation.
3	To understand and gain the knowledge of the principles of software engineering practices.
4	To Get good exposure and command in one or more application areas and on the software.
5	To participate and manage a large software engineering projects in future.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

5. Describe the Systems Development Life Cycle (SDLC).	Apply
6. Design of Modules.	Apply
7. Perform coding.	Apply
8. Analyze and Apply various types of testing techniques and prepare documentation.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	L	S	M	-	-	S	-	S	-	M	M	M
CO2	S	S	M	M	S	M	-	-	S	-	M	-	S	S	S
CO3	L	M	L	L	M	M	-	-	M	-	L	-	M	M	M
CO4	S	S	M	L	S	M	-	-	S	-	S	-	M	M	M

S- Strong; M-Medium; L-Low

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- Individual / not more than one student is permitted to work on a project.
- Each Student should be involved in each and every phase of Project Development. If it is found that student is not involved in any phase; for example coding phase, it may lead to the rejection/disqualifying of the project at any stage.
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i. Plant layout with dimensions.
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l. Specifications of bought out parts.
m. Process sheets-As per format given in course Industrial engineering.
n. Flow process charts.
o. Specification and consumption of consumables.
p. Details of inspection / testing carried out.
q. Details of rework / rectifications carried out.

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r. Cost estimation.

s. Monitoring and control report/sheet.

t. Notes on troubleshooting.

u. Notes on individual achievement of skills / experience /problems / solutions.

v. References.

w. Day to day logbook as per Annexure-V.

x. Presentation including moments at work-video/photographs in action

Notes:

Prepare project report with MS Office with following guidelines.

PAGE:	A4 (ON ONE SIDE).
MARGINN:	TOP :15mm. BOTTOM :15mm. RIGHT :15mm. LEFT :30mm.
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HEADER:	TITLE OF THE PROJECT, PAGE NUMBER ON TOP RIGHT.
FOOTER:	ACADEMIC YEAR, SHORT NAME OF THE INSTITUTE

SUGGESTED LEARNING RESOURCES.

1. Use of Library.
2. Reference books.
3. Hand books.
4. Encyclopedia.
5. Magazines.
6. Periodicals.
7. Journals.
8. Visits of industry, organizations related as per the requirement.
9. Internet.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.M.Nithya	Professor	CSE	hodcse@vmkvec.edu.in
2	Mr. K.Karthik	Associate Professor	CSE	karthik@avit.ac.in

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35021T81	INTERNSHIP	Category	L	T	P	Credit
		PI-IT	0	0	0	3

PREAMBLE

The Engineering Internship course is a Canvas-based course that offers students the opportunity to explore and develop their careers through professional practice. The structured plan of education impacts student work readiness through a number of professional development skill-building activities, including goal setting; analysis and reflection; feedback from employer; informational interviewing and debriefing their experience.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	An understanding of how liberal arts coursework ties to professional careers of interest.
2.	Gain insight into a possible career path of interest while learning about the industry in which the organization resides, organizational structure, and roles and responsibilities within that structure.
3.	Develop professional connections and identify a strategy for maintaining those connections

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Add details about your experience including new skills developed and results obtained .	Understand
CO2. Analyze your internship experience, reflecting on lessons learned and how your liberal arts education prepared you for the internship.	Apply
CO3. Identification of additional skills that will need to be developed to ensure career readiness.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	S	L	S	-	L	L	S	L	S	-	M	M	M
CO2	S	S	M	M	S	M	L	L	M	M	M	-	S	S	S
CO3	L	M	M	L	M	M	L	L	M	L	L	-	M	M	M

S- Strong; M-Medium; L-Low

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General Procedure

Final Reflection Report:

I. General Information Section

Explain your role and how your work contributed to the company

II. Technical Skills

Document the technical experiences you had during your work experience and discuss technical problems that you assisted in solving

III. Development of Professional Skills

Describe team and leadership building opportunities on the job

IV. Assessments

- Discuss whether or not you met goals set out by your supervisor or that you set for yourself
- Evaluate your performance of assigned projects, noting both areas of strength and improvement

V. Conclusion

- Summarize by addressing the impact of the work experience on your education and career goals
- Provide two "lessons learned" to share with any student that is considering an internship

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	Dr.M.Nithya	Professor	CSE/VMKVEC	hodcse@vmkvec.edu.in
2.	Dr.S.Rajaprakash	Associate professor	CSE/AVIT	rajaprakash@avit.ac.in.

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YOGA AND MEDITATION - 34121Z81

Course Objective: To gain knowledge about the Yogic Practices **Course Outcomes:**

Students should be able to

- Evaluate the importance of preparatory exercise.
- Demonstrate the suryanamaskar and various asanas.
- Utilize the meditation techniques.
- Compare mudras and bandhas
- Assess the difference between the asanas and physical exercises.

UNIT - I

History of Yoga - Definition and Meaning of the term Yoga - Comprehensive Natureand Scope of Yoga-Aims and Objectives of Yoga

Text books:

1. H R.Nagarathnam & Dr.H R Nagendra (2015) Promotion of positive health swami vivekanandha yoga prakashana, Banglore.
2. The Classic Guide to Yoga, Dr.G.S.Thangapandiyan, Sports Publication, New Delhi(2020).

UNIT – II

Stream of Yoga: Karma yoga- Raja yoga- Jnana Yoga - Bhakti yoga - Differencebetween practice of Asanas and Physical Exercise.

Text books:

1. Light on Yoga, B.K.S Iyengar Harpine Collins Publication, New Delhi, 2000.
2. Sound Health Through Yoga, K.Chandrasekaran, Prem Kalyan Publications,Sedapatti, 1999.

UNIT – III

Asanas Practice: - Suryanamaskar - Meditative Asanas: Sukhasana – Ardha Padmasana – Padmasana –Vajrasana – Standing Asanas: Tadasana –Trikonasana- Parivrtta Trikonasana – Vrikshasana –Sitting Asanas: Baddha konasana – Janusirasana – Paschimottanasana – Ustrasana – Vakrasana – Gomukhasana.

Text books:

1. H R.Nagarathnam & Dr.H R Nagendra (2015) Promotion of positive health swami vivekanandha yoga prakashana, Banglore.
2. The Classic Guide to Yoga, Dr.G.S.Thangapandiyan, Sports Publication, New Delhi(2020).

UNIT: IV

Asanas Practice: Prone Asanas: Makarasana – Bhujangasana – Sasangasana- Shalabhasana – Dhanurasana - Supine Asanas: Pavanamuktasana – Artha Halasana - Sethubandasana – Navasana –Savasana.

Text books:

1. H R.Nagarathnam & Dr.H R Nagendra (2015) Promotion of positive health swami vivekanandha yoga prakashana, Banglore.
2. The Classic Guide to Yoga, Dr.G.S.Thangapandiyan, Sports Publication, New Delhi(2020).

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UNIT- V

Pranayama Practice: Sectional Breathing - Nadisuddhi – Bhramari – Bhastrika -Kapalabhati – Introduction to Bandhas – Mudras

– Dharana (Trataka) – Dhyana.

Text books:

1. Swami Satyananda Saraswati, (2008): Asana Pranayama Mudra, Bandha (IV Revised Edition): Bihar School of Yoga, Munger, India.

Reference books:

1. Asanas, Swami Kuvalayananda, Kaivalayadhama, Lonavla, 1993.
2. Yoga for All, Maharishi Patanjali, Sahni Publications, 2003.
3. Yoga for Health, Institute of Naturopathy & Yogic Sciences, Bangalore, 2003.
4. Yoga for Health, K.Chandara Shekar, Khel Sahitya Kendra, Theni, 2003.
5. Yoga for the Morden Man, M.P.Pandit, Sterling Publishers Private Limited, NewDelhi, 1987.
6. Yoga for You, Indira Devi, Jaico Publishing House, Chennai, 2002.

Web Resources

1. https://kdham.com/
2. http://www.biharyoga.net/

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34121Z82	GENDER EQUITY AND LAW (COMMON TO ALL BRANCHES)	Category	L	T	P	Credit

		AC	0	0	2	0

Gender Equity is the provision of fairness and justice in the distribution of benefits and responsibilities between ,Men, Women, Transgender, and Gender non-binary individuals. Gender equity is important because, historically, societies around the world have deemed females, transgender people, and nonbinary people as "weaker" or less important than males.Gender equity emphasizes respecting individuals without discrimination, regardless of their gender. There are legal provisions thataddress issues like inequalities that limit a person's ability to access opportunities to achieve better health, education, and economic opportunity based on their gender.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To sensitize the students regarding the issues of gender and thegender inequalities prevalent in society.
2	To raise and develop social consciousness about gender equity among thestudents.
3	To build a dialogueand bring a fresh perspective on transgender and gender non-conforming individuals.
4	To create awareness among the students and to help them face gender stereotype issues.
5	To help the studentsunderstand the various legal provisions that are available in our society.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1.Understand the importance of gender equity	Understand
CO2.Initiate the awareness and recognize the social responsibility with regards to gender equity.	Apply
CO3.To develop a sense of inclusiveness and tolerance towards various genders without any discrimination.	Apply
CO4. To evaluate the social issues and apply suitable gender-related regulations for inclusive living.	Evaluate
CO5.To identify and analyze the existing gender inequality problems faced in various institutions.	Analyse

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MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO1	S	M	L	-	-	S	S	S	-	-	-	S	-	-	-
CO2	S	M	M	-	-	S	S	S	-	-	-	S	-	-	-
CO3	S	L	M	-	-	S	S	S	-	-	-	S	-	-	-
CO4	S	S	S	L	-	S	S	S	-	-	-	S	-	-	-
CO5	S	S	S	M	-	S	S	S	-	-	-	S	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT –I INTRODUCTION TO GENDER AND SEX 6 hrs

Definition of Sex – Definition of Gender - Sex Vs. Gender - Social Construction of Gender and Gender Roles – GenderStereotypes - Gender Division of Labour - Patriarchy, Masculinity and Gender Equality -Feminism and Patriarchy.

UNIT –II - GENDER BIAS 6 hrs

Introduction to Gender Inequality in India - Gender Bias in Media - Misleading Advertisement And

Poor Portrayal of Women and gender non-conforming individuals- Objectification of Women, Transgender, and gender non-conforming individuals - Differential Treatment of Women, Transgender, Exploitation Caused by Gender Ideology - Female Infanticide - Honor Killing.

UNIT –III GENDER SENSITIZATION AND INTERNATIONAL CONVENTIONS 6 hrs

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V.M.K.V. Engg. College, Salem.

Gender Sensitization -Need and Objective - Gender Sensitivity Training at Workplace – GenderSensitization in Judiciary - Gender Sensitization in School Curriculum.

UNIT-IV - SEXUAL OFFENCES AGAINST WOMEN **6 hrs**

Indian Penal Code, 1860 - S., 304B, 354, 354C, 354d, 376, 498A & 509 - The ImmoralTrafficPrevention Act 1986 - The Sexual Harassment of Women at Workplace (Prevention,Prohibition and Redressal) Act, 2013 - Protection of Women from Domestic Violence Act, 2005- Indecent Representation of Women Act, 1986**.**

UNIT-V ROLE OF GOVERNMENT FOR INCLUSIVE DEVELOPMENT **6hrs**

Initiatives of NCERT -Role of Ministry of Women and Child Development - Governmental Initiatives: Beti BachaoBeti Padhao (BBBP) - Ujjawala Scheme - Working Women Hostels (WWH), National Council for Transgender Persons.

TEXT BOOKS

1. IGNOU: Gender Sensitization: Society, Culture and Change (2019) BGSE001, New Delhi IGNOU
2. Jane Pilcher and Imelda Whelehan (2005): Fifty Key Concepts in Gender Studies

REFERENCES:

1. Women's Empowerment & Gender Parity: @Gender Sensitization, Dr. Shikha Bhatnagar, Repro Books (2020).

2. Gender Sensitization: Issues and Challenges, Anupama Sihag Raj Pal Singh, Raj Publications (2019).

3. Violence Against Women: Current Theory and Practice in Domestic Abuse, Sexual Violence, andExploitation (Research Highlights in Social Work), Jessica Kingsley Publishers (2012).

4. Gill, Rajesh, Contemporary Indian Urban Society- Ethnicity, Gender and Governance, BookwellPublishers, New Delhi (2009).

5. Sexual Violence Against Women: Penal Law and Human Rights Perspectives, Lexis Nexis (2009) 6. Chatterjee, Mohini, Feminism and Gender Equality, Aavishkar, Jaipur,2005.

7. Mies, Maria, Indian Women and Patriarchy, Concept Publishing Company, New Delhi, 2004.

COURSE DESIGNERS

S.No.	Name of the Faculty	Mail ID
1.	Gnana Sanga Mithra.S	sangamithra@avil.edu.in
2.	Aarthy.G	aarthy@avil.edu.in

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34121Z83	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	Category	L	T	P	C
		AC	0	0	2	0

Course Objectives :

1. To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
2. To make the students understand the traditional knowledge and analyse it and apply it to their day to day life

Course Outcomes:

At the end of the Course, Student will be able to:

1. Identify the concept of Traditional knowledge and its importance.
2. Explain the need and importance of protecting traditional knowledge.
3. Illustrate the various enactments related to the protection of traditional knowledge.
4. Interpret the concepts of Intellectual property to protect the traditional knowledge.
5. Explain the importance of Traditional knowledge in Agriculture and Medicine.

UNIT-I:

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge

UNIT-2:

Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT-3:

Legal framework and TK: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016.

UNIT-4:

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Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge

UNIT-5:

Traditional Knowledge in Different Sectors: Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK

Text Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.

Reference Books:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.

2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2.

Web Links:

1.https://www.youtube.com/watch?v=LZP1StpYEPM

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V.M.K.V. Engg. College, Salem.

34121Z84	INDIAN CONSTITUTION	Category	L	T	P	C
		AC	0	0	2	0

Course Objectives:

On completion of this course, the students will be able:

1 To understand the nature and the Philosophy of the Constitution.

2 To understand the outstanding Features of the Indian Constitution and Nature of the Federal system.

3 To Analyse Panchayat Raj institutions as a tool of decentralization.

4 To Understand and analyse the three wings of the state in the contemporary scenario.

5 To Analyse Role of Adjudicatory Process.

5 To Understand and Evaluate the recent trends in the Indian Judiciary.

Course Content

The Constitution - Introduction

The Historical background and making of the Indian Constitution –Features of the Indian Constitution- Preamble and the Basic Structure - Fundamental Rights and Fundamental Duties –Directive Principles State Policy

Government of the Union

The Union Executive- Powers and duties of President –Prime Minister and Council of Ministers - Lok Sabha and Rajya Sabha

Government of the States

The Governor –Role and Powers - Cheif Minister and Council of Ministers- State Legislature

Local Government

The New system of Panchayats ,Municipalities and Co-Operative Societies

Elections

Powers of Legislature -Role of Chief Election Commissioner-State Election Commission

TEXTBOOKS AND REFERENCE BOOKS:

1 Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi, 2008

2 The Constitution of India B.L. Fadia Sahitya Bhawan; New edition (2017)

3 Introduction to the Constitution of India DD Basu Lexis Nexis; Twenty-Fourth 2020 edition Suggested.

Total Hours: 30 hours

Software/Learning Websites:

1. https://www.constitution.org/cons/india/const.html
2. http://www.legislative.gov.in/constitution-of-india
3. https://www.sci.gov.in/constitution
4. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of india/

Alternative NPTEL/SWAYAM Course:

S.NO	NPTEL ID	NPTEL Course Title	Course Instructor
1	12910600	CONSTITUTION OF INDIA AND ENVIRONMENTAL GOVERNANCE: ADMINISTRATIVE AND ADJUDICATORY PROCESS	PROF. M. K. RAMESH NATIONAL LAW SCHOOL OF INDIA UNIVERSITY

COURSE DESIGNER

S.NO	NAME OF THE FACULTY	DESIGNATION	NAME OF THE INSTITUTION	MAIL ID
1	Dr.Sudheer	Principal	AV School of Law	Sudheersurya18@gmail.com

Dept. of Computer Science & Engg
V.M.K.V. Engg. College, Salem.

35021CC01	CLOUD COMPUTING ARCHITECTURE	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

To study and understand the concepts in cloud architectures and apply them practically.

PREREQUISITE CLOUD COMPUTING (17CSCC16)

COURSE OBJECTIVES

1.	To understand the components of cloud computing showing how business
2.	To Evaluate the deployment of web services from cloud architecture.
3.	To consistency of services deployed from a cloud architecture
4.	To understand the cloud computing services.
5.	To economic constraints and business requirements.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Able to Understand basics components of cloud computing	Understand
CO2: Able to apply cloud architecture in real time	Apply
CO3: Able to develop cloud computing projects	Apply
CO4: Able to Understand apply cloud services	understand
CO5: *Able to collaborate cloud services with other applications*	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M									L	L	M		
CO2	M	M		L								L		M	
CO3	M	M	L	L		M							M		
CO4	M	S	L			L				L		M	M		
CO5	M	L				M					M	L		M	

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT - I	INTRODUCTION	7 HOURS
Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits andchallenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility.		
UNIT - II	CLOUD APPLICATIONS	**10 HOURS**
Technologies and the processes required when deploying web services; Deploying a web service frominside and outside a cloud architecture		
UNIT - III	MANAGEMENT OF CLOUD SERVICE	**10 HOURS**
Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – CloudComputing for the Corporation.		
UNIT - IV	APPLICATION DEVELOPMENT	9 HOURS
Service creation environments to develop cloud based applications. Development environments for servicedevelopment; Amazon, Azure, Google App.		
UNIT - V	CLOUD IT MODEL	9 HOURS
Cloud based service, applications and development platform deployment so as to improve the total cost ofownership (TCO)		

TEXT BOOKS

1. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach"McGraw-Hill OsborneMedia; 1 edition[ISBN: 0071626948],2009.
2. Dimitris N. Chorafas, "Cloud Computing Strategies"CRC Press; 1 edition[ISBN: 1439834539],2010.

REFERENCES

1. GautamShroff, "Enterprise Cloud Computing Technology Architecture Applications", CambridgeUniversityPress; 1 edition,[ISBN: 978-0521137355],2010

COURSE DESIGNERS

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35021CC02	DISTRIBUTED COMPUTING	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

The student will be able to understand the concepts of distributed computing and communicating in distributed systems. This course also includes the network internet protocol, remote method invocation, peer to peer systems & distributed file system, synchronize, transaction and distributed deadlocks

PREREQUISITE

Basis of Networking

COURSE OBJECTIVES

1	To layout foundations of distributed systems
2	To introduce the idea of network related issues
3	To understand in detail the remote method and objects and support required for distributed system
4	To introduce the idea of middleware and computing of distributed systems
5	To understand the synchronization and cloud computing in distributed systems

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: To understand the basics of distributed computing	Understand
CO2: To learn the internet protocol & network	Understand and Apply
CO3: To learn the remote method invocation	Understand and Apply
CO4: To learn the peer to peer systems and distributed file system	Understand
CO5: To know the synchronization, transaction and distributed deadlocks	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M		M		M	S	S	S	M	S	M	S	M	M
CO2	M	S		M		M	M	S	S	M	S	M	S	M	M
CO3	M	S		M		M	M	M	S	L	S	M	S	M	M
CO4	M	S		M		L	M	M	M	L	M	M	S	M	M
CO5	M	M	L	M		M	M	L	M	L	M	M	S	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION **9 - hours**

Introduction – Examples of Distributed Systems–Trends in Distributed Systems – Focus on resource sharing – Challenges, DCS design goals: Transparencies, Fundamental issues, Case study: World Wide Web.

COMMUNICATION IN DISTRIBUTED SYSTEM **9 – hours**

System Model – Inter process Communication - the API for internet protocols – External data representation and Multicast communication. Network virtualization: Overlay networks. Case study: MPI

REMOTE METHOD INVOCATION AND OBJECTS **9 - hours**

Remote Invocation – Introduction - Request-reply protocols - Remote procedure call - Remote method invocation. Case study: Java RMI - Group communication - Publish-subscribe systems - Message queues - Shared memory approaches - Distributed objects - Case study: CORBA -from objects to components.

PEER TO PEER SERVICES AND FILE SYSTEM **9 - hours**

Peer-to-peer Systems – Introduction - Napster and its legacy - Peer-to-peer – Middleware - Routing overlays. Overlay case studies: Pastry, Tapestry- Distributed File Systems : Data-Intensive Computing , Distributed Hash Tables , Consistency Models , Fault Tolerance , Many-Core Computing

SYNCHRONIZATION AND REPLICATION **9 - hours**

Introduction - Clocks, events and process states - Synchronizing physical clocks - Logical time and logical clocks - Global states – Coordination and Agreement – Introduction - Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions – Locks – Optimistic concurrency control - Timestamp ordering -Distributed deadlocks – Replication – Workflow Systems: Grid Computing, Cloud Computing , Virtualization , IaaS Clouds , File systems, Networked File systems, Parallel File systems.

TEXT BOOKS

1. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design” Fifth edition – 2011- Addison Wesley.

REFERENCES

1. 1. Tanenbaum A.S., Van Steen M., “ Distributed Systems: Principles and Paradigms” , Pearson Education ,2007.

Liu M.L., “Distributed Computing, Principles and Applications”, Pearson and education, 2004.

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35021CC03	SECURITY IN CLOUD	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course introduces the basic concepts of security in cloud services and crypto systems incloud services, which are widely used in the design of cloud computing security. The security issues in virtualization system, virtualization technology, virtualization attacks and legal issues are also considered with in this course.

PREREQUISITE

CLOUD COMPUTING,,CYBER SECURITY

COURSE OBJECTIVES

1	To understand cloud computing security concepts
2	To study various cloud services
3	To apply cloud computing in collaboration with other services
4	To understand the cloud computing services
5	To apply cloud computing online

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand basic service concepts of cloud computing	Understand
CO2: Understand and apply security issues in cloud computing	Analyze
CO3: Apply virtualization techniques	Apply
CO4: Understand and apply the attacks concepts in virtualization	Apply
CO5: Understand and apply legal issues in cloud services	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M
CO5	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Security in Cloud Services (PaaS, IaaS and SaaS). Authentication in cloud services, open SSL, key management andcrypto systems in cloud services: stream ciphers, block ciphers, modes of operation, hashing, digital signatures.

