AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR, CHENNAI

&

VINAYAKA MISSION'S KIRUPANANDA VARIYAR ENGINEERING COLLEGE, SALEM

(Constituent Colleges of Vinayaka Mission's Research Foundation,

VINAYAKA MISSION'S RESEARCH FOUNDATION
(Deemed to be University under section 3 of the UGC Act 1956)

(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 (CYBER SECURITY)

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.

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 designsystem 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 (Cyber Security) programme will beable to:

PSO1	Demonstrate understanding of the principles and working of the hardware and Security aspect of computer systems and network.
PSO2	Understand, analyze and develop computer programs in the areas related to algorithms, Security, big data analytics and networking for efficient design of computer-based systems ofvarying complexity.
PSO3	Apply Cyber security and strategies in 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 investigativeand analytical skills along with the knowledge acquired in the field of cyber security.
PEO3	Graduate will prove an 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,Cyber Security, Network security and Scale new height in their profession through life long 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
2.		Basic Science courses		18 - 25
3.		Engineering Science courses includingworkshop, drawing, basics of electrical/mechanical/computer etc.		18 - 24
4.	**B.** Professional	Core courses		48-54
5.	**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
6.	**D.** Courses for Presentation of technical Skillsrelated to the specialization	Project work		8
		Mini Project		3
		Seminar		1
		Internship in industry or elsewhere		3
7.	****E. Mandatory Courses**	Indian Constitution, Essence of Indian Traditional Knowledge, Yoga / NCC / NSS / RRC / YRC / Sports and Games, Student Clubs, Unnat Bharat Abhiyan, Swachh Bharatetc.		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
2.		Basic Science courses		3 – 6
3.		Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.		5 – 9
4.	**B.** Professional	Core courses		48-54
5.	**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 ofThings etc.	6-9
6.	**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
7.	****E. Mandatory Courses**	Indian Constitution, Essence of Indian Traditional Knowledge,, Yoga/NCC/NSS/RRC/YRC/ Sports and Games, Student Clubs, Unnat Bharat Abhiyan, SwachhBharat etc.		Zero credit (Minimum 2 courses to be completed other than yoga and Practice)
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

COMPUTER SCIENCE AND ENGINEERING - CYBER SECURITY

Regulation - 2021

CURRICULUM

A. Foundation Courses									
Humanities and Social Sciences including Management courses–Credits (9-12)									
Sl No	**Course Code**	**Course**	**OfferingDept**	**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 DEVELOPMENT LAB	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)									
1	34121B01	ENGINEERING MATHEMATICS	MATH	FC-BS	2	1	0	3	NIL
2	34121B10	MATHEMATICS FOR COMPUTER ENGINEERS	MATH	FC-BS	2	1	0	3	NIL
3	34121B14	NUMERICAL METHODS AND NUMBER THEORY	MATH	FC-BS	2	1	0	3	NIL
4	34121B17	PROBABILITY AND QUEUEING THEORY	MATH	FC-BS	2	1	0	3	NIL
5	34121B28	MATHEMATICS FOR MACHINE LEARNING	MATH	FC-BS	2	1	0	3	NIL
6	34121B27	MATHEMATICS FOR DATA SCIENCE	MATH	FC-BS	2	1	0	3	NIL
7	34121B36	STATISTICAL FOUNDATION	MATH	FC-BS	2	1	0	3	NIL
8	34121B21	DISCRETE MATHEMATICS	MATH	FC-BS	2	1	0	3	NIL
9	34121B04	PHYSICAL SCIENCES	PHY & CHEM	FC-BS	4	0	0	4	NIL
10	34121B05	SMART MATERIALS AND NANOTECHNOLOGY	PHY	FC-BS	3	0	0	3	NIL
11	34121B81	PHYSICAL SCIENCES LAB	PHY &CHEM	FC-BS	0	0	4	2	NIL
12	34121B19	ENVIRONMENTAL SCIENCES	CHEM	FC-BS	3	0	0	3	NIL