SECURITY ISSSUES

Security Issues in Virtualization System: ESX and ESXi Security, ESX file system security, storage considerations, backup and recovery. Vulnerabilities in virtual machine, hypervisor vulnerabilities, hypervisor escape vulnerabilities,configuration issues, malware (botnets etc).

VIRTUALIZATION TECHNOLOGY

IBM security virtual server protection, virtualization-based sandboxing; Storage Security- HIDPS, log management,Data Loss Prevention. Location of the Perimeter.

VIRTUALIZATION ATTACKS

Guest hopping, attacks on VM (attack on control of VM, code injection into virtualized file structure), VM migrationattack, hyperjacking.

LEGAL ISSUES

Responsibility, ownership of data, right to penetration test, local law where data is held, examination of modern Security Standards (eg PCIDSS), how standards deal with cloud services and virtualization, compliance for the cloudprovider vs. compliance for the customer

TEXT BOOKS

1. TimMather, Subra Kumaraswamy, Shahed Latif, “Cloud Security and Privacy: An Enterprise Perspective on Risksand Compliance” O'Reilly Media; 1 edition [ISBN: 0596802765],2009.

2. Ronald L. Krutz, Russell Dean Vines, “Cloud Security” [ISBN: 0470589876],2010.

REFERENCES

1. John Rittinghouse, James Ransome, “Cloud Computing” CRC Press; 1 edition [ISBN: 1439806802], 2009.

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35021CC04	CRYPTOGRAPHY TECHNIQUES	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE:
To understand Cryptography Theories, Algorithms and Systems. and necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks

PREREQUISITE:
NIL

COURSE OBJECTIVES

1	To understand Cryptography Theories, Algorithms and Systems.
2	To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks
3	To Understand different cryptographic operations of symmetric cryptographic algorithms.
4	To Understand various Authentication schemes to simulate different applications
5	To Understand various Security practices and System security standards.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities	Understand
CO2. Apply the different cryptographic operations of symmetric cryptographic algorithms.	Apply
CO3. Apply the different cryptographic operations of public key cryptography.	Apply
CO4:. Apply the various Authentication schemes to simulate different applications.	Apply
CO5: Understand various Security practices and System security standards.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1		PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	L	L	-	-	-	-	-	L	-	L	S	L	L
CO2	S	S	M	-	-	M	M	L	-	L	-	-	S	L	L
CO3	S	S	M	L	-	M	M	L	-	-	L	-	S	L	-
CO4	S	S	M	L	L	L	M	M	M	M	L	L	S	S	-
CO5	S	S	M	M	M	L	M	M	L	M	M	M	S	S	L
CO6	S	S	L	-	-	L	M	L	-	-	-	L	S	L	-

S- Strong; M-Medium; L-Low

SYLLABUS
UNIT 1 INTRODUCTION

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography.- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

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UNIT – II SYMMETRIC CRYPTOGRAPHY

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures - Modular arithmetic-Euclid's algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution.

UNIT – III PUBLIC KEY CRYPTOGRAPHY

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT – IV MESSAGE AUTHENTICATION AND INTEGRITY

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509

UNIT – V SECURITY PRACTICE AND SYSTEM SECURITY

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

REFERENCES:

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd

2. BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.

3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

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35021CC08	CLOUD DEVELOPMENT MODEL LAB	Category	L	T	P	Credit
		SE	0	0	4	2

PREAMBLE

To introduce the major concept areas of cloud computing.

To enrich the knowledge in various phases of infrastructure services, storage services

PRERQUISITE : NIL

COURSE OBJECTIVES

1.	To understand, Infrastructure services
2.	To understand, Cloud Security management
3.	To understand, design and implement a parser
4.	To implement Infrastructure services
5.	To implement storage services techniques.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. To understand about cloud computing usagae.	Remember and Understand
CO2. To understand cloud security	Understand
CO3. To implement the cloud management	Apply
CO4. To understand cloud Infrastructure services	Understand, Apply
CO5. To implementation of identity management	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	S	M	S	--	L	--	--	S	L	M	--	M	--	M
CO2	M	L	--	--	--	M	S	--			S	M			
CO3	M			S	--	--	S	--			--	S	L	M	
CO4	M			S	S			--	S		S	S			
CO5	M	S	M	S	S			--	--	--	--	--	S	M	S

S- Strong; M-Medium; L-Low

List of Experiment

1. Study and implementation of Infrastructure as a Service. Study of Cloud Computing & Architecture
2. Installation and Configuration of virtualization using KVM
3. Study and implementation of Infrastructure as a Service
4. Study and implementation of Storage as a Service
5. Study and implementation of identity management
6. Study Cloud Security management
7. Write a program for web feed.

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8. Study and implementation of Single-Sing-On.
9. User Management in Cloud.
10. Case study on Amazon EC2/Microsoft Azure/Google Cloud Platform

Reference Books

.1.Rajkumar Buyya, James Broberg, Andzej M.Goscinski, "Cloud Computing –Principles and Paradigms",John Wiley & Sons, 2010.
2. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2008.
3. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring. Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, July 2008

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35021CC03	CLOUD APPLICATION DEVELOPMENT	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This module introduces students to developing web and cloud applications. By the end of the module the student will be able to build and deploy web and cloud-based application.

PREREQUISITE CLOUD COMPUTING (17CSCC16)

COURSE OBJECTIVES

1.	Use best practices in the design and development of elegant and flexible cloud software solutions
2.	Create, implement and deploy a cloud/LAMP based application.
3.	Analyze a real world problem and develop a cloud/LAMP based software solution.
4.	Contrast software development in the web, cloud and others

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the development for cloud computing	Understand
CO2: Design the cloud infrastrucute	Apply
CO3: development the web development and frame works	Apply
CO4: Able to recall the information in cloud.	Understand, apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M									L	L	M		
CO2	M	L		L						L		L		M	
CO3	M	M	L	L		M							M	M	L
CO4	M	S	L			L				L		M	M	S	

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT - I	**CLOUD BASED APPLICATIONS**	**(4 Hours)**
Introduction, Contrast traditional software development and development for the cloud. Public v private cloud apps. Understanding Cloud ecosystems – what is SaaS/PaaS, popular APIs, mobile;		
UNIT - II	**DESIGNING CODE FOR THE CLOUD**	**8 Hours**
Class and Method design to make best use of the Cloud infrastructure; Web Browsers and the Presentation Layer- Understanding Web browsers attributes and differences. Building blocks of the presentation layer: HTML, HTML5, CSS, Silverlight, and Flash.		
UNIT - III	**WEB DEVELOPMENT TECHNIQUES AND FRAMEWORKS**	**8HOURS**
Building Ajax controls, introduction to Javascript using JQuery, working with JSON, XML, REST. Application development Frameworks e.g. Ruby on Rails , .Net, Java API's or JSF; Deployment Environments – Platform As A Service (PAAS) ,Amazon, vmForce, Google App Engine, Azure, Heroku, AppForce		
UNIT - IV	**USE CASE 1: BUILDING AN APPLICATION**	**(4 Hours)**
Physical and virtual machine memory, CPU management and abstraction techniques using a hypervisor.		
UNIT - V	DEVELOPING AND DEPLOYING	6 HOURS
Building on the experience of the first project students will study the design, development, testing and deployment of an application in the cloud using a development framework and deployment platform		

TEXT BOOKS

1. Chris Hay, Brian Prince, "Azure in Action" Manning Publications [ISBN: 978-1935182481],2010.
2. Henry Li, "Introducing Windows Azure" Apress; 1 edition [ISBN: 978-1-4302-2469-3],2009.
3. Eugenio Pace, Dominic Betts, Scott Densmore, Ryan Dunn, Masashi Narumoto, MatiasWoloski, "Developing Applications for the Cloud on the Microsoft Windows Azure Platform" Microsoft Press; 1 edition [ISBN: 9780735656062],2010.
4. Eugene Ciurana, "Developing with Google App Engine" Apress; 1 edition [ISBN: 978-1430218319],2009.
5. Charles Severance, "Using Google App Engine" O'Reilly Media; 1 edition, [ISBN: 978-0596800697], 2009.

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35021CC07	INTERNET SECURITY AND COMPUTER FORENSICS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE:
To learn computer forensics and • To become familiar with forensics tools and learn to analyze and validate forensics data

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To learn computer forensics
2	To become familiar with forensics tools
3	To learn to analyze and validate forensics data
4	To learn Identify the vulnerabilities in a given network infrastructure
5	To Implement real-world hacking techniques to test system security

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the basics of computer forensics	Understand
CO2. Apply a number of different computer forensic tools to a given scenario	Apply
CO3. Analyze and validate forensics data.	Apply
CO4:. Identify the vulnerabilities in a given network infrastructure	Apply
CO5: Implement real-world hacking techniques to test system security	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	S	S	L	L	-	-	-	-	-	L	-	L	S	L	L
CO2	S	S	M	-	-	M	M	L	-	L	-	-	S	L	L
CO3	S	S	M	L	-	M	M	L	-	-	L	-	S	L	-
CO4	S	S	M	L	L	L	M	M	M	M	L	L	S	S	-
CO5	S	S	M	M	M	L	M	M	L	M	M	M	S	S	L
CO6	S	S	L	-	-	L	M	L	-	-	-	L	S	L	-

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I INTRODUCTION

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT II EVIDENCE COLLECTION AND FORENSICS TOOLS

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

UNIT III ANALYSIS AND VALIDATION

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email

Investigations – Cell Phone and Mobile Devices Forensics

UNIT-IV NETWORK FORENSIC

An overview of Routers – Hacking Routers – Investigating Routers – Investigating Wireless Attacks –Basics of wireless – Wireless Penetration Testing – Direct Connections to Wireless Access Point – Wireless Connect to a Wireless Access Point

UNIT V EMAIL FORENSIC & STEGANOGRAPHY

E-Mail Terminology - Forensics Acquisition – Processing Local mail archives – Processing server level archives – classification of steganography – categories of steganography in Forensics – Application of steganography -Types of password cracking.

TEXT BOOKS:

1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, ―Computer Forensics and Investigations‖, Cengage Learning, India Edition, 2016.
2. CEH official Certfied Ethical Hacking Review Guide, Wiley India Edition, 2015.

REFERENCES

1. John R.Vacca, ―Computer Forensics‖, Cengage Learning, 2005
2. MarjieT.Britz, ―Computer Forensics and Cyber Crime‖: An Introduction‖, 3rd Edition, Prentice Hall, 2013.
3. AnkitFadia ― Ethical Hacking‖ Second Edition, Macmillan India Ltd, 2006
4. Kenneth C.Brancik ―Insider Computer Fraud‖ Auerbach Publications Taylor & Francis Group–2008.

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35021CC04	CLOUD STORAGE INFRASTRUCTURES	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

Introduces the basic concepts of design of cloud storage infrastructures.

PREREQUISITE CLOUD COMPUTING

COURSE OBJECTIVES

1.	To understand the opportunities and challenges in cloud computing
2.	To Evaluate information storage management design in a cloud environment and how it relates tothe business objectives of an organization
3.	To Investigate how a global storage solution can be optimized.
4.	To Analyze how best to provide reliable access to information both locally and remotely using storage technologies
5.	To learn and apply the knowledge of design of cloud storage infrastructures

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: To understand the opportunities and challenges in cloud computing	Understand
CO2: To Evaluate information storage management	Analyse
CO3: Able to develop global storage projects	Apply
CO4: Able to Understand and apply cloud services	Analyse
CO5: Able to provide and available with reliable access to information with other environment applications	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	C	M									L	L	L	M	
CO2	M	M		L								L	S		
CO3		M	L	L		M			L						M
CO4	M	S	L			L				L		M	M	M	L
CO5	M	L				M					M	L			S

S- Strong; M-Medium; L-Low

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UNIT - I	VIRTUALIZED DATA CENTER ARCHITECTURE	8 HOURS
Cloud infrastructures; public, private, hybrid. Service provider interfaces; Saas, Paas, Iaas. VDC environments; concept, planning and design, business continuity and disaster recovery principles.		
UNIT - II	INFORMATION STORAGE SECURITY & DESIGN	10 HOURS
Storage strategy and governance; security and regulations. Designing secure solutions; the considerationsand implementations involved.		
UNIT - III	STORAGE NETWORK DESIGN	9 HOURS
Architecture of storage, analysis and planning. Storage network design considerations; NAS and FC SANs,hybrid storage networking technologies.		
UNIT - IV	OPTIMIZATION OF CLOUD STORAGE	9 HOURS
Global storage management locations, scalability, operational efficiency. Global storage distribution; terabytes to petabytes and greater.		
UNIT - V	INFORMATION AVAILABILITY DESIGN	9 HOURS
Designing backup/recovery solutions to guarantee data availability in a virtualized environment. Design areplication solution, local remote and advanced. Investigate Replication in NAS and SAN environments.		

TEXT BOOKS

Greg Schulz, "Cloud and Virtual Data Storage Networking", Auerbach Publications [ISBN: 978-1439851739], 2011

REFERENCES

Marty Poniatowski, "Foundations of Green IT"Prentice Hall; 1 edition[ISBN: 978-0137043750],

2009.3.EMC, "Information Storage and Management"Wiley; 2 edition[ISBN: 978-

0470294215],2012.

4.Volker Herminghaus, Albrecht Scriba,"Storage Management in Data Centers"Springer; editioN[ISBN:978-3540850229].2009.

5.Klaus Schmidt, "High Availability and Disaster Recovery"Springer; edition[ISBN:

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Jaichandran	Assistant Professor G-II	CSE	rjaichandran@avit.ac.in
2	Dr. M Nithya	Professor	VMKV	nithya@vmkv.edu.in

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35021AI01	GENETIC ALGORITHM AND ITS APPLICATIONS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course will cover fundamental concepts of Artificial Neural Networks (ANNs), Fuzzy logic (FL) and optimization techniques using Genetic Algorithm (GA), PSO, DE etc

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
2.	To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems
3.	To provide the mathematical background for carrying out the optimization associated with neural network learning

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Identify and select a suitable Soft Computing technology to solve the problem	Understand
CO2: Design a neural network to solve any problem	Create
CO3: Design fuzzy controller systems	Create
CO4: Construct a solution and implement a Soft Computing solution	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	M	-	-
CO2	L	-	-	-	-	-	-	S	L	M	-	-	M	-	-
CO3	L	M	-	-	-	-	M	S	L	M	-	-	M	-	-
CO4	L	M	-	-	S	-	-	-	-	-	-	-	H	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO BNN

Neural Networks: Introduction to Biological Neural Networks: Neuron physiology, Neuronal diversity, specification of the brain, the eye's Neural Network. Artificial Neural Network Concepts: Neural attributes, modeling learning in ANN, characteristics of ANN, ANN topologies, learning algorithm.

NETWORK PARADIGM

Neural Network Paradigm: MeCulloch-Pitts, Model, the perception, Backpropagation networks. Associative Memory, Adaptive Resonance (ART) paradigm, Hopfield Model, Competitive learning Model, Kohonen SelfOrganizing Network

FUZZY SETS

Fuzzy Logic: Introduction to Fuzzy sets: Fuzzy set theory Vs Probability Theory, classical set theory, properties of Fuzzy sets, Operation on Fuzzy sets. Fuzzy relations, Operations of Fuzzy relation, the extension principle. Fuzzy Arithmetic

GENETIC ALGORITHMS

Genetic Algorithms: Fundamentals of genetic algorithms: Basic concepts, Working principle, Encoding,Fitness function, Reproduction, Roulette wheel selection, Boltzmann selection, Tournament selection, Rankselection, Steady state selection. Genetic Modeling: Cross over, Inversion & Deletion, Mutation Operator, Bit-wise Operators. Applications of GA

HYBRID SYSTEMS

Genetic Algorithm – Genetic Modelling - Hybrid systems: Integration of Neural Networks, Fuzzy logic and Genetic Algorithms – GA based backpropagation networks – Fuzzy backpropagation networks – Simplifies Fuzzy ARTMAP - Fuzzy Associative Memories – Fuzzy Logic controlled Genetic systems

TEXT BOOKS

1. Introduction to Artificial Neural Systems, Jacek M. Zurada, Jaico Publishing House, 1994.
2. Neural Network, Fuzzy Logic and Genetic Algorithm, S. Rajshekahran, G.A. Vijaylaxmi Pai, PHI Learning Pvt. Ltd, 2003.

REFERENCES

1. Fuzzy sets & fuzzy logic, George J Klir, B. Yuan, PHI, 1995..
2. Swarm Intelligence: From Natural to Artificial Systems, E. Bonabeau, M. Dorigo, and G. Theraulaz, Oxford University Press, 1999.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department / Name of the College	Mail ID
1.	Dr. Nitisha	Associate Professor	CSE / AVIT	nitishaaggarwal@avit.ac.in
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35021AI03	FUZZY LOGIC AND ITS APPLICATIONS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course will cover fundamental concepts of Artificial Neural Networks (ANNs), Fuzzy logic (FL) and optimization techniques using Genetic Algorithm (GA), PSO, DE etc

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
2.	To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems
3.	To provide the mathematical background for carrying out the optimization associated with neural network learning

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Identify and select a suitable Soft Computing technology to solve the problem	Understand
CO2: Design a neural network to solve any problem	Create
CO3: Design fuzzy controller systems	Create
CO4: Construct a solution and implement a Soft Computing solution	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	M	-
CO2	L	-	-	-	-	-	-	S	L	M	-	-	M	-
CO3	L	M	-	-	-	-	M	S	L	M	-	-	M	-
CO4	L	M	-	-	S	-	-	-	-	-	-	-	H	-

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION TO BNN
Neural Networks: Introduction to Biological Neural Networks: Neuron physiology, Neuronal diversity, specification of the brain, the eye's Neural Network. Artificial Neural Network Concepts: Neural attributes, modeling learning in ANN, characteristics of ANN, ANN topologies, learning algorithm

NETWORK PARADIGM
Neural Network Paradigm: MeCulloch-Pitts, Model, the perception, Backpropagation networks. Associative Memory, Adaptive Resonance (ART) paradigm, Hopfield Model, Competitive learning Model, Kohonen SelfOrganizing Network

FUZZY SETS
Fuzzy Logic: Introduction to Fuzzy sets: Fuzzy set theory Vs Probability Theory, classical set theory, properties of Fuzzy sets, Operation on Fuzzy sets. Fuzzy relations, Operations of Fuzzy relation, the extension principle. Fuzzy Arithmetic

APPROXIMATE REASONING
Approximate reasoning: Introduction, linguistic variables, Fuzzy proposition, Fuzzy if-then rules. Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models –Tsukamoto Fuzzy Models –Input Space Partitioning and Fuzzy Modeling

GENETIC ALGORITHMS & HYBRID SYSTEMS
Genetic Algorithm – Genetic Modelling - Hybrid systems: Integration of Neural Networks, Fuzzy logic and Genetic Algorithms – GA based backpropagation networks – Fuzzy backpropagation networks – Simplifies Fuzzy ARTMAP - Fuzzy Associative Memories – Fuzzy Logic controlled Genetic systems

TEXT BOOKS
Introduction to Artificial Neural Systems, Jacek M. Zurada, Jaico Publishing House, 1994.
Neural Network, Fuzzy Logic and Genetic Algorithm, S. Rajshekahran, G.A. Vijaylaxmi Pai, PHI Learning Pvt. Ltd, 2003.

REFERENCES
Fuzzy sets & fuzzy logic, George J Klir, B. Yuan, PHI, 1995..
Swarm Intelligence: From Natural to Artificial Systems, E. Bonabeau, M. Dorigo, and G. Theraulaz, Oxford University Press, 1999.

COURSE DESIGNERS

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35021AI02	ARTIFICIAL NEURAL NETWORKS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enables them to lean about Artificial Intelligence. This syllabus contains intelligent agent, Knowledge Representation and Machine learning, and application. This is useful to how represent knowledge and in machine learning contain some important prediction method. Thus, this syllabus focuses on to know about AI and its concepts, application.

PREREQUISITE

ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

1.	To give an understanding on the fundamentals of non-traditional technologies and approaches to solving hard real- world problems
2.	Fundamentals of artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms. Use of ANN, Fuzzy sets to solve hard real-world problems
3.	To give an overview of Genetic algorithms and machine learning techniques to solving hard real-world problems
4.	To study aboutAlgorithm

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Identify the different agent and its types to solve the problems	Understand
CO2: Know about the problem solving technique in Artificial Intelligence	Analyze
CO3: Construct the normal form and represent the knowledge	Apply
CO4: Identify the extension of condition probability and how to apply in the real time environment.	Analyze
CO5: Apply the Information Retrieval and Speech Recognition in the real-world problems	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L			-	-	-	-	-	-	L	S	S	M
CO2	S	M	L			-	-	-	-	-	-	L	M	S	M
CO3	S	M	S			-	-	-	-	-	-	-	S	-	M
CO4	S	S	S			-	-	-	-	-	-	M	M	M	M
CO5	S	M	M			-	-	-	-	-	-	-	M	S	M

S- Strong; M-Medium; L-Low

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SYLLABUS

FUZZY SET THEORY

Introduction-Definition-History of Artificial Intelligence-Intelligent Agents-Types Of Agents-Problem Solving Approach To AI Problems-Problem Formulation

OPTIMIZATION

Problem Solving Methods-Search Strategies-Uninformed Search Strategies-Comparison of Uninformed earch Algorithms-Informed Search Strategies-Local Search Algorithms-Searching With Partial Information-Constraint Satisfaction Problem

NEURAL NETWORKS

Propositional Logic-First Order Predicate Logic-Prolog Programming-Unification-Forward Chaining- Backward Chaining-Ontological Engineering-Categories and Objects-Events-Mental Events and Mental Objects.

NEURO FUZZY MODELING

Conditional Probability-Joint probability, Prior Probability- Bayes Rule and Its Applications-Bayesian Networks-Inferences in Bayesian Networks- Morkov chain, Hidden Markov Models- Learning from Observation-Supervised Learning.

APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOKS

1.J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, 2004, Pearson Education 2011

REFERENCES

Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
DavisE.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y., 1989.
S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, AP Professional, Boston, 2005.

COURSE DESIGNERS

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1.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
2.	Dr.S.Senthil kumar	Assistant Professor	CSE / VMKVEC	senthilkumars@vmkvec.edu.in

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35021AI04	COMPUTER VISION	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

In this course students will learn basic principles of image formation, image processing algorithms and different algorithms for 3D reconstruction and recognition from single or multiple images (video). This course emphasizes the core vision tasks of scene understanding and recognition. Applications to 3D modelling, video analysis, video surveillance, object recognition and vision based control will be discussed**.**

PREREQUISITE NIL

COURSE OBJECTIVES

1	To learn the fundamental image processing techniques required for computer vision
2	To learn about Image formation process and perform shape analysis
3	To learn about image features, analysis of Images and generate 3D models
4	To apply techniques to build computer vision applications
5	To learn about video processing, motion computation and 3D vision and geometry

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Implement fundamental image processing techniques required for computer vision	Understand
CO2: Understand Image formation process and perform shape analysis	Apply
CO3: Extract features form Images and do analysis of Images and generate 3D models	Analyze
CO4: Develop applications using computer vision techniques	Apply
CO5: Understand video processing, motion computation and 3D vision and geometry	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	L	-	-	M	-	-	-	M	-	-	L	S	-	-
CO2	M	L	-	-	M	-	-	-	M	L	-	M	S	-	-
CO3	M	L	-	-	M	-	-	-	M	L	-	M	-	M	-
CO4	M	L	-	-	M	-	-	-	M	L	-	S	-	M	M
CO5	M	L	-	-	-	-	-	-	M	L	-	M	-	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

Introduction : Image Processing, Computer Vision and Computer Graphics , What is Computer Vision - Low-level, Mid-level, High-level , Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Multimedia, Virtual Reality and Augmented Reality

Image Formation Models : Monocular imaging system , Radiosity: The 'Physics' of Image Formation, Radiance, Irradiance, BRDF, color etc, Orthographic & Perspective Projection,Camera model and Camera calibration, Binocular imaging systems, Multiple views geometry, Structure determination, shape from shading , Photometric Stereo, Depth from Defocus , Construction of 3D model from images

Image Processing and Feature Extraction: Image preprocessing, Image representations (continuous and discrete) , Edge detection, **Motion Estimation** : Regularization theory , Optical computation , Stereo Vision , Motion estimation , Structure from motion, **Shape Representation and Segmentation :** Contour based representation, Region based representation, Deformable curves and surfaces , Snakes and active contours, Level set representations , Fourier and wavelet descriptors , Medial representations , Multiresolution analysis

Object recognition : Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis , Shape priors for recognition, **Image Understanding** : Pattern recognition methods, HMM, GMM and EM

Applications: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians

REFERENCE BOOKS

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall
Robot Vision, by B. K. P. Horn, McGraw-Hill.
2. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.
3. R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992.
4. D. H. Ballard, C. M. Brown. Computer Vision. Prentice-Hall, Englewood Cliffs, 1982.
5. Richard Szeliski, Computer Vision: Algorithms and Applications (CVAA). Springer, 2010
6. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
7. E. R. Davies, Computer & Machine Vision, Fourth Edition, Academic Press, 2012
8. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012
9. Mark Nixon and Alberto S. Aquado, Feature Extraction & Image Processing for Computer Vision, Third Edition, Academic Press, 2012.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department / Name of the College	Mail ID
1	Dr. Nitisha	Associate Professor	CSE / AVIT	nitishaaggarwal@avit.ac.in
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35021AI05	INFORMATION PROCESSING USING NLP	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course will cover the techniques, models, and algorithms that enable computers to deal withthe ambiguity and implicit structure of natural language. The computational and linguisticaspectsof natural language will be dealt with. How Knowledge will be extracted from unstructured text by identifying references to named entities as well as stated relationships between such entities,will be taught.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To introduce the fundamentals of Language processing from the algorithmic viewpoint.
2.	To discuss various issues those make natural language processing a hard task.
3.	To discuss some applications of Natural Language Processing (NLP).

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: To understand thefundamental concepts of Natural Language Processing.	Understand
CO2: To understand the algorithm design forNLP tasks	Understand
CO3: To apply usefulsystems for language processing and relatedtasks involving text processing	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	-	-	-	-	-	-	-	M	S	S	M
CO2	S	M	L	-	-	-	-	-	-	-	-	M	M	S	M
CO3	S	M	S	-	-	-	-	-	-	-	-	-	S	-	M

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SYLLABUS

INTRODUCTION

Introduction to Natural Language Understanding- Levels oflanguage analysis- Syntax, Semantics, ragmatics.Linguistic Background- An Outline of English Syntax

LEXICONS

Lexicons, POS Tagging, Word Senses.Grammars and Parsing- Features, Agreement and Augmented Grammars.

SEMANTICS AND LOGICAL FORM

Linking Syntax and SemanticsAmbiguity Resolution- other Strategies for SemanticInterpretation- Scoping and the Interpretation of NounPhrases.

KNOWLEDGE REASONING AND REPRESENTATION

Local DiscourseContext and Reference- Using World Knowledge- DiscourseStructure- Defining a Conversational Agent.

APPLICATIONS

Machine Translation, Information Retrievaland Extraction, Text Categorization and Summarization

TEXT BOOKS

1. James Allen, Natural Language Understanding, The Benjamin/Cummings Publishing Company Inc., Redwood City, CA.

2. D. Jurafsky and J. H. Martin, Speech and Language Processing, Prentice Hall India.

REFERENCES

1. Charniak, Eugene, Introduction to Artificial intelligence, Addison-Wesley.

2. Ricardo Baeza-Yates and BerthierRibeiro-Neto, Modern Information Retrieval, AddisonWesley,1999.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department / Name of the College	Mail ID
1.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
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S- Strong; M-Medium; L-Low

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35021AI07	DEEP STRUCTURED LEARNING	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course provides an introduction to the basics of machine learning, neural networks, and Deep learning techniques. This course also provides the learning practice and acquires knowledge on deep learning tools.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To study the basics of machine learning, neural networks and deep learning
2.	To study the present the mathematical, statistical and computational challenges of building neural networks
3.	To study the dimensionality reduction techniques
4.	To know deep learning techniques to support real-time applications
5.	To examine the case studies of deep learning techniques

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand basics of deep learning	Understand
CO2: Implement various deep learning models	Apply
CO3: Realign high dimensional data using reduction techniques	Apply
CO4: Understand and apply scaling up machine learning techniques and associated computing techniques and technologies	Apply
CO5: Analyse optimization and generalization in deep learning	Apply
CO6: Explore the deep learning application	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	S	M	-	M	-	-	M	M	-	M	M	M	-	-
CO2	S	S	S	S	M	-	-	M	M	-	M	M	-	-	M
CO3	S	M	M	S	M	-	-	M	M	-	M	M	M	-	-
CO4	S	M	M	S	M	-	-	M	M	-	M	M	M	-	-
CO5	S	M	M	S	M	-	-	M	M	-	M	M	M	-	-
CO6	S	M	M	S	M	-	-	M	M	-	M	M	-	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Introduction to machine learning- Linear models (SVMs and Perceptrons, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximate

DEEP NETWORKS

History of Deep Learning- A Probabilistic Theory of Deep Learning- Backpropagation andregularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow NetworksConvolutional Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning.

DIMENSIONALITY REDUCTION

Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization.

OPTIMIZATION AND GENERALIZATION

Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization- Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience

CASE STUDY AND APPLICATIONS

Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec
- Joint DetectionBioInformatics- Face Recognition- Scene Understanding- Gathering Image Captions.

REFERENCE BOOKS

1. CosmaRohillaShalizi, Advanced Data Analysis from an Elementary Point of View, 2015.
2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
3. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning, MIT Press, 2016.
4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.

COURSE DESIGNERS

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35021AI08	REINFORCEMENT LEARNING	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

Sequential decision-making is one of the major topics in machine learning. From experience, the task is to decide the sequence of actions to perform in an uncertain environment in order to achieve some goals that may not necessarily seem beneficial in near future but are optimal for getting better long term reward. Reinforcement learning (RL) is a paradigm that proposes a formal framework to this problem. The aim of the course will be to familiarize the students with the basic concepts as well as with the state-of-the-art research literature in deep reinforcement learning. After completion the students will be able to (a) structure a reinforcement learning problem, (b) understand and apply basic RL algorithms for simple sequential decision making problems in uncertain conditions. (c) evaluate the performance of the solution (d) interpret state-of-the-art RL research and communicate their results.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To introduce the fundamentals of Reinforcement Learning system that knows how to make automated decisions
2.	To understand how RL relates to and fits under the broader umbrella of machine learning, deep learning, supervised and unsupervised learning
3.	To understand how to formalize your task as a RL problem, and how to begin implementing a solution.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understood **F**undamentals of Reinforcement Learning system that knows how to make automated decisions	Understand
CO2: RL relates to and fits under the broader umbrella of machine learning, deep learning, supervised and unsupervised learning	Understand
CO3: To understand how to formalize your task as a RL problem, and how to begin implementing a solution.	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	-	-	-	-	-	-	-	-	M	S	S	M
CO2	S	M	M	-	-	-	-	-	-	-	-	M	M	S	M
CO3	S	M	S	-	-	-	-	-	-	-	-	M	S	-	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Course logistics and overview. Origin and history of Reinforcement Learning research. Its connections with other related fields and with different branches of machine learning. Probability Primer : Brush up of Probability concepts - Axioms of probability, concepts of random variables, PMF, PDFs, CDFs, Expectation. Concepts of joint and multiple random variables, joint, conditional and marginal distributions. Correlation and independence.

MARKOV DECISION PROCESS

Introduction to RL terminology, Markov property, Markov chains, Markov reward process (MRP). Introduction to and proof of Bellman equations for MRPs along with proof of existence of solution to Bellman equations in MRP. Introduction to Markov decision process (MDP), state and action value functions, Bellman expectation equations, optimality of value functions and policies, Bellman optimality equations.

PREDICTION AND CONTROL BY DYNAMIC PROGRAMMING

Overiew of dynamic programing for MDP, definition and formulation of planning in MDPs, principle of optimality, iterative policy evaluation, policy iteration, value iteration, Banach fixed point theorem, proof of contraction mapping property of Bellman expectation and optimality operators, proof of convergence of policy evalutation and value iteration algorithms, DP extensions.

MONTE CARLO METHODS FOR MODEL FREE PREDICTION AND CONTROL

Overiew of Monte Carlo methods for model free RL, First visit and every visit Monte Carlo, Monte Carlo control, On policy and off policy learning, Importance sampling. TD Methods: Incremental Monte Carlo Methods for Model Free Prediction, Overview TD(0), TD(1) and TD(λ), k-step estimators, unified view of DP, MC and TD evaluation methods, TD Control methods - SARSA, Q-Learning and their variants.

FUNCTION APPROXIMATION METHODS

Getting started with the function approximation methods, Revisiting risk minimization, gradient descent from Machine Learning, Gradient MC and Semi-gradient TD(0) algorithms, Eligibility trace for function approximation, Afterstates, Control with function approximation, Least squares, Experience replay in deep Q-Networks. Policy Gradients: Getting started with policy gradient methods, Log-derivative trick, Naive REINFORCE algorithm, bias and variance in Reinforcement Learning, Reducing variance in policy gradient estimates, baselines, advantage function, actor-critic methods

TEXT BOOKS

Reinforcement Learning: An Introduction", Richard S. Sutton and Andrew G. Barto, 2nd Edition
Probability, Statistics, and Random Processes for Electrical Engineering", 3rd Edition, Alberto Leon-Garcia.
Machine Learning: A Probabilistic Perspective", Kevin P. Murphy

REFERENCES

Richard S. Sutton, Andrew G. Barto, Reinforcement Learning: An Introduction, Second edition, MIT Press,2018

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department / Name of the College	Mail ID
1.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
2.	Dr.M. Nithya	Professor	CSE / VMKVEC	nithya@vmkv.edu.in

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35021AI09	ARTIFICIAL INTELLIGENCE AND AGENTS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course covers foundational techniques and tools required for Artificial intelligence and agents. This course spotlights the concepts, principles, and techniques are applicable in Artificial intelligence and agents environment in industry and real-world experience.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To learn about computer systems that exhibit intelligent behaviour, design intelligent agents.
2.	To identify AI problems and solve the problems, design knowledge representation and expert systems, design neural networks for solving problems,
3.	To understand different knowledge representation technique and reasoning.
4.	To Understand concept of knowledge representation i.e. propositional logic, first order logic.
5	To know the applications of AI

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand concepts of Artificial Intelligence and different types of intelligent agents and their architecture.	Understand
CO2: Formulate problems as state space search problem & efficiently solve them. .	Analyze
CO3: Understand different knowledge representation technique and reasoning	Apply
CO4: Understand concept of knowledge representation i.e. propositional logic, first order logic.	analyze
CO5: Analyze application of AI concepts in real time.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction to AI, Intelligent Agents and Searching

Definition of AI, birth of AI, brief history, Turing test, Types of environment, Types of agents, PEAS(Performance measure , Environment, Actuators, Sensors), Introduction to searching, State Space, SAGP (State, Action, Goal test, Path cost), DFS, BFS (Completeness, Time complexity, Space complexity, Optimality), Heuristics, Local Search Algorithm, Hill Climbing. Applications of Artificial Intelligence in real word. .

CSP, Game Playing and Logics

Constrain Satisfaction Problems examples, Approaches to solve CSPs, Test and generate method, back tracking. Game Playing, Optimal decision in games, Min Max algorithm, Evaluation functions, Introduction to Propositional Logic and First Order Logic, Syntax, Substitution, Unification, Deduction, Soundness, Completeness, Consistency, Satisfiability, Expert Systems.

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Uncertain Knowledge, Reasoning

Probabilistic Reasoning, Review of Probability Theory, Probabilistic Inference Rules, Bayes Theorem, examples of Bayes theorem, Introduction to Learning, Taxonomy of Learning Systems, Concept Learning, Find-S algorithm, Candidate Elimination Algorithm. Introduction to Neural Networks, Biological Neural Networks, Artificial Neural Networks, Perceptron, Perceptron Learning Rule, Delta Rule, Applications of Neural Networks.

Knowledge Representation

Definition and importance of Knowledge, Issues in Knowledge Representation, Knowledge Representation Systems, Properties of Knowledge Representation Systems Types of Knowledge Representation Systems: Semantic Nets, Frames, Conceptual Dependencies, Scripts, Rule Based Systems(Production System), Propositional Logic, Predicate Logic Propositional Logic(PL): Syntax, Semantics, Formal logic-connectives, truth tables, tautology, validity, well-formed-formula, Inference using Resolution, Backward Chaining and Forward Chaining. Predicate Logic: FOPL, Syntax, Semantics, Quantification, Inference with FOPL: By converting into PL (existential and universal instantiation), Unification and lifting, Inference using resolution. Bayesian Networks, Reasoning in Belief Networks Fuzzy Logic: Fuzzy Sets, Membership in Fuzzy Set, Fuzzy Rule base Systems

Applications of AI

Expert Systems, Components of Expert System: Knowledge base, inference engine, user interface, working memory, Development of Expert Systems Natural Language Processing: Natural Language Understanding and Natural Language Generation, Steps of Natural Language Processing: Lexical Analysis(Segmentation, Morphological Analysis), Syntactic Analysis, Semantic Analysis, Pragmatic Analysis, Machine Translation, Machine Vision Concepts: Machine vision and its applications, Components of Machine Vision System Robotics: Robot Hardware (Sensors and Effectors) , Robotic Perceptions

TEXT BOOKS:

1. Stuart Russell and Peter Norvig – Artificial Intelligence A Modern Approach, PEARSON Education.
2. Simon Haykin -Neural Networks PHI.

REFERENCES:

1. N. P. Padhy – Artificial Intelligence and Intelligence Systems, OXFORD publication.
2. B. YagnaNarayana - Artificial Neural Networks, PHI Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
3. NPTEL Lecture: Prof. SudeshnaSarkar, http://nptel.ac.in/courses/106105077/
4. NPTEL Lecture: Prof. P.Das Gupta, http://nptel.ac.in/courses/106105079/ 3.
5. NPTEL Lecture: Prof. Deepak Khemani, http://nptel.ac.in/courses/106106126/

COURSE DESIGNERS

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1.	Dr. M. Adimoolam	professor	CSE / AVIT	adimoolam.cse@avit.ac.in
2.	Dr.M. Nithya	Professor	CSE / VMKVEC	nithya@vmkvec.edu.in

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35021AI06	STATISTICAL MACHINE LEARNING	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

To provide an in-depth knowledge about machine learning concepts and identify applications suitable for different types of machine learning with suitable justification.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To study the outline the key concepts of machine learning
2.	To understand the supervised learning and classification techniques
3.	To apply the concept of unsupervised learning and Clustering for applications
4.	To describes the characteristic of the entire group of data and choose the best central tendency and variability statistic for different levels of measurement.
5	To Understand the role of Sampling and steps in developing a sampling plan

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Outline the key concepts of machine learning	Understand
CO2: Summarize supervised learning and classification techniques	Understand
CO3: Apply the concept of unsupervised learning and Clustering for applications	Apply
CO4: Analyze statistical data using measures of central tendency, dispersion and location for grouped and ungrouped data cases	Apply
CO5: Identify and recognize the appropriate sample survey design in real life related problems	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	-	-	L	-	-	-	-	-	M	L	-	-
CO2	S	S	S	L	-	L	-	L	L	-	L	M	S	M	L
CO3	S	S	M	L	-	L	-	L	L	-	L	M	S	M	L
CO4	S	L	M	L	-	L	-	-	-	-	-	M	-	-	-
CO5	S	L	S	-	-	L	-	L	-	-	-	M	-	L	-

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Machine Learning - Examples of machine learning applications- Types of machine learning –Model selection and generalization – Guidelines for Machine Learning Experiments

SUPERVISED LEARNING

Classification - Decision Trees – Univariate Tree –Multivariate Tree - Pruning –Perceptron – Multilayer Perceptron - Back Propagation – Cross Validation and Resampling Methods

UNSUPERVISED LEARNING

Clustering- Mixture densities -K-means - EM Algorithm – Supervised Learning After Clustering- Hierarchical Clustering

SAMPLING THEORY

Fundamentals of sampling – Methods of Sampling – Random Sampling - Simple random Sampling – Restricted Random sampling - Non-Random Sampling – Judgment or Purposive Sampling – Quato sampling – Convenience Sampling – Mixed sampling

ESTIMATION THEORY

Sampling distributions – Estimation of parameters (consistent and unbiased) – Point and interval estimates for population proportions, mean and variance - Maximum likelihood estimate method - Method of moments

TEXT BOOKS

1. EthemAlpaydin, Introduction to Machine Learning MIT Press, 2014.

REFERENCES

1. Tom M Mitchell, Machine Learning, First Edition, McGraw Hill Education, 2013
2. Richard S. Sutton and Andrew G. Barto: Reinforcement Learning: An Introduction. MIT Press

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department / Name of the College	Mail ID
1.	Mr. S. Muthuselvan	Assistant Professor	CSE / AVIT	muthuselvan@avit.ac.in
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35021CS01	DIGITAL FORENSICS	Category	L	T	P	Credit

		SE	**3**	**0**	**0**	**3**

PREAMBLE

The course covers the principles and practice of digital forensics. Students will study about societal and legal impact of computer activity: computer crime, intellectual property, privacy issues, legal codes; risks, vulnerabilities, and countermeasures; methods and standards for extraction, preservation, and deposition of legal evidence in a court of law.

PREREQUISITE : Cyber Security

COURSE OBJECTIVES

1.	To understand how to do the digital forensics investigation.
2.	To apply appropriate skills and knowledge in solving various computer forensics problems.
3.	To apply knowledge in solving forensic problems related with data.
4.	To apply knowledge in solving forensic problems related with routers, networks and E-mails.
5.	To learn email forensics and steganography

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: understand basics in digital forensics	Understand
CO2: understand and apply digital forensics in investigation	Understand and Apply
CO3: understand and apply data forensics	Understand and Apply
CO4: understand and apply network forensics	Understand and Apply
CO5: understand and apply email forensics & Steganography	Understand and Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	PSO2	PSO3
CO1	S	M	M	M	-	M	-	S	-	-	-	-	S	M	M
CO2	S	M	S	M	M	M	-	S	-	-	-	-	M	M	M
CO3	M	M	S	M	M	M	-	S	-	-	-	-	M	M	M
CO4	S	M	M	M		M	-	S	-	-	-	-	M	M	S
CO5	S	M	M	M	S	M	-	S	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS:

UNIT I - INTRODUCTION	**8 Hours**
History of Forensics – Computer Forensic Flaws and Risks – Rules of Computer Forensics – Legal issues – Digital Forensic Principles – Digital Environments – Digital Forensic Methodologies.	
UNIT II - DEGITAL FORENSIC INVESTIGATION	**9 Hours**
Live forensics and investigation –Digital evidence – Seizure methodology- Factors limiting the whole sale seizure of hardware- Demystifying computer /cyber crime – explosion of networking – explosion of wireless networks – Interpersonal communication.	
UNIT III - DATA FORENSIC	**8 Hours**
Recovering deleted files and deleted partitions – deleted file recovery tools – deleted partitioned recovery tools – data acquisition and duplication – data acquisition tools – hardware tools – backing up and duplicating data.	
UNIT IV - NETWORK FORENSIC	**10 Hours**
An overview of Routers – Hacking Routers – Investigating Routers – Investigating Wireless Attacks – Basics of wireless – Wireless Penetration Testing – Direct Connections to Wireless Access Point – Wireless Connect to a Wireless Access Point.	
UNIT V - EMAIL FORENSIC & STEGANOGRAPHY	**10 Hours**
E-Mail Terminology - Forensics Acquisition – Processing Local mail archives – Processing server level archives – classification of steganography – categories of steganography in Forensics – Application of steganography -Types of password cracking	
TEXT BOOKS	
1. John Sammons, "The Basics of Digital Forensics", Elsevier 2015 2. Linda Volonins, Reynalds Anzaldua, "Computer Forensics for dummies", Wiley Publishing Inc., 2008. 3. Anthony Reyes, Jack Wiles, "Cybercrime and Digital Forenscis", Syngress Publishers, Elsevier 2007.	
REFERENCES	
1. Thomas J Holt, Adam M Bossler and Kathryn C, "Cybercrime and Digital Forensics: An Introduction" 1st Edition, Routledge Publisher, 2015.	