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Engineering Science courses including Workshop, Drawing, Basics of Electrical / Mechanical / Computer etc., Credits – (18-24)									
1	35021E01	FOUNDATIONS OF COMPUTING AND PROGRAMMING (THEORY AND PRACTICALS)	CSE	FC-ES	2	0	2	3	NIL
2	34621E01	BASICS OF ELECTRICAL AND ELECTRONICSENGINEERING	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)									
1	35021C04	DATA STRUCTURES	CSE	CC	3	0	0	3	NIL
2	35021C11	OPERATING SYSTEMS	CSE	CC	3	0	0	3	NIL
3	35021C05	DESIGN AND ANALYSIS OF ALGORITHMS	CSE	CC	3	0	0	3	NIL
4	35021C04	DATABASE MANAGEMENT SYSTEMS	CSE	CC	3	0	0	3	NIL
5	35021C09	COMPUTER NETWORKS (THEORY AND PRACTICALS)	CSE	CC	3	0	2	4	NIL
6	35921C06	INTERNET OF THINGS AND ITS APPLICATIONS	AIDS	CC	3	0	0	3	NIL
7	35921C01	OBJECT ORIENTED PROGRAMMING (THEORY AND PRACTICALS)	AIDS	CC	3	0	2	4	NIL
8	36021C05	INTRODUCTION TO CYBER SECURITY	CYBER	CC	3	0	0	3	NIL
9	35021C83	DATABASE MANAGEMENT SYSTEMS LAB	CSE	CC	0	0	4	2	NIL
10	35021C82	DATA STRUCTURES LAB	CSE	CC	0	0	4	2	NIL
11	35921C02	BIG DATA AND ANALYTICS	AIDS	CC	3	0	0	3	DBMS
12	36021C03	ETHICAL HACKING AND ITS TECHNIQUES	CYBER	CC	3	0	0	3	COMPUTER NETWORKS
13	36021C01	DATA MINING	CYBER	CC	3	0	0	3	NIL
14	35921C05	FOUNDATIONS OF DATA SCIENCE	AIDS	CC	3	0	0	3	NIL
15	35021C12	PROBLEM SOLVING USING PYTHON PROGRAMMING (THEORY AND PRACTICALS)	CSE	CC	3	0	2	4	NIL
16	36021C04	INFORMATION SECURITY	CYBER	CC	3	0	0	3	NIL
17	36021C06	NETWORK SECURITY AND MANAGEMENT	CYBER	CC	3	0	0	3	NIL
18	36021C82	NETWORK SECURITY LAB	CYBER	CC	0	0	4	2	NIL
19	36021C81	ETHICAL HACKING AND ITS TECHNIQUES LAB	CYBER	CC	0	0	4	2	NIL
20	35921C81	BIG DATA AND ANALYTICS LAB	AIDS	CC	0	0	4	2	NIL
21	35921C03	DATA ANALYTICS USING PYTHON	AIDS	CC	3	0	0	3	NIL
22	36021C02	DIGITAL FORENSICS	CYBER	CC	3	0	0	3	CYBER SECURITY
23	35021C01	COMPUTER ARCHITECTURE AND ORGANIZATION	CSE	CC	3	0	0	3	NIL

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C. Professional Elective courses (12)										
Professional Elective courses relevant to chosen specialization/branch Credits-(12)										
1	36021P04	CYBER CRIMES AND CYBER LAWS	CYBER	EC-PS	3	0	0	3	CYBER SECURITY
2	36021P08	INTRUSION DETECTION AND PREVENTIONSYSTEM	CYBER	EC-PS	3	0	0	3	NETWORK SECURITY AND MANAGEMENT
3	36021P12	PENETRATION TESTING	CYBER	EC-PS	3	0	0	3	ETHICAL HACKING
4	36021P09	MOBILE COMMUNICATION SECURITY	CYBER	EC-PS	3	0	0	3	CYBER SECURITY
5	36021P01	BIG DATA SECURITY	CYBER	EC-PS	3	0	0	3	NIL
6	36021P03	CLOUD COMPUTING SECURITY	CYBER	EC-PS	3	0	0	3	NIL
7	36021P07	DATA VISUALIZATION TECHNIQUES	CYBER	EC-PS	3	0	0	3	NIL
8	35921P03	DATA CENTRE VIRTUALIZATION	AIDS	EC-PS	3	0	0	3	DATABASE MANAGEMENT SYSTEMS
9	35021P15	DISTRIBUTED COMPUTING	CSE	EC-PS	3	0	0	3	COMPUTER NETWORKS
10	35021P02	AGILE METHODOLOGIES	CSE	EC-PS	3	0	0	3	NIL
11	36021P02	BIO METRICS	CYBER	EC-PS	3	0	0	3	NIL
12	36021P10	OPEN SOURCE SYSTEMS	CYBER	EC-PS	3	0	0	3	NIL
13	35921P10	KNOWLEDGE BASED DECISION SUPPORTSYSTEM	AIDS	EC-PS	3	0	0	3	NIL
14	35021P20	INFORMATION RETRIEVAL TECHNIQUES	CSE	EC-PS	3	0	0	3	DATA MINING AND DATA WAREHOUSING
15	35021P22	IT INFRASTRUCTURE MANAGEMENT	CSE	EC-PS	3	0	0	3	NIL
16	35921P14	VIRTUALIZATION TECHNIQUES	AIDS	EC-PS	3	0	0	3	NIL
17	36021P14	USER INTERFACE DESIGN	CYBER	EC-PS	3	0	0	3	NIL
18	36021P11	OPTIMIZATION TECHNIQUES	CYBER	EC-PS	3	0	0	3	NIL
19	35021P23	MACHINE LEARNING	CSE	EC-PS	3	0	0	3	NIL
20	36021P06	DATA ANALYTICS	CYBER	EC-PS	3	0	0	3	NIL
21	36021P13	PROBLEM IDENTIFICATION AND DESIGN THINKING	CYBER	EC-PS	3	0	0	3	NIL
22	35021P11	DATA SCIENCE IN PYTHON	CSE	EC-PS	3	0	0	3	NIL
23	35021P14	DIGITAL MARKETING	CSE	EC-PS	3	0	0	3	NIL
Industry Designed/Industry Supported/Industry Offered/Industry Sponsored courses – Credits - (6)										
1	34121I07	BUSINESS INTELLIGENCE AND ITS APPLICATIONS	INFOSYS	EC-IE	3	0	0	3	NIL
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 INFORMATION TECHNOLOGY	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