COURSE DESIGNERS			
Name of the Faculty	**Designation**	**Department**	**Mail ID**
Dr.R.Jaichandran	Professor	CSE	rjaichandran@avit.ac.in

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35021CS02	CYBER CRIMES AND CYBER LAWS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course provides basic knowledge about cyber crimes and laws. Students will study about cyber laws for various types of cyber crimes.

PREREQUISITE : Nil

COURSE OBJECTIVES

1.	To provide introduction to cybercrimes and types
2.	To provide introduction to cyber crimes and digital evidences
3.	To study cyber laws
4.	To study about copy rights in digital medium
5.	To study cyber laws in e-commerce

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: understand types of cyber crimes	Understand
CO2: understand various types of cybercrimes and apply digital evidence in investigation	Understand and Apply
CO3: understand and apply cyber laws against cyber crimes	Understand and Apply
CO4: understand copy rights in digital medium	Understand
CO5*:* understand and apply cyber laws in e-commerce	Understand and Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	-	S	-	S	-	-	-	-	S	M	M
CO2	M	M	S	M	M	S	-	S	-	-	-	-	M	M	M
CO3	M	M	S	M	M	S	-	S	-	-	-	-	M	M	M
CO4	S	M	M	M		S	-	S	-	-	-	-	M	M	S
CO5	S	M	M	M	S	S	-	S	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS:

UNIT I - INTRODUCTION	**8 Hours**
History of computer networking and the Internet. Network edge - Protocol layers and their service models - Networks attacks – types of cybercrimes, case studies in cyber crime	
UNIT II - CYBER CRIME AND DEGITAL EVIDANCE	**9 Hours**
Computer system security- History-Standards, International security activity access controls-user access management –types of access control-Information security-threats-structure-policies- Tools - Information processing-Introduction to wireless network security.	
UNIT III - CYBER LAW	**9 Hours**
Scope of Cyber Law, Introduction to Indian Cyber Law, General Laws and Procedures in India-Cyber Law and Internet- Understanding of internet-Cyber Jurisprudence-Analytical and Ethical Jurisprudence-Conflicts of Law-Case Study: International Conventions on Cyber Law.	
UNIT IV - COPY RIGHTS IN DIGITAL MEDIUM	**10 Hours**
Organization security-asset classification and control-physical and environment security-personnel security-Human Rights- Cyber Stalking, Privacy Invasion by Government, E-Government and E-governance-Legal Issues in E-Governance Intellectual Property Issues and Cyberspace - The Indian Perspective.	
UNIT V - CYBER LAWS FOR E-COMMERCE	**9 Hours**
e-Commerce in India-Overview of e-Commerce- Growth and Potential of Ecommerce in India-Bottlenecks of e-Commerce-Regulatory and Legal Environment of E-Commerce- e-Banking-Tele-Banking Service- Challenges of Development of e-Banking- Electronic Contracts- Digital Signatures-legal and technical issues.	
TEXT BOOKS	
1. Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global, 2009. 2. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O' Reilly Media, 2006. 3. Thomas R. Peltier, "Information Security policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall, 2004. 4. Jonathan Rosenoer, "Cyber law: the Law of the Internet", Springer-verlag, 1997. 5. Thomas R Peltier, Justin Peltier and John blackley, "Information Security Fundamentals", 2nd Edition, Prentice Hall, 1996.	
REFERENCES	

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1. Law Relating to COMPUTERS, Internet and E-Commerce - A Guide to CYBER LAWS & the IT Act, with Rules, Regulations, Notifications & Case Law By NandanKamath (Ed.), Foreword by N.R.MadhavaMenon.
2. Electronic Banking: The Ultimate Guide to Online Banking Hardcover by SCN Education B.V.
3. Law Relating to COMPUTERS, Internet and E-Commerce - A Guide to CYBER LAWS & the IT Act, with Rules, Regulations, Notifications & Case Law By NandanKamath (Ed.), Foreword by N.R.MadhavaMenon.
4. Information Technology Law and practices by Vakulsharma,
5. Computers, Internet and New Technology Laws (A comprehensive reference work with a special focus on developments in India)" By: Karnika Seth,
6. Cyber Law & Crimes By: BarkhaBhasin, Rama Mohan Ukkalam,

COURSE DESIGNERS

Name of the Faculty	Designation	Department	Mail ID
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35021CS03	INTRUSION DETECTION AND PREVENTION SYSTEM	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course provides knowledge on intrusion detection and prevention system. Students learn about the different types of intrusions and tools used for detection and prevention of intrusions.

PREREQUISITE: Network Security and management

COURSE OBJECTIVES

1	To understand the concepts of intrusion detection and prevention system
2	To study intrusion detection system models
3	To study about anomaly detection
4	To develop secure intrusion detection system
5	To study recent trends in intrusion detection and prevention systems

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand intrusion detection and prevention systems	Understand
CO2: Develop and apply intrusion detection and prevention systems models	Understand and apply
CO3: Detect anomaly's	Understand and apply
CO4: Apply security concepts in intrusion detection and prevention system	Understand and apply
CO5: Apply IDPS tools	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	-	-	S	-	-	-	M	M	M	S	M
CO2	M	M	S	M	-	-	-	-	-	-	L	M	S	-	-
CO3	M	M	M	M	-	M	-	L	-	-	L	-	S	M	S
CO4	M	S	M	-	-	M	-	-	-	M	-	M	-	M	-
CO5	M	M	-	-	S	M	-	L	-	-	M	M	-	-	M

S- Strong; M-Medium; L-Low

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SYLLABUS:

UNIT I - INTRODUCTION	**9 Hours**
Intruder types, intrusion methods, processes and detection, message integrity and authentication, honeypots, firewalls.	
UNIT II - INTRUSION DETECTION SYSTEM (IDS)	**9 Hours**
General IDS model, data mining based IDS, Denning model, data mining framework for constructing features and models for intrusion detection systems	
UNIT III - ANOMALY DETECTION	**9 Hours**
Unsupervised anomaly detection, Host-based anomaly detection, taxonomy of security flaws in software, self-modeling system calls for intrusion detection with dynamic window size.	
UNIT IV - SECURE INTRUSION DETECTION SYSTEM	**10 Hours**
Secure intrusion detection systems, network security, secure intrusion detection environment, secure policy manager, and secure IDS sensor, alarm management, intrusion detection system signatures, sensor configuration, signature and intrusion detection configuration, IP blocking configuration, intrusion detection system architecture.	
UNIT V - RECENT TRENDS	**8 Hours**
Zero day attacks, artificial Intelligence in IDPS, tools for IDPS, Case studies	

TEXT BOOKS

3. Al-Sakib Khan Patha, The State of the Art in Intrusion Prevention and Detection, CRC press, 2016.
4. Endorf, C., Schultz E. and Mellander J., "Intrusion Detection and Prevention," McGraw-Hill, 2003.

REFERENCES

2. Rash, M., Orebaugh, A. and Clark, G., "Intrusion Prevention and Active Response: Deploying Network and Host IPS", Syngress. 2005.
3. Cooper, M., Northcutt, S., Fearnow, M. and Frederick, K., "Intrusion Signatures and Analysis", Sams. 2001

COURSE DESIGNERS

Name of the Faculty	Designation	Department	Mail ID
Dr.R.Jaichandran	Professor	CSE	rjaichandran@avit.ac.in

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35021CS04	PENETRATION TESTING	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

To course provides basic knowledge on the penetration testing. Students will learn about the tools used for penetration testing

PREREQUISITE: Ethical Hacking

COURSE OBJECTIVES

1	To understand penetration testing and its types
2	To study metasploit techniques
3	To understand and apply meterpreter techniques
4	To understand and apply credential harvesting techniques
5	To apply tools for penetration testing

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Able to understand penetration techniques	Understand
CO2: understand and develop applications for metasploit	Understand and apply
CO3: understand and develop applications for meterpreter	Understand and apply
CO4: understand and develop applications for credential harvesting	Understand and apply
CO5: setup penetration testing environment.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	-	-	S	-	-	-	M	M	M	S	M
CO2	M	M	S	M	-	-	-	-	-	-	L	M	S	-	-
CO3	M	M	M	M	-	M	-	L	-	-	L	-	S	M	S
CO4	M	S	M	-	-	M	-	-	-	M	-	M	-	M	-
CO5	M	M	-	-	S	M	-	L	-	-	M	M	-	-	M

S- Strong; M-Medium; L-Low

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SYLLABUS:

UNIT I - INTRODUCTION	**10 Hours**
Basics of Penetration Testing, Types of Penetration Testing, Intelligence Gathering, Thread Modeling, Vulnerability Analysis, Vulnerability Scanners	
UNIT II – METASPLOIT	**8 Hours**
Metasploit Overview, Meta Sploit Interfaces, Utilities,	
UNIT III – METERPRETER	**10 Hours**
Scanning with NMAP, Attack MS SQL, Basic Meterpeter Commands, Dumping Username and Password, Meterpreter Scripting	
UNIT IV - CREDENTIAL HARVESTING	**8 Hours**
Credential Harvesting overview, Configuration, Launching the attack, , Building Your Own Module	
UNIT V - SIMULATED PENETRATION TESTING	**9 Hours**
Post Exploitation, Attacking Apache Tomcat, Attacking Obscure Services, Configuring your Own Target Machine	
TEXT BOOKS	
1. David Kennedy, Jim O'Gorman, Devon Kearns, and Mati Aharoni, "Metasploit the Penetration Tester's Guide", No Starch Press, 2011, ISBN is 9781593272883.	
REFERENCES	
1. Lee Allen, Tedi Heriyanto, Shakeel Ali, "Kali Linux – Assuring Security by Penetration Testing", Packt Publishing, 2014, ISBN is 978-1-84951-948-9	

COURSE DESIGNERS

Name of the Faculty	Designation	Department	Mail ID
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35021CS05	**MOBILE COMMUNICATION SECURITY**	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course provides basic knowledge on security issues in mobile communications. Students will study about mobile computing and security services in mobile communications.

PREREQUISITE: Computer networks

COURSE OBJECTIVES

1	To understand security issues in mobile phone
2	To study security in mobile communications
3	To understand and apply protection techniques in mobile communication
4	To understand and apply network based security services
5	To study protection techniques in mobile transactions

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Able to understand mobile security	Understand
CO2: To understand and apply security in mobile communications	Understand and apply
CO3: To understand and apply protection techniques in mobile communication	Understand and apply
CO4: To apply network based security services	apply
CO5: To apply protection techniques for mobile transactions	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	S	M	-	-	-	-	S	-	-	-	M	M	M	S	M
CO2	M	M	S	M	-	-	-	-	-	-	L	M	S	-	-
CO3	M	M	M	M	-	M	-	L	-	-	L	-	S	M	S
CO4	M	S	M	-	-	M	-	-	-	M	-	M	-	M	-
CO5	M	M	-	-	S	M	-	L	-	-	M	M	-	-	M

S- Strong; M-Medium; L-Low

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UNIT I - INTRODUCTION	**10 Hours**
Introduction to Mobile Security - Security of GSM Networks - Security of UMTS Networks LTE Security - Vulnerabilities in Cellular Services - WiFi and Bluetooth Security - SIM/UICC Security - Security of Mobile VoIP Communications.	
UNIT II - MOBILE COMMUNICATION AND SECURITY	**10 Hours**
Threats, Hacking, and Viruses in Mobile Communications. Access Control and Authentication in Mobile Communications. Common Techniques for Mobile Communications Security. Smart Card Security: The SIM/USIM Case.	
UNIT III - ATTACKS AND PROTECTION TECHNIQUES IN MOBILE COMMUNICATION	**8 Hours**
Security of GSM Networks. Security of 3G Networks. Wireless Local Area Network Security. Security of Ad Hoc Networks.	
SECURITY OF NETWORK-BASED SERVICES IN MOBILE COMMUNICATION	**9 Hours**
Inter-System Roaming and Internetworking Security. Securing Mobile Services. Security of Mobile Sensor Networks. Security of Satellite Services.	
PROTECTION TECHNIQUES FOR MOBILE APPLICATIONS	**8 Hours**
Security of Mobile Payments. Security of Mobile Voice Communications. Security of Multimedia Communications	
TEXT BOOKS	
1. Nourreddine Boudriga, Security of Mobile Communications, Aurerbach Publications, CRC Press, 2019. 2. Noureddine Boudriga, "Security of Mobile Communications", CRC Press, 2009.	
REFERENCES	
1. Himanshu Dwivedi, Chris Clark and David Thiel, "Mobile Application Security", McGraw-Hill, 1st Edition, 2010.	

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35021CS06	BIG DATA SECURITY	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

In this course you will learn how to program in R and how to use R for effective data analysis. You will learn how to install and configure software necessary for a statistical programming environment, discuss generic programming language concepts as they are implemented in a high-level statistical language. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, and organizing and commenting R code. Topics in statistical data analysis and optimization will provide working example.

PREREQUISITE

BIG DATA ANALYTICS

COURSE OBJECTIVES

1	To understand the mathematical foundations of security principles
2	To appreciate the different aspects of encryption techniques
3	To understand the role played by authentication in security
4	To understand the security concerns of big-data.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the mathematical foundations of security principles	Understand
CO2: Appreciate the different aspects of encryption techniques	Understand
CO3: Understand the role played by authentication in security	Understand
CO4: Understand the security concerns of big-data	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

SYMMETRIC TECHNIQUES

Probability and Information Theory - Algebraic foundations – Number theory - Substitution Ciphers – Transposition Ciphers – Classical Ciphers – DES – AES – Confidentiality Modes of Operation

ASYMMETRIC TECHNIQUES

Diffie-Hellman Key Exchange protocol – Discrete logarithm problem – RSA cryptosystems & cryptanalysis – ElGamal cryptosystem – Elliptic curve architecture and cryptography - Data Integrity techniques.

AUTHENTICATION

Authentication requirements – Authentication functions – Message authentication codes – Hash functions – Security of hash functions and MACS – MD5 Message Digest algorithm – Secure hash algorithm.

SECURITY ANALYTICS I

Introduction to Security Analytics – Techniques in Analytics – Analysis in everyday life – Challenges in Intrusion and Incident Identification – Analysis of Log file – Simulation and Security Process.

SECURITY ANALYTICS II

Access Analytics – Security Analysis with Text Mining – Security Intelligence – Security Breaches

REFERENCESBOOKS:

1. William Stallings, "Crpyptography and Network security: Principles and Practices", Pearson/PHI, 5th Edition, 2010.
2. Behrouz A. Forouzan, "Cryptography and Network Security", Tata McGraw Hill Education, 2nd Edition, 2010.
3. Douglas R. Stinson ,"Cryptography Theory and Practice ", Chapman & Hall/CRC, 3rd Edition, 2006.
4. Mark Talabis, Robert McPherson, I Miyamoto and Jason Martin, "Information Security Analytics: Finding Security Insights, Patterns, and Anomalies in Big Data",Syngress Media, U.S., 2014.

COURSE DESIGNERS

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35021CS07	CLOUD COMPUTING SECURITY	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course cloud computing security introduces the basic concepts of security in cloud services and crypto systems in cloud services, which are widely used in the design of cloud computing security. The security issues in virtualization system, virtualization technology, virtualization attacks and legal issues are also considered with in this course.

PREREQUISITE

CLOUD COMPUTING,,CYBER SECURITY

COURSE OBJECTIVES

1	To understand cloud computing security concepts
2	To study various cloud services
3	To apply cloud computing in collaboration with other services
4	To understand the cloud computing services
5	To apply cloud computing online

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand basic service concepts of cloud computing	Understand
CO2: Understand and apply security issues in cloud computing	Analyze
CO3: Apply virtualization techniques	Apply
CO4: Understand and apply the attacks concepts in virtualization	Apply
CO5: Understand and apply legal issues in cloud services	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M
CO5	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Security in Cloud Services (PaaS, IaaS and SaaS). Authentication in cloud services, open SSL, key management and crypto systems in cloud services: stream ciphers, block ciphers, modes of operation, hashing, digital signatures.

SECURITY ISSSUES

Security Issues in Virtualization System: ESX and ESXi Security, ESX file system security, storage considerations, backup and recovery. Vulnerabilities in virtual machine, hypervisor vulnerabilities, hypervisor escape vulnerabilities, configuration issues, malware (botnets etc).

VIRTUALIZATION TECHNOLOGY

IBM security virtual server protection, virtualization-based sandboxing; Storage Security- HIDPS, log management, Data Loss Prevention. Location of the Perimeter.

VIRTUALIZATION ATTACKS

Guest hopping, attacks on VM (attack on control of VM, code injection into virtualized file structure), VM migration attack, hyperjacking.

LEGAL ISSUES

Responsibility, ownership of data, right to penetration test, local law where data is held, examination of modern Security Standards (eg PCIDSS), how standards deal with cloud services and virtualization, compliance for the cloud provider vs. compliance for the customer

TEXT BOOKS

3. TimMather, Subra Kumaraswamy, Shahed Latif, “Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance” O'Reilly Media; 1 edition [ISBN: 0596802765],2009.

4. Ronald L. Krutz, Russell Dean Vines, “Cloud Security” [ISBN: 0470589876],2010.

REFERENCES

1. John Rittinghouse, James Ransome, “Cloud Computing” CRC Press; 1 edition [ISBN: 1439806802], 2009.

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35021CS08	DATA VISUALIZATION TECHNIQUES	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

Visualization is increasingly important in this era where the use of data is growing in many different fields. Data visualization techniques allow people to use their perception to better understand this data. The goal of this course is to introduce students to data visualization including both the principles and techniques. Students will learn the value of visualization, specific techniques in information visualization and scientific visualization, and how understand how to best leverage visualization methods.

PREREQUISITE

DATA WAREHOUSING AND DATA MINING

COURSE OBJECTIVES

1	To understand how accurately represent voluminous complex data set in web and from other data sources
2	To understand the methodologies used to visualize large data sets
3	To understand the process involved in data visualization and security aspects involved in data visualization

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand how accurately represent voluminous complex data set in web and fromother data sources	Understand
CO2: Understand the methodologies used to visualize large data sets	Understand
CO3: Uunderstand the process involved in data visualization and security aspects involved in data visualization	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	M	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Context of data visualization – Definition, Methodology, Visualization design objectives. Key Factors – Purpose, visualization function and tone, visualization design options – Data representation, Data Presentation, Seven stages ofdata visualization, widgets, data visualization tools.

VISUALIZING DATA METHODS

Mapping - Time series - Connections and correlations - Scatterplot maps - Trees, Hierarchies andRecursion - Networks and Graphs, Info graphics

VISUALIZING DATA PROCESS

Acquiring data, - Where to Find Data, Tools for Acquiring Data from the Internet, Locating Files forUse with Processing, Loading Text Data, Dealing with Files and Folders, Listing Files in a Folder,Asynchronous Image Downloads, Advanced Web Techniques, Using a Database, Dealing with aLarge Number of Files. Parsing data - Levels of Effort, Tools for Gathering Clues, Text Is Best,Text Markup Languages, Regular Expressions (regexps), Grammars and BNF Notation,Compressed Data, Vectors and Geometry, Binary Data Formats, Advanced Detective Work.

INTERACTIVE DATA VISUALIZATION

Drawing with data – Scales – Axes – Updates, Transition and Motion – Interactivity - Layouts –Geomapping – Exporting, Framework – T3, .js, tablo.

SECURITY DATA VISUALIZATION

Port scan visualization - Vulnerability assessment and exploitation - Firewall log visualization -Intrusion detection log visualization -Attacking and defending visualization systems - Creatingsecurity visualization system.

REFERENCES

1. Scott Murray, “Interactive data visualization for the web”, O‟Reilly Media, Inc., 2013.
2. Ben Fry, “Visualizing Data”, O‟Reilly Media, Inc., 2007.
3. Greg Conti, “Security Data Visualization: Graphical Techniques for Network Analysis”, No Starch Press Inc, 2007

COURSE DESIGNERS

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35021BC01	DESIGN AND DEVELOPMENT OF BLOCK CHAIN APPLICATIONS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course provides a broad overview of the essential concepts of blockchain technology – by initially exploring the Bitcoin protocol followed by the Ethereum protocol – to lay the foundation necessary for developing applications and programming.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	*To understand the history, types and applications of Blockchain*
2	*To acquire knowledge about cryptography and consensus algorithms.*
3	*To Deploy projects using Web3j and design blockchain based applications.*
4	*To Implement an ICO on Ethereum*
5	*To Design blockchain based application with Swarm and IPFS*

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: *Contentedly discuss and describe the history, types and applications of Blockchain.*	Understand
CO2: *Gains familiarity with cryptography and Consensus algorithms.*	Understand
CO3: *Create and deploy projects using Web3j.*	Create
CO4: *Implement an ICO on Ethereum*	Apply
CO5: *Design blockchain based application with Swarm and IPFS*	create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	*PO1*	*PO2*	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	*M*	*M*	-	-	-	-	S	-	-	-	M	M	M	S	M
CO2	*M*	*M*	S	M	-	-	-	-	-	-	L	M	S	-	-
CO3	*M*	*M*	M	M	-	M	-	L	-	-	L	-	S	M	S
CO4	*M*	*S*	M	-	-	M	-	-	-	M	-	M	-	M	-
CO5	*M*	*M*	-	-	S	M	-	L	-	-	M	M	-	-	M

S- Strong; M-Medium; L-Low

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SYLLABUS

Unit I - INTRODUCTION TO BLOCKCHAIN

Distributed DBMS – Limitations of Distributed DBMS, Introduction to Block chain – History, Definition, Distributed Ledger, Blockchain Categories – Public, Private, Consortium, Blockchain Network and Nodes, Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain, and Types of Blockchain.

Unit II - BLOCKCHAIN ARCHITECTURE

Operation of Bitcoin Blockchain, Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain-Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET).

Unit III – BLOCKCHAIN-BASED FUTURES SYSTEM

Project presentation- Futures smart contract: Blockchain oracles- Web3j: Setting up the Web3J- Installing web3j- Wallet creation, Java client: The wrapper generator- Initializing web3j- Setting up Ethereum accounts- Deploying the contract.

Unit IV - BLOCKCHAINS IN BUSINESS AND CREATING ICO

Public versus private and permissioned versus permission less blockchains- Privacy and anonymity in Ethereum- Why are privacy and anonymity important? - The Ethereum Enterprise Alliance- Blockchainas-a-Service- Initial Coin Offering (ICO): Project setup for ICO implementation- Token contracts- Token sale contracts-Contract security and testing the code.

Unit V – DISTRIBUTED STORAGE IPFS AND SWARM

Ethereum Virtual Machine- Swarm and IPFS: Installing IPFS, Hosting our frontend: Serving your frontend using IFPS, Serving your frontend using Swarm, IPFS file uploader project: Project setup the web page.

TEXT BOOKS

1. Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, decentralization, and smart contracts explained”, 2nd Edition, Packt Publishing Ltd, March 2018.
2. Bellaj Badr, Richard Horrocks, Xun (Brian) Wu, “Blockchain By Example: A developer's guide to creating decentralized applications using Bitcoin, Ethereum, and Hyperledger”, Packt Publishing Limited, 2018.

REFERENCES

1. Andreas M. Antonopoulos , “Mastering Bitcoin: Unlocking Digital Cryptocurrencies”, O’Reilly Media Inc, 2015.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction”, Princeton University Press, 2016.

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35021BC02	CRYPTOGRAPHY AND INFORMATION SECURITY	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE:
To understand Cryptography Theories, Algorithms and Systems. and necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks

PREREQUISITE:
NIL

COURSE OBJECTIVES

1	To understand Cryptography Theories, Algorithms and Systems.
2	To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks
3	To Understand different cryptographic operations of symmetric cryptographic algorithms.
4	To Understand various Authentication schemes to simulate different applications
5	To Understand various Security practices and System security standards.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities	Understand
CO2. Apply the different cryptographic operations of symmetric cryptographic algorithms.	Apply
CO3. Apply the different cryptographic operations of public key cryptography.	Apply
CO4:. Apply the various Authentication schemes to simulate different applications.	Apply
CO5: Understand various Security practices and System security standards.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	L	L	-	-	-	-	-	L	-	L	S	L	L
CO2	S	S	M	-	-	M	M	L	-	L	-	-	S	L	L
CO3	S	S	M	L	-	M	M	L	-	-	L	-	S	L	-
CO4	S	S	M	L	L	L	M	M	M	M	L	L	S	S	-
CO5	S	S	M	M	M	L	M	M	L	M	M	M	S	S	L
CO6	S	S	L	-	-	L	M	L	-	-	-	L	S	L	-

S- Strong; M-Medium; L-Low

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SYLLABUS
UNIT 1 INTRODUCTION

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies

- Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography.- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT – II SYMMETRIC CRYPTOGRAPHY

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures - Modular arithmetic-Euclid's algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution.

UNIT – III PUBLIC KEY CRYPTOGRAPHY

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT – IV MESSAGE AUTHENTICATION AND INTEGRITY

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509

UNIT – V SECURITY PRACTICE AND SYSTEM SECURITY

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

REFERENCES:

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd

2. BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.

3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

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35021BC08	**CRYPTO CURRENCY TECHNOLOGIES**	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

To analyze the basic concepts of various Block Chain and Crypto-Currency Technologies.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand the mechanism of Block chain and Crypto currency.
2	To understand the functionality of current implementation of block chain technology.
3	To understand the required cryptographic background.
4	To explore the applications of Block chain to crypto currencies and understanding limitations of current Block chain.
5	To exposure towards recent research.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand and apply the fundamentals of Cryptography in Crypto currency.	Understand
CO2: Gain knowledge about various operations associated with the life cycle of Block chain and Crypto currency.	Understand
CO3: Deal with the methods for verification and validation of Bit coin transactions.	Apply
CO4: Demonstrate the general ecosystem of several Crypto currencies.	Analyze
CO5: Educate the principles, practices and policies associated Bit coin business.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	-	-	-	-	S	-	-	-	M	M	M	S	M
CO2	M	M	S	M	-	-	-	-	-	-	L	M	S	-	-
CO3	M	M	M	M	-	M	-	L	-	-	L	-	S	M	S
CO4	M	S	M	-	-	M	-	-	-	M	-	M	-	M	-
CO5	M	M	-	-	S	M	-	L	-	-	M	M	-	-	M

S- Strong; M-Medium; L-Low

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SYLLABUS

Unit I - Introduction to Cryptography and Crypto currencies

Cryptographic Hash Functions, Hash Pointers and Data Structures, Digital Signatures, Public Keys as Identities, A Simple Crypto currency.

Unit II - Blockchain Achieves, Store and Use

Decentralization-Centralization vs. Decentralization-Distributed consensus, Consensus with- out identity using a blockchain, Incentives and proof of work. Simple Local Storage, Hot and Cold Storage, Splitting and Sharing Keys, Online Wallets and Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets.

Unit III – Bitcoin mechanism and mining

Bitcoin transactions, Bitcoin Scripts, Applications of Bitcoin scripts, Bitcoin blocks, The Bit- coin network, Limitations and improvements. The task of Bitcoin miners, Mining Hardware, Energy consumption and ecology, Mining pools, Mining incentives and strategies

Unit IV - Community, Politics, and Regulation

Consensus in Bitcoin, Bitcoin Core Software, Stakeholders: Who"s in Charge, Roots of Bitcoin, Governments Notice on Bitcoin, Anti Money Laundering Regulation, New York"s Bit License Proposal. Bitcoin as a Platform: Bitcoin as an Append only Log, Bitcoins as Smart Property, Secure Multi Party Lotteries in Bitcoin, Bitcoin as Public Randomness, Source-Prediction Markets, and Real World Data Feeds.

Unit V – Altcoins, Cryptocurrency Ecosystem and recent trends

Altcoins: History and Motivation, A Few Altcoins in Detail, Relationship Between Bitcoin and Altcoins, Merge Mining-Atomic Crosschain Swaps-6 BitcoinBacked Altcoins, Side Chains, Ethereum and Smart Contracts. Recent Trends and applications.

TEXT BOOKS

1. Narayanan, A., Bonneau, J., Felten, E., Miller, A., and Goldfeder, S. (2016). Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press.

REFERENCES

1. Antonopoulos, A. M. (2014). Mastering Bitcoin: unlocking digital cryptocurrencies. OReilly Media, Inc.".

2. Franco, P. (2014). Understanding Bitcoin: Cryptography, engineering and economics. John Wiley and Sons.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. M. Adimoolam	Professor	CSE	adimoolam.cse@avit.ac.in
2	M. Annamalai	Assistant Professor	CSE	annamalaim@vmkvec.edu.in

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35021BC03	BITCOIN MINING	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course was designed who want to learn how to navigate investment in cryptocurrencies. You'll learn how to define a currency, analyse the foundations of digital signatures and block chain technology in cryptocurrency, and accurately assess the risks of cryptocurrency in a modern investment portfolio.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To build a bitcoin payment system and to perform auctions in Ethereum.
2	To study about cryptocurrencies and their functions.
3	To understand about Bitcoin and Ethereum and the role of Blockchain in various domains.
4	To Recall about Bitcoin and Ethereum
5	To Apply Blockchain in various domains.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Build a bitcoin payment system.	Apply
CO2: Building their own Cryptocurrency and perform Auctions in Ethereum.	Apply
CO3: Grasp what is Cryptocurrency and how it functions	Remember
CO4: Recall about Bitcoin and Ethereum	Remember
CO5: Apply Blockchain in various domains.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	S	-	S	-	S	-	-	-	M	S	M	S	M
CO2	S	S	S	M	S	-	-	-	-	-	L	S	S	S	-
CO3	S	S	S	M	S	M	-	L	-	-	L	S	S	S	S
CO4	S	S	S	-	S	M	-	-	-	M	-	S	-	S	-
CO5	S	S	S	-	S	M	-	L	-	-	M	S	-	S	M

S- Strong; M-Medium; L-Low

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SYLLABUS

Unit I - BUILDING A BITCOIN PAYMENT SYSTEM

The emergence of blockchain and cryptocurrency-What is blockchain? - Interact with the blockchain- Types of blockchains: Classification of blockchains, Building A Bitcoin payment system: Getting started with Bitcoin, Building a payment gateway.

Unit II - CRYPTOCURRENCY AND AUCTIONS IN ETHEREUM

Building Your Own Cryptocurrency- Compiling Bitcoin from source- New cryptocurrency – Readercoin: Cloning Bitcoin, Readercoin rebranding- Peer-to-Peer Auctions in Ethereum: Introduction to Ethereum, Building an auction DApp: Auction description, Auction contract in Solidity- Contract code analysisEnumerations, Arrays, Mappings, Structures, Functions, Modifiers, Inheritance.

Unit III – CRYPTOCURRENCIES AND BITCOIN

Introduction to Cryptocurrencies, Tokens – Cryptosecurities, Players involved - Cryptocurrency Users, Miners, Cryptocurrency exchanges, Trading platforms, Wallet providers, Coin inventors, Coin offerors. Distributed Ledger Technology (DLT), Bitcoin (BTC) – Genesis Block, Buy Bitcoin, Transactions, Unspent Transaction Output (UTXO), Bitcoin Mining, Value of Bitcoin, Advantages and Disadvantages.

Unit IV - ETHEREUM CRYPTOCURRENCY

Ethereum (ETH) – Smart Contracts, UTXO, Types of Accounts - Externally controlled accounts and Contract account, Merkley Tree, Ether, Components of Ethereum Transaction, DApps, Hard & Soft Fork, Bitcoin Stack versus Ethereum Stack.

Unit V – USE CASES

Blockchain in Supply Chain - Blockchain in Manufacturing - Blockchain in Automobiles - Blockchain in Healthcare - Blockchain in Cyber security - Blockchain in Financial Industry.

TEXT BOOKS

1. Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, decentralization, and smart contracts explained”, 2nd Edition, Packt Publishing Ltd, March 2018.

REFERENCES

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfede, “Bitcoin and Cryptocurrency Technologies”, Princeton University Press, 2016.

COURSE DESIGNERS

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35021BC10	CYBER FORENSICS AND INVESTIGATION	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE:
To learn computer forensics and • To become familiar with forensics tools and learn to analyze and validate forensics data

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To learn computer forensics
2	To become familiar with forensics tools
3	To learn to analyze and validate forensics data
4	To learn Identify the vulnerabilities in a given network infrastructure
5	To Implement real-world hacking techniques to test system security

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the basics of computer forensics	Understand
CO2. Apply a number of different computer forensic tools to a given scenario	Apply
CO3. Analyze and validate forensics data.	Apply
CO4:. Identify the vulnerabilities in a given network infrastructure	Apply
CO5: Implement real-world hacking techniques to test system security	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	S	S	L	L	-	-	-	-	-	L	-	L	S	L	L
CO2	S	S	M	-	-	M	M	L	-	L	-	-	S	L	L
CO3	S	S	M	L	-	M	M	L	-	-	L	-	S	L	-
CO4	S	S	M	L	L	L	M	M	M	M	L	L	S	S	-
CO5	S	S	M	M	M	L	M	M	L	M	M	M	S	S	L
CO6	S	S	L	-	-	L	M	L	-	-	-	L	S	L	-

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT I INTRODUCTION TO COMPUTER FORENSICS

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT II EVIDENCE COLLECTION AND FORENSICS TOOLS

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

UNIT III ANALYSIS AND VALIDATION

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

UNIT-IV ETHICAL HACKING

Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing

UNIT V ETHICAL HACKING IN WEB

Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

TEXT BOOKS:

1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, ―Computer Forensics and Investigations‖, Cengage Learning, India Edition, 2016.
2. CEH official Certfied Ethical Hacking Review Guide, Wiley India Edition, 2015.

REFERENCES

1. John R.Vacca, ―Computer Forensics‖, Cengage Learning, 2005
2. MarjieT.Britz, ―Computer Forensics and Cyber Crime‖: An Introduction‖, 3rd Edition, Prentice Hall, 2013.
3. AnkitFadia ― Ethical Hacking‖ Second Edition, Macmillan India Ltd, 2006
4. Kenneth C.Brancik ―Insider Computer Fraud‖ Auerbach Publications Taylor & Francis Group–2008.

COURSE DESIGNERS

COURSE DESIGNERS			
Name of the Faculty	**Designation**	**Department**	**Mail ID**
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35021BC07	GRAPHICS AND GAMING	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to understand the basics of Game Theory

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To introduce the student to the notion of a game, its solutions concepts, and other basic notions and
2	To study tools of game theory, and the main applications for which they are appropriate, including electronic trading markets
3	To formalize the notion of strategic thinking and rational choice by using the tools of game theory, and to provide insights into using game theory in modeling applications
4	To draw the connections between game theory, computer science, and economics, especially emphasizing the computational issues
5	To introduce contemporary topics in the intersection of game theory, computer science, and economics

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Explain the concept of basic notion of a game, its solutions concepts, and other issues	Understand
CO2: Develop a strategicgame theory with perfect information	Apply
CO3: Analyze a formal notion of strategic thinking and rational choice by using tools of game theory	Analyze
CO4: Indentify the non-cooperativegame theory form.	Apply
CO5: Analyze the connections between game theory, computer science, and economics, especially emphasizing the computational issues	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	M	M	-	-	L	-	L	-	-	**S**	M	M
CO2	M	-	-	M	L	-	S	-	-	M	-	-	**S**	-	-
CO3	S	M	M	M	L	-	-	-	-	L	S	L	-	S	-
CO4	S	M	M	S	M	-	-	M	-	M	-	-	-	-	M
CO5	S	M	M	M	M	-	-	-	-	M	-	L	M	S	-

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Making rational choices: basics of Games – strategy - preferences – payoffs – Mathematical basics - Game theory – Rational Choice - Basic solution concepts-noncooperative versus cooperative games - Basic computational issues - finding equilibria and learning in games- Typical application areas for game theory (e.g. Google's sponsored search, eBay auctions, electricity trading markets).

GAMES WITH PERFECT INFORMATION

Games with Perfect Information - Strategic games - prisoner's dilemma, matching pennies Nash equilibria- theory and illustrations - Cournot's and Bertrand's models of oligopoly- auctions mixed strategy equilibrium- zero-sum games- Extensive Games with Perfect Information repeated games (prisoner's dilemma)- subgame perfect Nash equilibrium; computational issues.

GAMES WITH IMPERFECT INFORMATION

Games with Imperfect Information - Bayesian Games – Motivational Examples – General Definitions –Information aspects – Illustrations - Extensive Games with Imperfect -Information - Strategies- Nash Equilibrium – Beliefs and sequential equilibrium – Illustrations - Repeated Games – The Prisoner's Dilemma – Bargaining.

NON-COOPERATIVE GAME THEORY

Non-cooperative Game Theory - Self-interested agents- Games in normal form - Analyzing games: from optimality to equilibrium - Computing Solution Concepts of Normal-Form Games – Computing Nash equilibriaof two-player, zero-sum games -Computing Nash equilibria of twoplayer, general-sum games - Identifying dominated strategies.

MECHANISM DESIGN

Aggregating Preferences-Social Choice – Formal Model- Voting - Existence of social functions - Ranking systems - Protocols for Strategic Agents: Mechanism Design - Mechanism design with unrestricted preferences- Efficient mechanisms - Vickrey and VCG mechanisms (shortest paths) - Combinatorial auctions - profit maximization Computational applications of mechanism design - applications in Computer Science - Google's sponsored search - eBay auctions.

TEXT BOOKS

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth Edition, Sun Microsystems Press, 2008.

REFERENCES

1. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005.
2. David Marshall, Wade A. Reynolds, “Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual DataCenter”, Auerbach Publications, 2006.
3. Kumar Reddy, Victor Moreno, “Network virtualization”, Cisco Press, July, 2006.
4. Chris Wolf, Erick M. Halter, “Virtualization: From the Desktop to the Enterprise”, APress 2005.
5. Kenneth Hess , Amy Newman, “Practical Virtualization Solutions: Virtualization from the Trenches”, Prentice Hall, 2010.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
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35021BC09	ANDROID SECURITY	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

In this modern era almost every hands has a handheld devices. Each handheld device have the computing capability to meet the half the needs of user such as banking, browsing, education and emergency etc. It is a must for a computer engineer to have some basic knowledge about the handheld devices platform and its supporting software development. This course will give adequate knowledge in developing a mobile applications for different such as Android, iOS, Windows.

PRE REQUISITE – NIL

COURSE OBJECTIVES

1.	Understand system requirements for mobile applications
2.	Generate suitable design using specific mobile development frameworks
3.	Generate mobile application design
4.	Implement the design using specific mobile development frameworks
5.	Deploy the mobile applications in marketplace for distribution

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Expose to technology and business trends impacting mobile applications	Understand
CO2.Understand enterprise scale requirements of mobile applications	Understand
CO3. Familiarize in the Graphics used for Android application development	Apply
CO4. Competent with the characterization and architecture of mobile applications	Apply
CO5. Competent with designing and developing mobile applications using one application development framework.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	M	M	M	-	-	M	-	-	-	M	S	M	M
CO2	S	M	M	M	M	-	-	M	-	-	-	M	S	M	M
CO3	S	M	L	M	L	-	-	M	-	-	-	L	S	M	M
CO4	S	M	M	M	M	-	-	M	-	-	-	M	S	M	M
CO5	S	M	M	M	L	-	-	M	-	-	-	L	S	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT I INTRODUCTION

Introduction to mobile applications –Embedded systems -Market and business drivers for mobile applications –Publishing and delivery of mobile applications –Requirements gathering and validation for mobile applications

UNIT II BASIC DESIGN

Introduction –Basics of embedded systems design –Embedded OS -Design constraints for mobile applications, both hardware and software related –Architecting mobile applications –User interfaces for mobile applications –touch events and gestures –Achieving quality constraints –performance, usability, security, availability and modifiability.

UNIT III ADVANCED DESIGN

Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

UNIT IV TECHNOLOGY I – ANDROID

Introduction – Establishing the development environment – Android architecture – Activities and views –Interacting with UI –Persisting data using SQLite–Packaging and deployment –Interaction with server side applications –Using Google Maps, GPS and Wifi –Integration with social media applications.

UNIT V TECHNOLOGY II –IOS

Introduction to Objective C –iOS features –UI implementation –Touch frameworks –Data persistence using Core Data and SQLite –Location aware applications using Core Location and Map Kit –Integrating calendar and address book with social media application –Using Wifi -iPhone marketplace.

TEXT BOOKS

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012.

REFERENCES

1. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech, 2012.

2. James Dovey and Ash Furrow, “Beginning Objective C”, Apress, 2012.

3. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS 6 Development: Exploring the iOS SDK”, Apress, 2013

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
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35021BC04	PUBLIC KEY INFRASTURTURE AND TRUST MANAGEMENT	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course provides basic knowledge on security and management concepts. Students will learn about cryptography algorithms, hash functions, digital signatures and user authentications.

PREREQUISITE: Computer Networks

COURSE OBJECTIVES

1	To understand the concepts in network security and management
2	To study public key crypto systems
3	To study about hash functions
4	To study MAC codes and digital signatures
5	To study user authentication

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand network security and management concepts	Remember and Understand
CO2: Understand and apply public key cryptography	Understand and apply
CO3: Understand and apply hash functions	Understand and apply
CO4: Understand and apply MAC codes & digital signatures	Understand and apply
CO5: Apply user authentication techniques	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	-	-	S	-	-	-	M	M	M	S	M
CO2	M	M	S	M	-	-	-	-	-	-	L	M	S	-	-
CO3	M	M	M	M	-	M	-	L	-	-	L	-	S	M	S
CO4	M	S	M	-	-	M	-	-	-	M	-	M	-	M	-
CO5	M	M	-	-	S	M	-	L	-	-	M	M	-	-	M

S- Strong; M-Medium; L-Low

SYLLABUS:

UNIT I - INTRODUCTION	11 Hours
Definitions & challenges of security, OSI security architecture, attacks & services. Firewalls, Types of Firewalls, Cryptography & cryptanalysis. Classical encryption techniques, substitution techniques, transposition techniques. Block ciphers, DES, AES structure, multiple encryption-triple DES.	
UNIT II - PUBLIC KEY CRYPTO SYSTEMS	**11 Hours**
Number theory fundamentals, principles of pubic key crypto systems, RSA algorithm, Strength of RSA, Diffie-Hellman key exchange, Elliptic curve cryptography. Symmetric key distribution using symmetric and asymmetric encryptions, distribution of public keys, X.509 Certificates	
UNIT III - HASH FUNCTIONS	**8 Hours**

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Cryptographic hash functions, applications, security requirements, hash function based on block chaining, Secure Hash Algorithm (SHA).

UNIT IV - MAC CODES AND DIGITAL SIGNATURES **7 Hours**

MAC, security requirements, HMAC, CMAC, key wrapping, Digital signatures

UNIT V - USER AUTHENTICATION **8 Hours**

Remote user authentication, symmetric and asymmetric encryptions for user authentications, Kerberos, identity management & verification.

TEXT BOOKS

COURSE DESIGNERS

Name of the Faculty	Designation	Department	Mail ID
Dr.R.Jaichandran	Professor	CSE	rjaichandran@avit.ac.in

1. William Stallings, Cryptography & Network Security-Principles and Practices, Sixth Edition, Pearson Publishers, 2014.
2. Christof Paar & Jan Pelzl, Understanding cryptography, Heidelberg, Springer 2014.

REFERENCES

1. Bragg et al., Network security –The complete reference, Tata Mc Graw Hill, 2012.

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35021BC05	BLOCK CHAIN TECHNOLOGIES:BUSINESS INNOVATION AND APPLICATIONS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE:
To understand Architecture Design , Algorithms and Systems. and necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks

PREREQUISITE:
NIL

COURSE OBJECTIVES

1	To understand the history, types and applications of Blockchain
2	To understand necessary design of block chain
3	To Understand different components.
4	To Understand various Authentication schemes to simulate different applications
5	. To implement Blockchain for various use cases

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities	Understand
CO2. Apply the different cryptographic operations of symmetric cryptographic algorithms.	Apply
CO3. Apply the different cryptographic operations of public key cryptography.	Apply
CO4:. Apply the various Authentication schemes to simulate different applications.	Apply
CO5: Understand various Security practices and System security standards.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

CO S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	L	L	-	-	-	-	-	L	-	L	S	L	L
CO2	S	S	M	-	-	M	M	L	-	L	-	-	S	L	L
CO3	S	S	M	L	-	M	M	L	-	-	L	-	S	L	-
CO4	S	S	M	L	L	L	M	M	M	M	L	L	S	S	-
CO5	S	S	M	M	M	L	M	M	L	M	M	M	S	S	L
CO6	S	S	L	-	-	L	M	L	-	-	-	L	S	L	-

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT I

History of Blockchain-Terminologies in Blockchain-Types of Blockchain-Applications of BlockchainHow blockchain works-Ingredients of Blockchain.