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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)									
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	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 subjects –Electives from other Emerging Areas Credits-(6-9)									
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 AND AUTOMATION	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 INTERNETOF 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)									
1	36021R01	PROJECT WORK	CYBER	PI-P		0	0	16	8	NIL
2	36021M81	MINI PROJECT	CYBER	PI-M		0	0	6	3	NIL
3	36021S81	SEMINAR	CYBER	PI-S		0	0	2	1	NIL

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4	36021T81	INTERNSHIP	CYBER	PI-IT	3 WEEKS			3	NIL
E. Mandatory courses (0 Credits) (Not included for CGPA calculations)									
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

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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

S. No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	Dr. Jennifer G Joseph	Prof. and Head, H&S	**AVIT**	Jennifer@avit.ac.in
2.	Dr.P.Saradha	Associate Professor	**VMKVEC**	saradhap@vmkvec.edu.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:

S. No	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. Jennifer G Joseph	Professor & Head	English	jennifer@avit.ac.in
2.	Dr. P. Saradha	Associate Professor	English	saradhap@vmkvec.edu.in

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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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1.	Dr. Jennifer G Joseph,	Prof. and Head, H&S	English	jennifer@avit.ac.in
2.	Dr.P.Saradha	Associate Professor	English	saradhap@vmkvec.edu.in

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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.

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

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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:

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.

COURSE DESIGNERS:

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1.	A. Mani	Associate Professor	Management Studies	mani@vmkvec.edu.in
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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.

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COURSE DESIGNERS

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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
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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 multi variable, 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

NIL

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

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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
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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
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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
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34121B17	BABILITY 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
1.	Dr. P. Sasikala	Professor	Mathematics	sasikala@vmkvec.edu.in
2.	Mr. D. Balaji	Asst. Professor	Mathematics	balaji@avit.ac.in

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34121B28	MATHEMATICS FOR MACHINE LEARNING	Category	L	T	P	Credit
		FC-BS	2	1	0	3

PREAMBLE

In this course we will study the mathematical foundations of Machine Learning, with an emphasis on the interplay between approximation theory, statistics, and numerical optimization. We will begin with a study of Statistical Learning Theory, including the concepts of Empirical Risk Minimization, Regularization and VC dimension. We will then study popular machine learning models, including deep neural networks, and analyse the underlying Optimization methods.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To study about the problem of supervised learning from the point of view of function approximation, optimization, and statistics
2	To identify the most suitable optimization and modelling approach for a given machine learning problem
3	To analyse the performance of various optimization algorthms from the point of view of computational complexity (both space and time) and statistical accuracy
4	To implement a simple neural network architecture and apply it to a pattern recognition task

COURSE OUTCOMES

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

CO1. Understand the problem of supervised learning from the point of view of function approximation, optimization, and statistic	Understand
CO2. Understand the most suitable optimization and modelling approach for a given machine learning problem	Understand
CO3. Analyse the performance of various optimization algorthms from the point of view of computational complexity (both space and time) and statistical accuracy	Analyse
CO4. analyse a simple neural network architecture on a pattern recognition task	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	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO2	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO3	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO4	S	S	M	M	M	--	--	--	--	--	--	M	S	S	M
CO5	S	S	M	M	M	--	--	--	--	--	--	M	S	S	M

S- Strong; M-Medium; L-Low

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SYLLABUS

LINEAR LGEBRA

Definition, applications, solving linear systems, linear inequalities, linear programming. Real-valued functions of twoor more variables.Definition, examples, simple demos, applications

PROBABILITY

Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull distributions, Functions of random variable, Chebychev inequality.