UNIT II

BLOCKCHAIN ARCHITECTURE Operation of Bitcoin Blockchain, Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain- Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET)

UNIT - III

Blockchain Business Models Introduction to Blockchain Business Models-Need for Blockchain business modelsTraditional business models-Types of Blockchain Business Models- Blockchain As A Service (BaaS)-Token Economy- Utility Token Business Model-Blockchain-Based Software ProductsP2P Blockchain Business Model-Blockchain Professional Services. Block chain for Banking and Financial transactions

UNIT - IV

Blockchain Technology Stack Data structures for Blockchain-Merkle trees-Shared data- Protocols—Fat protocols-PlatformsDAPPS-Smart Contracts.

UNIT – V

USECASE MODEL – BLOCKCHAIN DIGITAL IDENTITY Use case 3: Blockchain for Government: (i) Digital identity, land records and other kinds of record keeping between government entities, (ii) public distribution system social welfare systems Blockchain Cryptography, Privacy and Security on Blockchain

.

TEXT BOOKS:

1. Brojo Kishore Mishra , Sanjay Kumar Kuanar “Handbook of IoT and Blockchain: Methods, Solutions, and Recent Advancements (Internet of Everything (IoE)) “, CRC Press; 1st edition , November 2020.
2. Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, decentralization, and smart contracts explained”, 2nd Edition, Packt Publishing Ltd, March 2018.

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35021BC06	BLOCK CHAIN ARCHITECTURE DESIGN	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE:
To understand Architecture Design , Algorithms and Systems. and necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks

PREREQUISITE:
NIL

COURSE OBJECTIVES

1	To understand Architecture Design.
2	To understand necessary design of block chain
3	To Understand different components.
4	To Understand various Authentication schemes to simulate different applications
5	To Understand various Security practices and System security standards.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities	Understand
CO2. Apply the different cryptographic operations of symmetric cryptographic algorithms.	Apply
CO3. Apply the different cryptographic operations of public key cryptography.	Apply
CO4:. Apply the various Authentication schemes to simulate different applications.	Apply
CO5: Understand various Security practices and System security standards.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S	L	L	-	-	-	-	-	L	-	L	S	L	L
CO2	S	S	M	-	-	M	M	L	-	L	-	-	S	L	L
CO3	S	S	M	L	-	M	M	L	-	-	L	-	S	L	-
CO4	S	S	M	L	L	L	M	M	M	M	L	L	S	S	-
CO5	S	S	M	M	M	L	M	M	L	M	M	M	S	S	L
CO6	S	S	L	-	-	L	M	L	-	-	-	L	S	L	-

S- Strong; M-Medium; L-Low

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SYLLABUS

Unit I

Introduction to Blockchain: Digital Money to Distributed Ledgers , Design Primitives: Protocols, Security, Consensus, Permissions, Privacy. Blockchain Architecture and Design: Basic crypto primitives: Hash, Signature,) Hashchain to Blockchain, Basic consensus mechanisms

Unit II

Requirements for the consensus protocols, Proof of Work (PoW), Scalabilityaspects of Blockchain consensus protocols Permissioned Blockchains:Design goals, Consensusprotocols for Permissioned Blockchain

Unit III

Hyperledger Fabric (A): Decomposing the consensus process , Hyperledger fabric components, Chaincode Design and Implementation Hyperledger Fabric (B): Beyond Chaincode: fabric SDK and Front End (b) Hyperledger composer tool

Unit V

Use case 3: Blockchain for Government: (i) Digital identity, land records and other kinds of record keeping between government entities, (ii) public distribution system social welfare systems Blockchain Cryptography, Privacy and Security on Blockchain

UNIT – V SECURITY PRACTICE AND SYSTEM SECURITY

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

TEXT BOOKS:

Mstering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos Blockchain by Melanie Swa, O'Reilly

Hyperledger Fabric – https://www.hyperledger.org/projects/fabric

Zero to Blockchain – An IBM Redbooks course, by Bob Dill, David Smits – https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html

COURSE DESIGNERS

Name of the Faculty	Designation	Department	Mail ID
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35021IOT01	IOT ARCHITECTURE AND PROTOCOLS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

To analyze the basic concepts of various architectures of IOT and protocols related to its architecture.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To Comprehend the essentials of IoT and its applications.
2	To Understand the concepts of IoT Architecture Reference model and IoT reference architecture.
3	To Analyze various IoT Application layer Protocols.
4	To Apply IP based protocols and Authentication Protocols for IoT.
5	To Design IoT-based systems for real-world problems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Comprehend the essentials of IoT and its applications.	Understand
CO2: Understand the concepts of IoT Architecture Reference model and IoT reference architecture.	Understand
CO3: Analyze various IoT Application layer Protocols.	Analyze
CO4: Apply IP based protocols and Authentication Protocols for IoT.	Apply
CO5: Design IoT-based systems for real-world problems.	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	-	-	-	-	S	-	-	-	M	M	M	S	M
CO2	M	M	S	M	-	-	-	-	-	-	L	M	S	-	-
CO3	M	M	M	M	-	M	-	L	-	-	L	-	S	M	S
CO4	M	S	M	-	-	M	-	-	-	M	-	M	-	M	-
CO5	M	M	-	-	S	M	-	L	-	-	M	M	-	-	M

S- Strong; M-Medium; L-Low

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SYLLABUS

Unit I

Introduction to IOT, Applications of IOT, Use cases of IOT.

Unit II

The IoT Architectural Reference Model as Enabler, IoT in Practice: Examples: IoT in Logistics and Health, IoT Reference Model: Domain, information, functional and communication models.

Unit III

IoT Reference Architecture: Architecture, Functional, information, deployment and operation views; SOA based Architecture, API-based Architecture, OPENIoT Architecture for IoT/Cloud Convergence.

Unit IV

Application Protocols for IoT: UPnP, CoAP, MQTT, XMPP. SCADA, WebSocket; IP-based protocols: 6LoWPAN, RPL; Authentication Protocols; IEEE 802.15.4.

Unit V

Case study: Cloud-Based Smart-Facilities Management, Healthcare, Environment Monitoring System.

TEXT BOOKS

1. Bassi, Alessandro, et al, "Enabling things to talk", Springer-Verlag Berlin An, 2016.
2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", CISCO Press, 2017
3. Hersent, Olivier, David Boswarthick, and Omar Elloumi. The internet of things: Key applications and protocols. John Wiley & Sons, 2011.

REFERENCES

1. Buyya, Rajkumar, and Amir Vahid Dastjerdi, eds. Internet of Things: Principles and paradigms. Elsevier, 2016.

COURSE DESIGNERS

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35021IOT02	MACHINE LEARNING -I	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course helps the students to know how kernel methods can be used in various machine learning tasks, including classification, ranking and preference learning, as well as learning with multiple data sources and targets. The student knows how convex optimization methods can be used to efficiently train kernel-based models. The student knows how structured data such as sequences, hierarchies and graphs can be tackled through kernel methods.

PREREQUISITE

MACHINE LEARNING

COURSE OBJECTIVES

1.	To familiarize on the concepts of kernel based machine learning
2.	To study on the methods for dimensionality reduction
3.	To gain knowledge on the unsupervised models for cluster analysis
4.	To implement various models for Kernel- ridge regression and SVMs

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the fundamental concepts in kernel based machine learning	Understand
CO2: Understand the various methods for dimensionality reduction	Apply
CO3: Understand and apply how unsupervised models work for cluster analysis	Apply
CO4: Apply and analyze various Kernel-Ridge regression models	Analyse
CO5: Apply and analyze various Support Vector Machines and its variants	Analysee

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO2	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO3	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO4	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO5	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-

S- Strong; M-Medium; L-Low

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SYLLABUS

FUNDAMENTALS OF KERNEL BASED MACHINE LEARNING:

Feature representation and dimension reduction – The learning subspace property (LSP) and "kernelization" aof learning models – Unsupervised learning for cluster discovery – Supervised learning for linear classifiers – Gnereralized inner products and kernel function – Performabce metrics Kernel-induced vector spaces: Mercer kernels and kernel-induced similiarity metrics – Training data independent intrinsic feature vectors – Training data-dependent empirical feature vectors – The kernel-trick for nonvectorial data analysis

DIMENSION_REDUCTION:FEATURE SELECTION AND PCA/KPCA:

Subspace projection and PCA - Numerical methods for computation of PCA – Kernel principal component analysis (KPCA) – Kernel principal component analysis(KPCA) Feature Selection: The filtering approach to feature selection – The wrapper approach to feature selection – Application studies of the feature selection approach

UNSUPERVISED LEARNING MODELS FOR CLUSTER ANALYSIS:

Unsupervised learning for cluster discovery: The similarity metric and clustering strategy – K-means clustering Models – Expectation-maximization(EM) learning models – Self-organizing maps(SOM) learning models – Bi-clustering data analysis Kernel methods for cluster analysis: Kernel based K-means learning models – Kernel K-means for nonvectorical data analysis – K-means learning models in kernel-induced spectral space – Kernelized K-means learning models – Kerrnel- induced SOM learning models – Neighbor-joining hierarchical cluster analysis

KERNEL RIDGE REGRESSORS AND VARIANTS:

Kernel-based regression and regularization analysis: Linear least-squares-error analysis - Kernel-based regression analysis – Regularization via radial basis function (RBF) networks Linear Regression and discriminant analysis for supervised classification: Characterization of supervised learning models – Supervised learning models over-determined formulation – A regularization method for robust learning: training versus prediction performances – Kernelized learning models in empirircal space: linear kernels Kernel ridge regression for supervised classification: Kernel-based discriminant analysis(KDA) – Kernel ridge regression (KRR) for supervised classification - Perturbational discriminant analysis(PDA): Decision component and the regression ratio in special space – Application studies: KDA versus KRR – Trimming detrimental (anti-support) vectors in KRR learning models – Multi-class and multi-label supervised classification – Supervised subspace projection methods

SUPPORT VECTOR MACHINES AND VARIANTS:

Support vector machines: Linear support vector machines – SVM with fuzzy separation : roles of stack variables – Kernrel-based support vector machines – Application case studies – Empirical space SVM for trimming of training vectors Support vector learning models for outlier detection – Support vector regression(SVR) – Hyperplane based one-class SVM learning models – Hypersphere-based one class SVM – Support vector clustering Ridge-SVM learning models – Roles of C and o on WECs of KRR and SVM – Ridge-SVM learning models - Impacts of design parameters on the WEC of ridge SVM – Prediction accuracy versus training time – Application case studies

TEXT BOOKS

1. Kernel Methods and Machine Learning, S.Y.Kung, Cambridge University Press, 2014.

COURSE DESIGNERS

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35021IOT03	ARTIFICIAL NEURAL NETWORKS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enables them to lean about Artificial Intelligence. This syllabus contains intelligent agent, Knowledge Representation and Machine learning, and application. This is useful to how represent knowledge and in machine learning contain some important prediction method. Thus, this syllabus focuses on to know about AI and its concepts, application.

PREREQUISITE

ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

1.	To give an understanding on the fundamentals of non-traditional technologies and approaches to solving hard real- world problems
2.	Fundamentals of artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms. Use of ANN, Fuzzy sets to solve hard real-world problems
3.	To give an overview of Genetic algorithms and machine learning techniques to solving hard real-world problems
4.	To study about Algorithm

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Identify the different agent and its types to solve the problems	Understand
CO2: Know about the problem solving technique in Artificial Intelligence	Analyze
CO3: Construct the normal form and represent the knowledge	Apply
CO4: Identify the extension of condition probability and how to apply in the real time environment.	Analyze
CO5: Apply the Information Retrieval and Speech Recognition in the real-world problems	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L			-	-	-	-	-	-	L	S	S	M
CO2	S	M	L			-	-	-	-	-	-	L	M	S	M
CO3	S	M	S			-	-	-	-	-	-	-	S	-	M
CO4	S	S	S			-	-	-	-	-	-	M	M	M	M
CO5	S	M	M			-	-	-	-	-	-	-	M	S	M

S- Strong; M-Medium; L-Low

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SYLLABUS

FUZZY SET THEORY

Introduction-Definition-History of Artificial Intelligence-Intelligent Agents-Types Of Agents-Problem Solving Approach To AI Problems-Problem Formulation

OPTIMIZATION

Problem Solving Methods-Search Strategies-Uninformed Search Strategies-Comparison of Uninformed earch Algorithms-Informed Search Strategies-Local Search Algorithms-Searching With Partial Information-Constraint Satisfaction Problem

NEURAL NETWORKS

Propositional Logic-First Order Predicate Logic-Prolog Programming-Unification-Forward Chaining- Backward Chaining-Ontological Engineering-Categories and Objects-Events-Mental Events and Mental Objects.

NEURO FUZZY MODELING

Conditional Probability-Joint probability, Prior Probability- Bayes Rule and Its Applications-Bayesian Networks-Inferences in Bayesian Networks- Morkov chain, Hidden Markov Models- Learning from Observation-Supervised Learning.

APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOKS

1.J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2011

REFERENCES

Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
DavisE.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 2005.

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35021IOT04	NETWORK PROGRAMMING	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

The purpose of this course is to understand the concepts of network programing. Identify the components required to build different types of networks. Identify the solution for each functionality for each layer. Trace the flow of information from one node to another node in the network.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To provide basic knowledge in networking concepts.
2	To introduce and demonstrate various bridges, switches and Ethernets.
3	To introduce different methodologies in APIs.
4	To learn about Web Programming & Security
5	To provide knowledge about different application protocols.

COURSE OUTCOMES

On successful completion of the course, students will be able to

CO1.Learn the fundamentals of networks and different types of OSI Layers.	Remember and Understand
CO2.Learn the different Ethernet, wireless networks, switching and bridging concepts	Remember and Understand
CO3.Design solutions for complex routing methods and different multicast routing techniques.	Understand, Apply, analyse and evaluate
CO4.Learn the concepts of different protocols for transmission purpose and study the quality of service for TCP protocol.	Understand, Apply, analyse and evaluate
CO5.Learn different types of application protocols and its architecture.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	S	M	-	-	-	-	-	-	-	-	-	-
CO2	S	M	L	M	S	-	-	-	-	-	-	-	-	-	-
CO3	S	S	S	S	M	-	-	-	-	-	-	-	-	-	-
CO4	S	S	S	S	S	M	-	-	-	-	-	-	-	-	-
CO5	S	M	M	-	M	-	-	-	M	L	-	L	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

Unit- I

Networking & TCP/IP: Communication protocols, Network architecture, UUCP, XNS, IPX/SPX for LANs, TCP & IP headers, IPv4 & v6 address structures, Programming Applications: Time & date routines, Internet protocols: Application layer, Transport layer, Network layer, Datalink layer protocols, Chat, Email, Web server working method & programming.

UNIT-II

Socket Programming: Creating sockets, Posix data type, Socket addresses, Assigning address to a socket, Java socket programming, Thread programming, Berkeley Sockets: Overview, socket address structures, byte manipulation & address conversion functions, elementary socket system calls – socket, connect, bind, listen, accept, fork, exec, close, TCP ports (ephemeral, reserved), Berkeley Sockets: I/O asynchronous & multiplexing models, select & poll functions, signal & fcntl

functions, socket implementation (client & server programs), UNIX domain protocols.

UNIT- III

APIs & Winsock Programming: Windows socket API, window socket & blocking I/O model, blocking sockets, blocking functions, timeouts for blocking I/O, API overview, Different APIs & their programming technique, DLL & new API's, DLL issues, Java Beans.

UNIT- IV

Web Programming & Security: Java network programming, packages, RMI, Overview of Javascript, WAP architecture & WAP services, Web databases, Component technology, CORBA concept, CORBA architecture, CGI programming, Firewall & security technique, Cryptography, Digital Signature.

UNIT- V

Client Server Programming: Client side programming: Creating sockets, implementing generic network client, Parsing data using string Tokenizer, Retrieving file from an HTTP server, Retrieving web documents by using the URL class. Server side programming: Steps for creating server, Accepting connection from browsers, creating an HTTP server, Adding multithreading to an HTTP server.

TEXT BOOKS:

1. Behrouz A. Foruzan, "Data communication and Networking", Seventh Edition, Tata McGraw-Hill, 2017.
2. Andrew S. Tannenbaum, David J. Wetherall "Computer Networks", Pearson Education, Eighth Edition, 2016.

REFERENCES:

1. William Stallings, "Data and Computer Communication", Eighth Edition, Pearson Education.
2. Knuth,D.E., "Computer Communication and Networks", Sixth Edition , McGrath-Hill, 2016.

COURSE DESIGNERS

S. No.	Name of the faculty	Designation	Department / Name of the College	Mail Id
1	Mr. S. SenthilKumar	Assistant Professor	CSE / VMKVEC	senthilkumars@vmkvec.edu.in
2	Mr. S. Muthuselvan	Assistant Professor Gr. II	CSE / AVIT	muthuselvan@avit.ac.in

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35021IOT05	INTERNET AND WEB TECHNOLOGY	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting.

PREREQUISITE – RICH INTERNET APPLICATION

COURSE OBJECTIVES

1	To introduce basic concepts of internet
2	To learn about HTML & XML
3	To learn about internet security

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1 . Analyze a web page and identify its elements and attributes.	Analyze
CO2. Create web pages using XHTML and Cascading Style Sheets.	Apply
CO3. Build dynamic web pages using JavaScript (Client side programming).	Apply
CO4. Create XML documents and Schemas	Apply
CO5. Build interactive web applications using JSP	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	M	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	-	M	-	-	-	**S**	M	M
CO3	S	M	L	-	L	-	-	-	M	-	-	L	**S**	M	M
CO4	S	M	L	-	M	-	-	-	M	-	-	-	**S**	M	M
CO5	S	M	L	-	M	-	-	-	M	-	-	L	**S**	M	M

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO INTERNET

Introduction, Evolution of Internet, Internet Applications, Internet Protocol -TCP/IP, UDP, HTTP, Secure Http(Shttp) Internet Addressing – Addressing Scheme – Ipv4 & IPv6, Network Byte Order, Domain Name Server and IP Addresses, Mapping . Internet Service Providers, Types Of Connectivity Such As Dial-Up Leaded Vsat Etc. Web Technologies: Three Tier Web Based Architecture; Jsp, Asp, J2ee, .Net Systems

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HTML CSS AND SCRIPTING

HTML – Introduction, Sgml, Dtd(Document Type Definition, Basic Html Elements, Tags and usages, HTML Standards , Issues in HTML Dhtml: Introduction Cascading Style Sheets: Syntax ,Class Selector, Id Selector Dom (Document Object Model) & Dso (Data Source Object) Approaches To Dynamic Pages: Cgi, Java Applets, Plug Ins, Active X, Java Script – Java Script Object Model, Variables-Constant – Expressions, Conditions- Relational Operators- Data Types – Flow Control – Functions & Objects-events and event handlers – Data type Conversion & Equality – Accessing HTML form elements

XML

What is XML – Basic Standards, Schema Standards, Linking & Presentation Standards, Standards that build on XML, Generating XML data, Writing a simple XML File, Creating a Document type definition, Documents & Data ,Defining Attributes & Entities in the DTD ,Defining Parameter Entities & conditional Sections, Resolving a naming conflict, Using Namespaces, Designing an XML data structure, Normalizing Data, Normalizing DTDS

INTERNET SECURITY & FIREWALLS

Security Threats From Mobile Codes, Types Of Viruses, Client Server Security Threats, Data & Message Security, Various electronic payment systems, Introduction to EDI,Challenges–Response System, Encrypted Documents And Emails , Firewalls: Hardened Firewall Hosts, Ip- Packet Screening, Proxy Application Gateways, Aaa (Authentication ,Authorization And Accounting).

WEBSITE PLANNING & HOSTING

Introduction, Web Page Lay-Outing, Where To Host Site, Maintenance Of Site, Registration Of Site On Search Engines And Indexes, Introduction To File Transfer Protocol, Public Domain Software, Types Of Ftp Servers (Including Anonymous),FtpClients Common Command. Telnet Protocol, Server Domain, Telnet Client, Terminal Emulation. Usenet And Internet Relay Chat.

TEXT BOOKS

1. Internet & Intranet Engineering,- Daniel Minoli, TMH.

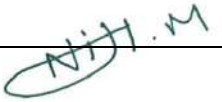
2 .Alexis Leon and Mathews Leon – Internet for Every One, Tech World.

REFERENCES

1. Eric Ladd, Jim O'Donnel –"Using HTML 4, XML and JAVA"-Prentice Hall of India -1999.

2. "Beginning Java Script "– Paul Wilton – SPD Publications –2001

Course Designers:



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35021IOT06	WIRELESS AND MOBILE COMMUNICATION	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course provides basic knowledge on security issues in mobile communications. Students will study about mobile computing and security services in mobile communications.