STATISTICAL LEARNING THEORY:

Binary Classification - Finite Hypothesis Sets - PAC Learning - Learning Shapes - Rademacher Complexity - The VC Dimension - The VC Inequality - Genral Loss Functions - Covering Numbers - Model Selection

CALCULUS

Curvature – Cartesian and Parametric Co-ordinates – Centre and radius of curvature – Circle of curvature – Evolute.

OPTIMIZATION

Overview of Optimization – Convexity – Lagrangian Duality – KKT Conditions – Support vector Machines I – Support Vector Machines II – Iterative algorithm and Gradient Descent – Convergence of Iterative Methods – Convergence of GradientDescent – Extensions of Gradient Descent – Stochastic Gradient Descent

TEXT BOOKS:

1. M.Mohri, A. Rostamizadeh and T. Talwalkar, “Foundation of Machine Learning”, Adaptive Computation andMachine Learning series, MIT Press, 2012
2. S. Shalev Shwartz and S. ben David, Understanding Machine Learning : from theory to algorithms, CambridgeUniversity Press, 2014

REFERENCES:

1. **T. Hastie, J. Fraidman, R. Tibshirani, Elements of Statistical Learning, Volume 2, Springer, 2009.**

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr.L.Tamilselvi	Professor	AVIT	ltamilselvi@avit.ac.in
2	Ms.M.Usha	Assistant Professor	VMKVEC	usha@vmkvec.edu.in

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34121B27	MATHEMATICS FOR DATA SCIENCE	Category	L	T	P	Credit
		FC-BS	2	1	0	3

PREAMBLE

The course is a brief overview of the basic tools from Linear Algebra and Multivariable Calculus that will be needed in subsequent courses of the program.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	To study the fundamental properties of matrices, their norms, and their applications
2	To study the concepts of Differentiating/integrating multiple variable functions, and the role of the gradient and the hessian matrix.
3	To learn about Basic properties of optimization problems involving matrices and functions of multiple variables

COURSE OUTCOMES

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

CO1. To understand the fundamental properties of matrices, their norms, and their applications	Understand
CO2. To understand the concepts of Differentiating/integrating multiple variable functions, and the role of the gradient and the hessian matrix.	Understand
CO3. To learn about Basic properties of optimization problems involving matrices and functions of multiple variables	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	M	M	M	--	--	--	--	--	--	M	M	M	M
CO2	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M
CO3	S	S	M	M	M	--	--	--	--	--	--	M	M	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

MATRICES AND BASIC OPERATIONS, SQUARE MATRICES

Matrices and Basic Operations, interpretation of matrices as linear mappings, and some example. Square Matrices, Determinants, Properties of determinants, singular and non-singular matrices, examples, finding an inverse matrix

EIGEN FORMS AND NORMED SPACES

Characteristic Polynomial, Definition of Left/right Eigenvalues and Eigenvectors, Caley- Hamilton theorem, Singular Value Decomposition, interpretation of eigenvalues/vectors. Normed Spaces, Vector Spaces, Matrix Norms Definition of complete normed and vector spaces and some examples. Matrix norms and properties,applications to series of matrices and their convergence

NULL MATRIX AND DEFINITE MATRICES

The Range and the Null space of a Matrix. Definition and basic properties, orthogonality, Gram- Schmidt algorithm Positive-Definite Matrices and the Taylor Expansion of a two-variable function. Definition of positive-definiteness and the role of the eigenvalues. Physical meaning and importance in real-life problems

LINEAR SYSTEMS AND REAL VALUED FUNCTIONS:

Definition, applications, solving linear systems, linear inequalities, linear programming. Real-valued functions of two or more variables.Definition, examples, simple demos, applications

ANALYSIS ELEMENTS AND OPTIMIZATION PROBLEMS, INTEGRATION, CONVEXOPTIMIZATION

Distance, Limits, continuity, differentiable, the gradient and the Hessian. Optimization problems:Simple examples, motivation, the role of the Hessian, maxima and minima and related extrema conditions. Integration: Double integrals, Fubini's theorem, properties, applications. Elements of Convex Optimization: Functions of n variables. Convex sets, convex functions, convex problems, and their basic properties.Examples of convex problems, convexity versus non-convexity

REFERENCES:

1. Gilbert Strang, Linear Algebra and Its Applications, Thomson/Brooks Cole (Available inaGreek Translation)

Thomas M. Apostol, Calculus, Wiley, 2nd Edition, 1991, ISBN 960-07-0067-2.

2. Michael Spivak, Calculus, Publish or Perish, 2008, ISBN 978-0914098911.
3. Ross L. Finney, Maurice D. Weir, and Frank R. Giordano, Thomas's Calculus, Pearson,, 12th Edition, 2009.
4. David C. Lay, Linear Algebra and Its Applications, 4th Edition.
5. 'Yousef Saad, 'Iterative Methods for Sparse Linear Systems'

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1	Dr.L.Tamilselvi	Professor	AVIT	ltamilselvi@avit.ac.in
2	Ms.M.Usha	Assistant Professor	VMKVEC	usha@vmkvec.edu.in

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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 – piezo electricity – magne to striction materials – magne to striction effect– shape memory alloys (SMA) – photo elastic materials – photo elasticity.
Smart material based sensors: Introduction to sensing technology - electric and magne to srictive 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 - magne tostrictive 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 Nano scale: 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 Nano materials: 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.

COURSE DESIGNERS

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1	Dr. B. DHANALAKSHMI	Asso. Professor	Physics	dhanalakshmi.phy@avit.ac.in
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3	Dr. R. N. VISWANATH	Professor	Physics	rnviswanath@avit.ac.in

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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	PSO 2	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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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.

COURSE DESIGNERS

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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.

COURSE DESIGNERS

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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

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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 the electrical 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
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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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.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.T.Sheela	Associate Professor	ECE	sheela@vmkvec.edu.in
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3	Mr.R.Karthikeyan	Assistant Professor (Gr-II)	ECE	rrmdkarthikeyan@avit.ac.in
4	Ms.R.Mohana Priya	Assistant Professor (Gr-II)	ECE	mohanapriya@avit.ac.in

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34421E84	ENGINEERING SKILLS PRACTICALS LAB	Category	L	T	P	Credit
		FC-ES	0	0	4	2

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	PO 1	PO2	PO3	PO 4	PO 5	PO6	PO 7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO 1	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 – Fitting
Vee – 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 Carpentry
Lap 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
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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-Data types-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

S.No.	Name of the Faculty	Designation	Department	Mail ID
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

S. No.	Name of the Faculty	Designation	Dept/College	MailID
1	S.Supriya	Assist.Professor	Civil/VMKVEC	jansupriyanair@gmail.com
2	Mrs.Pa.Suriya	Asst.Professor	Civil/AVIT	suriya@avit.ac.in

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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

Sl.No	**Faculty Name**	**Designation**	**Department/Name of the College**	**Emailid**
1	R.MAHESH	AP(G-II)	MECH/AVIT	mahesh@avit.ac.in

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34421E81	ENGINEERING GRAPHICS AND DESIGN	Category	L	T	P	Credit
		FC-ES	0	0	6	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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	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 lines, 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

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Deviation, Allowance. Preparation of manual parts drawing and assembled sectional views from orthographic part drawings,	
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	Dept / 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 andDesign	Prof. Naresh VarmaDatla, Prof. S. R. Kale	IIT Delhi	12 weeks
2.	Engineering Drawing	Robi, P.S.	IIT Guwahati	12 weeks
3.	Engineering Drawing andComputer 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,-arraysof structures-structures and functions- unions- typedef- enumerations.-File handling :command line arguments- File modes- basic file operations read,-write and append

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TEXTBOOKS

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

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.

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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

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35021C11	OPERATING SYSTEMS	Category	L	T	P	Credit
		CC	3	0	0	3

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

S- Strong; M-Medium; L-Low

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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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35021C09	COMPUTER NETWORKS (THEORY AND PRACTICALS)	Categoryy	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

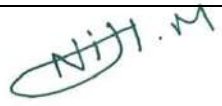
On successful completion of the course, students will be able to

CO1.Learn the fundamentals of networks and different types of OSI Layers.	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



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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, EighthEdition, 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.