PREREQUISITE: Computer networks

COURSE OBJECTIVES

1	To understand security issues in mobile phone
2	To study security in mobile communications
3	To understand and apply protection techniques in mobile communication
4	To understand and apply network based security services
5	To study protection techniques in mobile transactions

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Able to understand mobile communication.	Understand
CO2: To understand and apply security in mobile communications	Understand and apply
CO3: To understand and apply protection techniques in mobile communication and wireless network.	Understand and apply
CO4: To apply network based security services	apply
CO5: To apply protection techniques for mobile transactions	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	-	-	S	-	-	-	M	M	M	S	M
CO2	M	M	S	M	-	-	-	-	-	-	L	M	S	-	-
CO3	M	M	M	M	-	M	-	L	-	-	L	-	S	M	S
CO4	M	S	M	-	-	M	-	-	-	M	-	M	-	M	-
CO5	M	M	-	-	S	M	-	L	-	-	M	M	-	-	M

S- Strong; M-Medium; L-Low

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UNIT I - INTRODUCTION	10 Hours
Introduction to Mobile Security - Security of GSM Networks - Security of UMTS Networks LTE Security - Vulnerabilities in Cellular Services - WiFi and Bluetooth Security - SIM/UICC Security - Security of Mobile VoIP Communications.	
UNIT II - MOBILE COMMUNICATION AND SECURITY	**10 Hours**
Threats, Hacking, and Viruses in Mobile Communications. Access Control and Authentication in Mobile Communications. Common Techniques for Mobile Communications Security. Smart Card Security: The SIM/USIM Case.	
UNIT III - ATTACKS AND PROTECTION TECHNIQUES IN MOBILE COMMUNICATION	**8 Hours**
Security of GSM Networks. Security of 3G Networks. Wireless Local Area Network Security. Security of Ad Hoc Networks.	
SECURITY OF NETWORK-BASED SERVICES IN MOBILE COMMUNICATION	**9 Hours**
Inter-System Roaming and Internetworking Security. Securing Mobile Services. Security of Mobile Sensor Networks. Security of Satellite Services.	
PROTECTION TECHNIQUES FOR MOBILE APPLICATIONS	**8 Hours**
Security of Mobile Payments. Security of Mobile Voice Communications. Security of Multimedia Communications	
TEXT BOOKS	
1. Nourreddine Boudriga, Security of Mobile Communications, Aurerbach Publications, CRC Press, 2019. 2. Noureddine Boudriga, "Security of Mobile Communications", CRC Press, 2009.	
REFERENCES	
1. Himanshu Dwivedi, Chris Clark and David Thiel, "Mobile Application Security", McGraw-Hill, 1st Edition, 2010.	

COURSE DESIGNERS

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35021IOT08	**ADVANCED DATABASE SYSTEM**	**Category**	**L**	**T**	**P**	**Credit**
		SE	3	0	0	3

PREAMBLE:

This course aims at facilitating the student to understand the various concepts and functionalities of Database Management Systems, the method and model to store data and how to manipulate them through query languages, the effective designing of relational database and how the system manages the concurrent usage of data in multi user environment.

PREREQUISITE:

DATABASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES

1	To describe a relational database and object-oriented database.
2	To create, maintain and manipulate a relational database using SQL.
3	To describe ER model and normalization for database design.
4	To examine issues in data storage and query processing and can formulate appropriate solutions.
5	To design and build database system for a given real world problem.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Illustrate the database design for applications and database adminstrators.	Understand
CO2. Build and manipulate the relational database using Structured Query Language and relational languages.	Apply
CO3. Develop a normalized database for a given application by incorporating various constraints like integrity and value constraints.	Apply
CO4. Apply concurrency control & recovery mechanism for database problems.	Apply
CO5. Construct data structures like indexes and hash tables for the fast retrieval of data.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	S	M	M	M	M	-	-	-	-	-	M	S	S	M	S
CO2	M	M	M	L	M	-	-	-	-	-	M	M	S	M	S
CO3	M	M	S	M	M	-	-	-	-	-	M	L	S	M	S
CO4	S	M	M	M	L	-	-	-	-	-	M	M	S	S	S
CO5	S	M	M	M	M	-	-	-	-	-	M	M	S	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

PARALLEL AND DISTRIBUTED DATABASES **9**

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Three Tier Client Server Architecture- Case Studies.

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OBJECT AND OBJECT RELATIONAL DATABASES **9**

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems : Object Relational feature sin SQL/Oracle – Case Studies.

XML DATABASES **9**

XML Databases: XML Data Model – DTD - XML Schema - XML Querying – Web Databases – JDBC – Information Retrieval – Data Warehousing – Data Mining

MOBILE DATABASES **9**

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Mobile Database Recovery Schemes

MULTIMEDIA DATABASES **9**

Multidimensional Data Structures – Image Databases – Text/Document Databases- Video Databases – Audio Databases – Multimedia Database Design.

REFERENCES

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, " Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
5. V.S.Subramanian, "Principles of Multimedia Database Systems", Harcourt India Pvt Ltd., 2001.
6. Vijay Kumar, " Mobile Database Systems", John Wiley & Sons, 2006.

COURSE DESIGNERS

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35021IOT09	BIG DATA VISUALIZATION	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course focuses on big data technologies used for storage, analysis and manipulation of data. The student will learn about fundamentals of Hadoop, MapReduce, Pig, Hive, R and have hand on training on the same It also help to develop projects and apply existing data analytics tools to gain comprehensive knowledge on Data analytics.

PREREQUISITE : Nil

COURSE OBJECTIVES

1.	To introduce the basic concepts of Big Data.
2.	Summarize the NoSQL Data management.
3.	To discuss the basic concepts of Hadoop.
4.	To discuss the map reduce applications in big data.
5.	To discuss the hadoop related other tools like Pig, Hive, HBase and Cassandra.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Outline the basic big data concept.	Remember
CO2: Categorize and summarize the processing in Big Data and its importance.	Understand
CO3: Simulate various Big data technologies like Hadoop MapReduce, Pig, Hive, Hbase and No-SQL.	Apply
CO4: Determine tools and techniques to analyze Big Data	Analyze
CO5:Discuss the Hadoop related tools.	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1		S			S								S	S
CO2	M	S	L	S	M							M	S	S
CO3	L	M	S	M	M	M						M	M	M
CO4		M	M		S								M	
CO5	L	M			S	M			M				S	

S- Strong; M-Medium; L-Low

SYLLABUS

UNDERSTANDING BIG DATA

What is big data – why big data – convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies – introduction to Hadoop – open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics

NOSQL DATA MANAGEMENT

Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships – graph databases – schemaless databases – materialized views – distribution models – sharding – master-slave replication – peer-peer replication – sharding and replication – consistency – relaxing consistency – version stamps – map-reduce – partitioning and combining – composing map-reduce calculations

BASICS OF HADOOP

Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression – serialization – Avro – file-based data structures

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MAPREDUCE APPLICATIONS

MapReduce workflows – unit tests with MRUnit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN – failures in classic Map-reduce and YARN – job scheduling – shuffle

and sort – task execution – MapReduce types – input formats – output formats

HADOOP RELATED TOOLS

Hbase – data model and implementations – Hbase clients – Hbase examples – praxis.Cassandra – cassandra data model – cassandra examples – cassandra clients – Hadoop integration.

Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts.

Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.

TEXT BOOKS:

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.

REFERENCES:

1. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
2. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
3. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
4. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
5. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
6. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
   Alan Gates, "Programming Pig", O'Reilley, 2011.

COURSE DESIGNERS

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35021IOT07	**IOT METHODOLOGY AND APPLICATIONS**	**Category**	**L**	**T**	**P**	**Credit**
		SE	**3**	**0**	**0**	**3**

PREAMBLE

To study and understand the technologies involved in Internet of Things (IoT) and apply them practically.

PREREQUISITE :NIL

COURSE OBJECTIVES

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1.	To understand the basic concepts of IOT
2.	To study the methodology of IOT
3.	To Develop IOT applications using Raspberry PI
4.	To Develop IOT applications using Arduino and Intel Edison
5.	To apply cloud concepts in IOT

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Able to understand basics in IOT	Understand
CO2: Able to understand Methodology in IOT	Apply
CO3: Able to design IOT applications using Raspberry	Analyze
CO4: Able to design IOT applications using Aurdino and Intel Edison	Analyze
CO5: Able to apply Cloud computing in IOT	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.

IOT METHODOLOGY

IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

IOT WITH RASPBERRY

Basics of Raspberry PI, Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services

IOT WITH AURDINO AND INTEL EDISON

Basics of Aurdino, Intel Edison with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks

APPLICATIONS

Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for Iot – Data Analytics for IoT – Software & Management Tools for IoT.

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TEXT BOOKS
1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015. **2.** Manoel Carlos Ramon, “Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers”, Apress, 2014.
REFERENCES
1. Marco Schwartz, “Internet of Things with the Arduino Yun”, Packt Publishing, 2014

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35021IOT10	INDUSTRIAL INTERNET OF THINGS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

Industrial Internet of Things is the pioneer of today's modern technology. To match the engineering skills with the industry skills this subject will induce and impart the knowledge among the young professionals.

PREREQUISITE: Basic knowledge of computer and internet

COURSE OBJECTIVES

1	IIOT concerns the transformation of industrial processes through the integration of modern technologies such as sensors, communication, and computational processing.
2	Technologies such as Cyber Physical Systems (CPS), Internet of Things (IoT), Cloud Computing, Machine Learning, and Data Analytics are considered to be the different drivers necessary for the transformation.
3	Industrial Internet of Things (IIoT) is an application of IoT in industries to modify the various existing industrial systems.
4	IIoT links the automation system with enterprise, planning and product lifecycle.
5	Real case studies

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Apply & Analyzing the transformation of industrial process by various techniques.	Analyze
CO2. Evaluate the transformation technologies are considered to be the different drivers.	Apply
CO3. Existing industrial systems will adopt the applications of IIoT.	Apply
CO4. Intensive contributions over automation system with enterprise, planning and product life cycle	Analyze

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CO5. Analyze of various Real time case studies.													Analyze	
MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES														
COS	PO 1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
CO1	S	S	M	-	M	-	-	-	-	-	-	M	S	M	-
CO2	S	S	S	M	M	-	-	-	-	-	-	M	S	M	M
CO3	S	S	S	M	M	-	-	-	-	-	-	M	S	M	M
CO4	S	S	S	M	M	-	-	-	-	-	-	M	S	M	M
CO5	S	S	S	S	M	-	-	-	-	-	-	M	S	M	M
S- Strong; M-Medium; L-Low															

SYLLABUS

INDUSTRIAL INTERNET OF THINGS INTRODUCTION:

Sensing & actuation, Communication-Part I, Part II, Networking-Part I, Part II.Industry 4.0: Globalization, The Fourth Revolution, LEAN Production Systems, Cyber Physical Systems and Next Generation Sensors, Collaborative Platformand Product Lifecycle Management

INDUSTRIAL INTERNET OF THINGS& IT'S LAYERS

Industrial IoT: Industrial Processes-Part I, Part II, Industrial Sensing & Actuation. IIoT-Introduction, Industrial IoT: Business Model and Reference Architecture: IIoT-Business Models-Part I, Part II, IIoT Reference Architecture-Part I, Part II, Industrial IoT- Layers: IIoT Sensing-Part I, Part II, IIoT Processing-Part I, Part II.

IIoT COMMUNICATION

Communication-Part I, Industrial IoT- Layers: IIoT Communication, IIoT Networking-Part I, Part II, Part III. Industrial IoT: Big Data Analytics and Software Defined Networks: SDN in IIoT-Part I, Part II, Data Center Networks, Industrial IoT

IIoT BIG DATA & SDN APPLICATIONS

Industrial IoT: Security and Fog Computing - Fog Computing in IIoT, Security in IIoT-Part I, Part II, Industrial IoT- Application Domains. Industrial IoT- Application Domains: Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications), Facility Management.

APPLICATIONS & REAL TIME CASE STUDIES

Industrial IoT- Application Domains: Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries, Real case studies - Virtual reality lab, Manufacturing industries – part one, Manufacturing industries – part two, Milk processing and packaging industries, Steel technology lab, Student projects – part one, Student projects – part two

TEXT BOOKS:

2. Anandarup Misra, Sudip | Roy, Chandana | Mukherjee, "Introduction to Industrial Internet of Things and Industry 4.0, CRC press, 2003.Gilchrist, Alasdair, "Introduction to IoT", Apress, 2016
3. Gilchrist, Alasdair "IIoT Reference Architecture", Apress, 2016

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35021DS01	BIG DATA TOOLS AND TECHNIQUES	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course covers foundational techniques and tools required for big data analytics. This course spotlights the concepts, principles, and techniques are applicable in big data analytics environment in industry and real-world experience.

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To understand how big data analytics can leverage into a key component
2.	To understand the big data tools with their applications
3.	To understand the big data reports for the existing tools
4.	To understand the big data applications like MongoDB, Cassandra and Hive.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the basics of digital data and introduction to big data	Understand
CO2: Analyze the basic big data challenges, important and technologies.	Analyze
CO3: Solve big data analytics challenges with the help of Hadoop and MongoDB architecture and technologies.	Apply
CO4: Analyze big data storage like MongoDB, Cassandra and Hive.	Analyze
CO5: Analyze Pig and Hive in terms of processing and to design Jasper Reports.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

DIGITAL DATA AND INTRODUCTION TO BIG DATA

Types of Digital Data - Structured Data - Semi-Structured Data - Unstructured Data - Introduction to Big Data - What is Big Data - Why Big Data - Traditional Business Intelligence (BI) versus Big Data - Typical Hadoop Environment - Changes in the Realms of Big Data - Coexistence of Big Data and Data Warehouse.

BIG DATA ANALYTICS

What's in Store? - Big Data Analytics - Classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Big Data Analytics Important - Technologies for Meet the Challenges Posed by Big Data - Data Science - Data Scientist - Big Data Environment - Analytics Tools.

HADOOP

Introduction to Hadoop - Hadoop Components - Hadoop Conceptual Layer - High Level Architecture of Hadoop - Business Value of Hadoop -Hadoop Distributed File System - Processing Data with Hadoop - MapReduce Daemons - MapReduce working - MapReduce Example - Managing Resources and Application with Hadoop YARN - Hadoop Ecosystem.

MONGODB, CASSANDRA AND HIVE

MongoDB - RDBMS and MongoDB - Data Types in MongoDB-CRUD- Introduction to Apache Cassandra - Features of Cassandra - CQL Data Types -CQLSH- Keyspaces-CRUD-Collections- Using a Counter - Time To Live (TTL)-Alter - Import and Export - Export to CSV - Import from CSV - Import from STDIN - Export to STDOUT - System Tables - Practice Examples - Introduction to Hive - Hive Architecture - Hive Data Types - Hive File Format - Hive Query Language - RCFILE Implementation - SERDE - UDF.

PIG AND JASPER REPORTS

Anatomy of Pig - Pig on Hadoop - Pig Philosophy - Use Case for Pig: ETL Processing - Pig Latin Overview - Data Types in Pig - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Type - Piggy Bank - UDF (User Defined Function) - Parameter Substitution - Diagnostic Operator - Word Count Example - When to use Pig? - When NOT to use Pig? - Pig at Yahoo - Pig versus Hive - Hive Vs Pig - Introduction to Jasper Reports, Jaspersoft Studio - Connecting to MongoDB NoSQL database - Connecting to Cassandra NoSQL Databases

TEXT BOOKS:

3. Big Data and Analytics - Seema Acharya and Subhashini C - Wiley India
4. Big data for dummies - Judith Hurwitz, Alan Nugent,Fern Halper, Marcia Kaufman
5. Hadoop: The Definitive Guide by Tom White
6. Hadoop in action - Chuck Lam
7. Hadoop for dummies - Dirk Deroos, Paul C. Zikopoulos, Roman B. Melnyk,Bruce Brown

REFERENCES:

6. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series, 2012.
7. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier, 2007
8. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
9. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.
10. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", Wiley and SAS Business Series, 2012.

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35021DS02	DATA MINING AND ANALYTICS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

Data warehousing and data mining is one of the most advanced fields of computer science which involves use of Mathematics, Statistics, Information Technology and information Sciences in discovering new information and knowledge from large databases It is a new emerging interdisciplinary area of research and development which has created interest among scientists of various disciplines.

PREREQUISITE

Database Management System

COURSE OBJECTIVES

1.	Distinguish a data warehouse from an operational database system, and appreciate the needs for developing a data warehouse for large corporation.
2.	Describe the problems and processes involved in the development of a data warehouse
3.	To explain the process of data mining and its importance.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1:. Understand the basics of data warehousing and mining	Understand
CO2: Apply the data preprocessing, language, architectures, concept description.	Apply
CO3: Understand association rules and its algorithms.	Understand
CO4: Classify and clustering rules and the respective algorithms	Apply
CO5: Understand the latest trends about the data warehousing and mining	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	L		M	-	-	-	-	-	-	-	M	M	M	M
CO2	S	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	S	L		L	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	L	-	-	-	-	-	-	-	M	M	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION AND DATA WAREHOUSING

Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation, Further Development, Data Warehousing to Data Mining.

DATA PREPROCESSING, LANGUAGE, ARCHITECTURES, CONCEPT DESCRIPTION

Why Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

ASSOCIATION RULES

Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases.

CLASSIFICATION AND CLUSTERING

Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, Outlier Analysis.

RECENT TRENDS

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining.

TEXT BOOK

1. J. Han, M. Kamber, “Data Mining: Concepts and Techniques”, Harcourt India / Morgan Kauffman, 2001.

REFERENCES

1. Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education 2004.
2. Sam Anahory, Dennis Murry, "Data Warehousing in the real world", Pearson Education 2003.
3. David Hand, Heikki Manila, Padhraic Symth, "Principles of Data Mining", PHI 2004.
4. W.H.Inmon, "Building the Data Warehouse", 3rd Edition, Wiley, 2003.
5. Alex Bezon, Stephen J.Smith, "Data Warehousing, Data Mining & OLAP", MeGraw-Hill Edition, 2001.
6. Paulraj Ponniah, "Data Warehousing Fundamentals", Wiley-Interscience Publication, 2003.

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35021DS03	BASICS OF DATA SCIENCE	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

Data Science is about drawing useful conclusions from large and diverse data sets through exploration, prediction, and inference. Exploration involves identifying patterns in information. Prediction involves using information we know to make informed guesses about values we wish we knew. Inference involves quantifying our degree of certainty. The primary tools for exploration are visualizations and descriptive statistics, for prediction are machine learning and optimization, and for inferenceare statistical tests and models. Throug hunder standing aparticular domain, the students learn to ask appropriate questions about their data and correctly interpret the answers provided by inferential and computational tools

PREREQUISITE

NIL

COURSE OBJECTIVES

1.	To obtain a Comprehensive knowledge of various tools and techniques for Data transformation and visualization
2.	To learn the probability and probabilistic models of datascience
3.	To learn the basic statistics and testing hypothesis for specific problems
4.	To learn about the prediction models

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand how to apply pre-processing techniques to convert raw data so as to enabl further analysis	Understand
CO2: Understand and apply exploratory data analysis and create insightful visualizations to identify patterns	Understand
CO3: Understand how to derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions	Understand
CO4: Understand the statistical foundations of data science and analyze the degree of certainty of predictions using statistical test and models	Understand
CO5: Familiarize with machine learning algorithms for prediction and to derive insights	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	-	-	M	-	-	-	-	-	-	-	-	M	M	M
CO2	S	M	M	M	-	-	-	-	-	-	-	-	M	M	M
CO3	S	-	-	-	-	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	-	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	-	-	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION:

Data Science, Big Data and Data Science – Data fication - Current landscape of perspectives - Skill sets needed; Matrices - Matrices to represent relations between data, and necessary linear algebraic operations on matrices -Approximately representing matrices by decompositions (SVD and PCA); Statistics: Descriptive Statistics: distributions and probability - Statistical Inference: Populations and samples - Statistical modeling - probability distributions - fitting a model - Hypothesis Testing - Intro to R/ Python.

DATA PREPROCESSING:

Data cleaning - data integration - Data Reduction Data Transformation and Data Discretization.Evaluation of classification methods – Confusion matrix, Students T-tests and ROC curves-Exploratory Data Analysis - Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA - The Data Science Process.

BASIC MACHINE LEARNING ALGORITHMS:

Association Rule mining - Linear Regression- Logistic Regression - Classifiers - k-Nearest Neighbors (k-NN), k-means - Decision tree - Naive Bayes- Ensemble Methods - Random Forest. Feature Generation and Feature Selection - Feature Selection algorithms - Filters; Wrappers; Decision Trees; Random Forests.

CLUSTERING:

Choosing distance metrics - Different clustering approaches - hierarchical agglomerative clustering, k-means (Lloyd's algorithm), - DBSCAN - Relative merits of each method - clustering tendency and quality.

DATA VISUALIZATION:

Basic principles, ideas and tools for data visualization.

REFERENCE BOOKS

1. Cathy O'Neil and Rachel Schutt, " Doing Data Science, Straight Talk From The Frontline", O'Reilly, 2014.

2. Jiawei Han, Micheline Kamber and Jian Pei, " Data Mining: Concepts and Techniques", Third Edition. ISBN 0123814790, 2011.

3. Mohammed J. Zaki and Wagner Miera Jr, "Data Mining and Analysis: Fundamental Concepts and Algorithms", Cambridge University Press, 2014.

4. Matt Harrison, "Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization , O'Reilly, 2016.

5. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2015.

6. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly Media, 2012

COURSE DESIGNERS

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35021DS04	INFORMATION STROAGE AND MANAGEMENT	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to understand the basics of Information Storage with pertinence to modeling, query operations and indexing.

PREREQUISITE: DATA MINING & DATA WAREHOUSING

COURSE OBJECTIVES

1	To understand the responsibility data storage and protection as it is the crucial component of any computing system
2	To understand the need for networking to store and access data across multiple storages
3	To understand security needs.
4	To understand the various applications of Information
5	To lay foundation for learning the Security Management

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Describe the objectives of information retrieval systems	Understand
CO2: Understand about the various IR models	Apply
CO3: Understand the static and dynamic indices and query operations	Apply
CO4: implement clustering algorithms like hierarchical clustering and classification	Apply
CO5: Able to Understand searching ,ranking and digital libraries	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	M	M	M	-	-	-	-	-	M	S	S	S
CO2	S	S	S	M	M	L	-	M	-	-	-	M	S	M	M
CO3	S	L	L	-	L	-	-	-	-	-	-	S	M	S	S
CO4	S	S	S	M	M	M	-	M	-	-	-	M	S	-	S
CO5	S	S	M	M	M	L	-	-	-	-	-	M	M	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT I - INTRODUCTION

Review data creation and the amount of data being created and understand the value of data to a business, Challenges in Data Storage and Management, Data Storage Infrastructure. Storage Systems Environment: Components of a Storage System Environment: Disk drive components, Disk Drive Performance, Logical Components.

UNIT II - DATA PROTECTION

Concept of RAID and its Components, Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Comparison of Levels. Intelligent Storage Systems: Components, Intelligent Storage Array, High-level architecture and working of an intelligent storage system.

UNIT III - INTRODUCTION TO NETWORKED STORAGE

Evolution of networked storage, Architecture, Overview of FC-SAN, NAS, and IPSAN. Network-Attached Storage (NAS): Benefits of NAS, Components, Implementations, File Sharing, I/O operations, Performance and Availability. Content Addressed Storage (CAS): features and Benefits of a CAS. CAS Architecture, Storage and Retrieval, Examples. Storage Virtualization: Forms, Taxonomy, Configuration, Challenges, Types of Storage Virtualizations.

UNIT IV - INFORMATION AVAILABILITY, MONITORING, MANAGING

Datacenter: Information Availability, Business continuity, Failure Analysis, Business impact Analysis, Differentiate between business continuity (BC) and disaster recovery (DR). Disaster Recovery: Backup, Methods, And Technologies, Replication technologies: Local replicas, Technologies, Restore and Restart, Multiple Replicas. Remote Replication. DR in practice.

UNIT V - STORAGE SECURITY AND MANAGEMENT SECURITY

Framework, Storage security domains, List and analyzes the common threats in each domain, Security Implementations. Managing the Storage Infrastructure - Monitoring the Storage Infrastructure, Storage Management Activities, Challenges and solutions.

TEXT BOOK:

1. EMC Corporation, Information Storage and Management, Wiley India. (For Unit I toV).

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35021DS06	BUSINESS INTELLIGENCE AND ANALYTICS	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

Business Intelligence (BI) refers to the tools, technologies, applications and practices used to collect, integrate, analyze, and present an organization's raw data in order to create insightful and actionable business information in Data mining.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To Introduce students to various business intelligence concepts
2	To learn the concepts of data integration used to develop intelligent systems for decision support
3	To introduce visualization tool for prepare the enterprise reporting
4	To learn analytical components and technologies used to create dashboards and scorecards, data/text/Web mining methods
4	To gain new insights into organizational operations in implementation of systems for Business Intelligence (BI)

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1. Learn about the concepts of OLTP and OLAP for BI infrastructure development	Understand
CO2. Gained an understanding of how business professionals can use analytics techniques to formulate and solve relevant problems and how they use analytics to support decision making	Analyze
CO3. Apply Clustering, Association and Classification techniques for Data Integration	Apply
CO4. Assess BI tools to solve problems, issues, and trends using predictive analysis	Apply
CO5. Develop systems to measure, monitor and predict the enterprise variables and performance indicators for business decision-making process	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO4	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION TO BUSINESS INTELLLIGENCE

Introduction to OLTP AND OLAP – BI Definition and BI Concepts – Business Applications of BI - BI Framework- Role of Data Warehousing in BI –BI Infrastructure Components- BI Process – Developing Data Warehouse – Management Framework – Business driven approach –BI Technology — BI Roles & Responsibilities.

BASICS OF DATA INTEGRATION

Concepts of Data Integration need and advantages of using Data Integration – Introduction to common data integration approaches – Introduction to ETL using SSIS – Introduction to Data Quality – Data Profiling Concepts and Applications.

INTRODUCTION TO MULTIDIMENSIONAL DATA MODELING

Introduction to Data and Dimensional Modeling – Multi Dimensional Data Model – ER modeling Vs Multi Dimensional Model – Concepts of Dimensions - facts - cubes- attributes- hierarchies- star and snowflake schema – Introduction to Business Metrics and KPIs – Creating Cubes using SSAS.

BASICS OF ENTERPRISE REPORTING

Introduction to Enterprise Reporting - Concepts of dashboards - balanced scorecards – Introduction to SSRS Architecture– Enterprise Reporting using SSRS reporting service

BI ROAD AHEAD

BI and Mobility – BI and cloud computing – BI for ERP systems - Benefits of BI in ERP-NorthWind_Traders Data- Data Analyses through Excel-Kettle Tool – Conversion of data using Kettle Tool.

TEXT BOOKS

1.RN Prasad, Seema Acharya, "Fundamentals Of Business Analytics" Wiley India,2011

REFERENCES

1.Soumendra Mohanty, "Data Warehousing Design, Development and Best Practices", Tata McGraw-Hill, New Delhi, 2007.

2.David Loshin, "Business Intelligence", Morgan Kaufmann Publishsers, San Francisco, Fifth edition, 2007.

3.Larissa Terpeluk Moss and Shaku Atre, "Business Intelligence Roadmap", Pearson Education, 2007

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35021DS09	BIG DATA VISUALIZATION	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course focuses on the challenges in setting up a data center. Resource monitoring using hypervisors and access control to virtual machines will be covered in depth in this course. Setting up of a virtual data center and how to manage them with software interfaces will be discussed in detail

PREREQUISITE

Database Management System

COURSE OBJECTIVES

1	To learn the concepts of Web design patterns and page design
2	To understand and learn the scripting languages with design of web applications
3	To learn the maintenance and evaluation of web design
4	To learn about Resource monitoring and virtual machine data Protection

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Explain the concept of data center and Evolution of Data Centre	Understand
CO2: Apply enterprise-level virtualization machines through software management interfaces, Environments connectivity.	Apply
CO3: Illustrate the virtualization deployment, modification, management; monitoring and migration methodologies	Apply
CO4: Analyze the utility in Windows Vista and later, displays information about the use of hardware and software resources in real time.	Analyze
CO5: Develop the resource monitoring and virtual machine data Protection skills.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	-
CO2	S	L	L	-	M	-	-	-	-	-	-	M	**S**	M	M
CO3	S	M	L	-	M	-	-	-	-	-	-	M	**S**	-	M
CO4	S	M	L	-	L	-	-	-	-	-	-	M	**S**	M	M
CO5	S	L	L	-	M	-	-	-	-	-	-	M	**S**	M	-

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SYLLABUS

INTRODUCTION TO DESIGN DRAWING

Introduction to Materials, Tools & Methods - different grades of pencils & exploring- Developing free finger, wrist, hand & arm movement and initiate muscle- Introduction to Observation – Scrutinize, Examine, Study, Inspect, Perceive, Sense, Feel, Notice, Identify, Understand- Training the eye to observe accurately to educate the visual sense- Introduction to Perception – View, Opinion, Insight, Discernment- Introduction to Perspective – Eye level, Vanishing Point

DRAWING OF CUBES and PERSPECTIVES

Introduction to Vanishing Points, View Point, Eye Level, Horizon, Parallel & Converging Lines-One Point Perspective- Two Point Perspective-Three Point Perspective-Perspective in the Environment, Interior Spaces and Objects

VIRTUAL MACHINES & ACCESS CONTROL

Introduction to other geometric forms like cylinder, cuboids etc.- Introduction to Object Drawing-How to observe – shape, proportions, effect of light on the objects etc.- Introduction to Human Form proportions-Human Form – Object Relationships

RESOURCE MONITORING

Physical and virtual machine memory, CPU management and abstraction techniques using a hypervisor

OBJECT DRAWING and HUMAN FORM DRAWING

Backup and recovery of virtual machines using data recovery techniques; Scalability - Scalability features within Enterprise virtualized environments using advanced management applications that enable clustering, distributed network switches for clustering, network and storage expansion; High Availability : Virtualization high availability and redundancy techniques.

TEXT BOOKS

1.Erik Olofsson, Klara Sjolen, Design Sketching, KEEOS Design Books.

2. K . Morling, Geometric and Engineering Drawing, Third Edition, Graduate of the Institution of Mechanical Mike Laverick, "VMware vSphere 4 Implementation" Tata McGraw-Hill Osborne Media; 1 edition[ISBN: 978-0071664523], 2012.

1. Jason W. McCarty, Scott Lowe, Matthew K. Johnson, "VMware vSphere 4 Administration Instant

REFERENCES

1. Brian Perry, Chris Huss, Jeantet Fields, "VCP VMware Certified Professional on vSphere 4 Study Guide" Sybex; edition [ISBN: 978-0470569610], 2013.

2. Jason Kappel, Anthony Velte, Toby Velte, "Microsoft Virtualization with Hyper-V: Manage Your Datacenter with Hyper-V, Virtual PC, Virtual Server, and Application Virtualization" McGraw-Hill Osborne [ISBN: 978- 007161

COURSE DESIGNERS

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35021DS08	DATABASE SECURITY AND PRIVACY	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course helps the students to know how database methods can be used in various databse techniques, including classification, ranking and preference, as well as learning with multiple data sources and targets. The student knows how convex optimization methods can be used to efficiently train kernel-based models. The student knows how structured data such as sequences, hierarchies and graphs can be tackled through kernel methods.

PREREQUISITE

MACHINE LEARNING

COURSE OBJECTIVES

1.	To understand the fundamentals of security, and how it relates to information systems.
2.	To identify risks and vulnerabilities in operating systems from a database perspective.
3.	To learn good password policies, and techniques to secure passwords in an organization.
4.	To learn and implement administration policies for users.
5.	To understand the various database security models and their advantages or

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the fundamental concepts of security fundamentals	Understand
CO2: Understand the various methods for database security privacy	Apply
CO3: Understand and apply the model and virtual database	Apply
CO4: Apply and analyze various database auditing	Analyse
CO5: Apply and analyze various data mining techniques	Analysee

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO2	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO3	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO4	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO5	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT I - SECURITY ARCHITECTURE & OPERATING SYSTEM SECURITY FUNDAMENTALS Security Architecture: Introduction-Information Systems- Database Management Systems-Information Security Architecture-Database Security–Asset Types and value-Security Methods. Operating System Security Fundamentals: Introduction-Operating System Overview-Security Environment – Components- Authentication Methods-User Administration-Password PoliciesVulnerabilities-E-mail Security.

UNIT II - ADMINISTRATION OF USERS & PROFILES,PASSWORD POLICIES, PRIVILEGES AND ROLES Administration of Users: Introduction-Authentication-Creating Users, SQL Server User-Removing, Modifying Users-Default, Remote Users-Database Links-Linked Servers-Remote Servers-Practices for Administrators and Managers-Best Practices Profiles, Password Policies, Privileges and Roles: Introduction-Defining and Using Profiles-Designing and Implementing Password Policies-Granting and Revoking User Privileges-Creating, Assigning and Revoking User Roles-Best Practices.

UNIT III - DATABASE APPLICATION SECURITY MODELS & VIRTUAL PRIVATE DATABASES Database Application Security Models: Introduction-Types of Users-Security Models- Application Types-Application Security Models-Data Encryption Virtual Private Databases: Introduction-Overview of VPD-Implementation of VPD using Views, Application Context in Oracle-Implementing Oracle VPD-Viewing VPD Policies and Application contexts using Data Dictionary, Policy Manager Implementing Row and Column level Security with SQL Server.

UNIT IV-AUDITING DATABASE ACTIVITIES Auditing Database Activities: Using Oracle Database Activities-Creating DLL Triggers with OracleAuditing Database Activities with Oracle-Auditing Server Activity with SQL Server 2000-Security and Auditing Project Case Study.

UNIT V - PRIVACY PRESERVING DATA MINING TECHNIQUES Privacy Preserving Data Mining Techniques: Introduction- Privacy Preserving Data Mining AlgorithmsGeneral Survey-Randomization Methods-Group Based Anonymization-Distributed Privacy Preserving Data Mining-Curse of Dimensionality-Application of Privacy Preserving Data Mining.

TEXT BOOKS

2. Hassan A. Afyouni, "Database Security and Auditing", Third Edition, Cengage Learning, 2009. (UNIT 1 to IV)
3. .Charu C. Aggarwal, Philip S Yu, "Privacy Preserving Data Mining": Models and Algorithms, Kluwer Academic Publishers, 2008.(UNIT V).

COURSE DESIGNERS

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35021DS10	MACHINE LEARNING -I	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course helps the students to know how kernel methods can be used in various machine learning tasks, including classification, ranking and preference learning, as well as learning with multiple data sources and targets. The student knows how convex optimization methods can be used to efficiently train kernel-based models. The student knows how structured data such as sequences, hierarchies and graphs can be tackled through kernel methods.

PREREQUISITE

MACHINE LEARNING

COURSE OBJECTIVES

1.	To familiarize on the concepts of kernel based machine learning
2.	To study on the methods for dimensionality reduction
3.	To gain knowledge on the unsupervised models for cluster analysis
4.	To implement various models for Kernel- ridge regression and SVMs

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Understand the fundamental concepts in kernel based machine learning	Understand
CO2: Understand the various methods for dimensionality reduction	Apply
CO3: Understand and apply how unsupervised models work for cluster analysis	Apply
CO4: Apply and analyze various Kernel-Ridge regression models	Analyse
CO5: Apply and analyze various Support Vector Machines and its variants	Analysee

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO2	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO3	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO4	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO5	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-

S- Strong; M-Medium; L-Low

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SYLLABUS

FUNDAMENTALS OF KERNEL BASED MACHINE LEARNING:

Feature representation and dimension reduction – The learning subspace property (LSP) and "kernelization" aof learning models – Unsupervised learning for cluster discovery – Supervised learning for linear classifiers – Gnereralized inner products and kernel function – Performabce metrics Kernel-induced vector spaces: Mercer kernels and kernel-induced similiarity metrics – Training data independent intrinsic feature vectors – Training data-dependent empirical feature vectors – The kernel-trick for nonvectorial data analysis

DIMENSION_REDUCTION:FEATURE SELECTION AND PCA/KPCA:

Subspace projection and PCA - Numerical methods for computation of PCA – Kernel principal component analysis (KPCA) – Kernel principal component analysis(KPCA) Feature Selection: The filtering approach to feature selection – The wrapper approach to feature selection – Application studies of the feature selection approach

UNSUPERVISED LEARNING MODELS FOR CLUSTER ANALYSIS:

Unsupervised learning for cluster discovery: The similarity metric and clustering strategy – K-means clustering Models – Expectation-maximization(EM) learning models – Self-organizing maps(SOM) learning models – Bi-clustering data analysis Kernel methods for cluster analysis: Kernel based K-means learning models – Kernel K-means for nonvectorical data analysis – K-means learning models in kernel-induced spectral space – Kernelized K-means learning models – Kerrnel- induced SOM learning models – Neighbor-joining hierarchical cluster analysis

KERNEL RIDGE REGRESSORS AND VARIANTS:

Kernel-based regression and regularization analysis: Linear least-squares-error analysis - Kernel-based regression analysis – Regularization via radial basis function (RBF) networks Linear Regression and discriminant analysis for supervised classification: Characterization of supervised learning models – Supervised learning models over-determined formulation – A regularization method for robust learning: training versus prediction performances – Kernelized learning models in empirircal space: linear kernels Kernel ridge regression for supervised classification: Kernel-based discriminant analysis(KDA) – Kernel ridge regression (KRR) for supervised classification - Perturbational discriminant analysis(PDA): Decision component and the regression ratio in special space – Application studies: KDA versus KRR – Trimming detrimental (anti-support) vectors in KRR learning models – Multi-class and multi-label supervised classification – Supervised subspace projection methods

SUPPORT VECTOR MACHINES AND VARIANTS:

Support vector machines: Linear support vector machines – SVM with fuzzy separation : roles of stack variables – Kerrnel-based support vector machines – Application case studies – Empirical space SVM for trimming of training vectors Support vector learning models for outlier detection – Support vector regression(SVR) – Hyperplane based one-class SVM learning models – Hypersphere-based one class SVM – Support vector clustering Ridge-SVM learning models – Roles of C and o on WECs of KRR and SVM – Ridge-SVM learning models - Impacts of design parameters on the WEC of ridge SVM – Prediction accuracy versus training time – Application case studies

TEXT BOOKS

4. Kernel Methods and Machine Learning, S.Y.Kung, Cambridge University Press, 2014.

COURSE DESIGNERS

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35021DS05	TEXT MINING	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course helps the students to know how kernel methods can be used in various machine learning tasks, including classification, ranking and preference learning, as well as learning with multiple data sources and targets. The student knows how convex optimization methods can be used to efficiently train kernel-based models. The student knows how structured data such as sequences, hierarchies and graphs can be tackled through kernel methods.

PREREQUISITE

MACHINE LEARNING

COURSE OBJECTIVES

1.	To understand the basic issues and types of text mining.
2.	•To appreciate the different aspects of text categorization and clustering.
3.	To understand the role played by text mining in Information retrieval and extraction.
4.	To appreciate the use of probabilistic models for text mining.
	To appreciate the current trends in text mining.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Identify the different features that can be mined from text and web documents	Understand
CO2: Use available open source classification and clustering tools on some standard text data sets.	Apply
CO3: Modify existing classification/clustering algorithms in terms of functionality or features used.	Apply
CO4: Design a system that uses text mining to improve the functions of an existing open source search engine.	Analyse
CO5: Implement a text mining system that can be used for an application of your choice	Analysee

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO2	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO3	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO4	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO5	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT I INTRODUCTION

Overview of text mining- definition- general architecture – algorithms – core operations – Preprocessing – types of problems- basics of document classification - information retrieval- clustering and organizing documents - information extraction - prediction and evaluation-textual information to numerical vectors - collecting documents- document standardization – tokenizationlemmatization-vector generation for prediction - sentence boundary determination -evaluation performance

UNIT II TEXT CATEGORIZATION AND CLUSTERING

Text Categorization – definition – document representation – feature selection - decision tree classifiers - rule-based classifiers - probabilistic and naive bayes classifiers - linear classifiers classification of linked and web data - meta-algorithms– clustering –definition- vector space models – distance - based algorithms - word and phrase-based clustering - semi-supervised clustering - transfer learning

UNIT III TEXT MINING FOR INFORMATION RETRIEVAL AND INFORMATION EXTRACTION

Information retrieval and text mining- keyword search- nearest-neighbor methods- similarity- webbased document search – matching- inverted lists- evaluation. information extraction - architecture - co-reference - named entity and relation extraction- template filling and database construction – applications. inductive - unsupervised algorithms for information extraction. text summarization techniques - topic representation - influence of context - indicator representations - pattern extraction - Apriori algorithm – FP tree algorithm

UNIT IV PROBABILISTIC MODELS Probabilistic models for text mining -mixture models - stochastic processes in bayesian - nonparametric models - graphical models - relationship between clustering, dimension reduction and topic modeling - latent semantic indexing - probabilistic latent semantic indexing -latent dirichlet allocation- interpretation and evaluation - probabilistic document clustering and topic models - probabilistic models for information extraction - hidden markov models - stochastic context-free grammars - maximal entropy modeling - maximal entropy markov models -conditional random fields

UNIT V RECENT TRENDS Visualization approaches - architectural considerations - visualization techniques in link analysis - example- mining text streams - text mining in multimedia - text analytics in social media - opinion mining and sentiment analysis - document sentiment classification - opinion lexicon expansion - aspect-based sentiment analysis - opinion spam detection – text mining applications and case studies.

TEXT BOOKS

1. Sholom Weiss, NitinIndurkhya, Tong Zhang, Fred Damerau "The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data", Springer, paperback 2010.
2. Ronen Feldman, James Sanger," The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data",Cambridge University press, 2006.
3. Charu C. Aggarwal ,Cheng Xiang Zhai, "Mining Text Data", Springer; 2012.

COURSE DESIGNERS

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35021DS07	WEB INTELLIGENCE	Category	L	T	P	Credit
		SE	3	0	0	3

PREAMBLE

This course helps the students to know how kernel methods can be used in various machine learning tasks, including classification, ranking and preference learning, as well as learning with multiple data sources and targets. The student knows how convex optimization methods can be used to efficiently train kernel-based models. The student knows how structured data such as sequences, hierarchies and graphs can be tackled through kernel methods.

PREREQUISITE

MACHINE LEARNING

COURSE OBJECTIVES

1.	To familiarize basics of Internet.
2.	To manage the Web designing and uploading
3.	To understand various scripting languages like Java scripting and VB scripting.
4.	To appreciate the use of Queries
	To appreciate the current trends in Web Technology.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Identify the different features that can be mined from text and web documents	Understand
CO2: Use available open source classification and clustering tools on some standard text data sets.	Apply
CO3: Modify existing classification/clustering algorithms in terms of functionality or features used.	Apply
CO4: Design a system that uses text mining to improve the functions of an existing open source search engine.	Analyse
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MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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CO2	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO3	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO4	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-
CO5	S	M	-	-	M	-	M	M	-	-	-	S	-	M	-

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT I - INTERNET CONCEPTS

Fundamental of Web ,History of Web, Web development overview, Domain Name System (DNS), DHCP,and SMTP and other servers ,Internet service provider (ISP), Concept of IP Address, Internet Protocol, TCP/IP Architecture and protocol (IP) ,Web Browser and Web Server.

UNIT II - HTML and DHTML

HTML Tag, Rules of HTML, Text Formatting & Style, List, Adding Graphics to Html Document, Tables and Layout , Linking Documents, Frame, Forms, Project in HTML, Introduction to DHTML, CSS, Class & DIV, External Style Sheet.

UNIT III - JAVA SCRIPT AND VB SCRIPT

Java Script (JS) in Web Page, Advantage of Java Script, JS object model and hierarchy ,Handling event, Operators and syntax of JS, Function, Client side JS Vs Server side JS ,JS security Introduction to VB Script, Operator & Syntax of VB Script, Dialog Boxes, Control & Loop, Function in VBS.

UNIT IV – XML

Introduction to XML, XML in Action, Commercial Benefits of XML, Gaining Competitive advantage with XML, Programming in XML, XML Schema ,XSLT ,DOM structure model ,XML quires and transformation .

UNIT V - JQUERY

Introduction to jQuery : What Does jQuery Do for Me?, Obtaining jQuery, Installing jQuery - Selecting and Filtering : Using the Selectors API, Filtering a Selection, Searching within a Selection with find method, Finding an Element‘s Siblings with siblings method, Searching Ancestors Using the parents and parent Methods - Events - Filtering Selections and Arrays : Basic Iteration, Filtering Selections and Arrays - jQuery CSS : CSS Method, The outerWidth and outerHeight Methods - jQuery Effects : Showing and Hiding Elements, Sliding Elements, Fading Elements, Custom Animation.

TEXT BOOKS:

1. Margaret Levine Young, “Internet-The Complete Reference”, McGraw Hill, 2nd Edition (For Unit I to III)
2. Jon Ducket, (2005), “Web Programming with HTML, CSS and JavaScript”, Wiley Publishing. (For Unit IV to V)

COURSE DESIGNERS

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