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35921C06	INTERNET OF THINGS AND ITS APPLICATIONS	Category	L	T	P	Credit
		CC	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: Understand basics in IOT	Understand
CO2 Understand Methodology in IOT	Apply
CO3: Design IOT applications using Raspberry	Analyze
CO4: Design IOT applications using Aurdino and Intel Edison	Analyze
CO5: 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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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
Bascis of Raspberry PI, Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Webservices
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 forLinux Programmers", Apress,2014.
REFERENCES
1. Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Professor	CSE	rjaichandran@avit.ac.in
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35921C01	OBJECT ORIENTED PROGRAMMING (THEORY AND PRACTICALS)	Category	L	T	P	Credit
		CC	3	0	2	4

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.

PREREQUISITE – 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. Explain 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	PO10	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 catchstatements - 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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36021C05	INTRODUCTION TO CYBER SECURITY	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course provides basic knowledge on cyber security concepts. Students able to understand different types of attacks and preventive measures.

PREREQUISITE : NIL

COURSE OBJECTIVES

1.	To understand the fundamentals of cyber security
2.	To understand and prevent different types of attacks
3.	To understand and prevent exploitations in cyber space
4.	To detect and prevent Malicious codes
5.	Defend against cyber attacks

COURSE OUTCOMES

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

CO1: Able to understand basics concepts in cyber security	Understand
CO2: Able to understand and apply techniques in preventing real time attacks	Understand and Apply
CO3: Able to prevent exploitations in web applications	Apply
CO4: Able to analyze, identify and prevent malicious activity.	Analyze and Apply
CO5*: *Able to defend against cyber attacks	Apply

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	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
CO5	S	M	M	M	S	-	-	-	-	-	-	-	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS:

UNIT I- INTRODUCTION	**10 Hours**
Network and security concepts – basic cryptography – Symmetric encryption – Public key Encryption – DNS – Firewalls – Virtualization – Radio Frequency Identification – Microsoft Windows security Principles.	
UNIT II - ATTACKER TECHNIQUES	**8 Hours**
Antiforensics – Tunneling techniques – Fraud Techniques - Threat Infrastructure.	
UNIT III - EXPLOITATION	**8 Hours**
Techniques to gain a foot hold – Misdirection, Reconnaissance, and disruption methods.	
UNIT IV - MALICIOUS CODE	**9 Hours**
Self Replication Malicious code – Evading Detection and Elevating privileges – Stealing Information and Exploitation.	
UNIT V - DEFENSE AND ANALYSIS TECHNIQUES	**10 Hours**
Memory Forensics – Honeypots – Malicious code naming – Automated malicious code analysis systems – Intrusion detection systems – Defense special file investigation tools.	
TEXT BOOKS	
1. James Graham, Richard Howard and Ryan Olson, "Cyber Security Essentials", CRC Press, Taylor & Francis Group, 2011. 2. By Dan Shoemaker, Ph.D., William Arthur Conklin, Wm Arthur Conklin, "Cyber security: The Essential Body of Knowledge", Cengage Learning, 2012.	
REFERENCES	
1. Ali Jahangiri, "Live Hacking: The Ultimate Guide to hacking Techniques & Counter measures for Ethical Hackers & IT Security Experts", 2009.	

COURSE DESIGNERS

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35021C83	DATABASE MANAGEMENT SYSTEM 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.

PRERQUISITE 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	PO11	PO12	PSO1	PSO2	PSO 3
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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LIST OF EXPERIMENTS

1. Write a program to illustrate the creation of a database and writing SQL queries to retrieve information from the database
2. Write a program to perform Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions
3. Write a program to illustrate Simple SQL Queries
4. Write a program to analyze and model a database application
5. Write a program to illustrate the creation and Modification of Tables without normalization
6. Write a program to illustrate the creation and Modification of Tables with normalization
7. Write a program to illustrate Integrity Constraints enforcement
8. Write a program to illustrate Complex SQL Queries
9. Write a program to illustrate the creation and usage of other database objects
10. Write a program to illustrate the creation of Procedures, Functions and Package with Cursor
11. Write a program to illustrate the creation of Triggers.
12. Write a program to illustrate the creation of composite data types in PL/SQL

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.

COURSE DESIGNERS

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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

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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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35921C02	BIG DATA AND ANALYTICS	Category	L	T	P	Credit
		CC	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

DATABASE MANAGEMENT SYSTEM

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

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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 ofCassandra - 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

1. Big Data and Analytics - Seema Acharya and Subhashini C - Wiley India
2. Big data for dummies - Judith Hurwitz, Alan Nugent,Fern Halper, Marcia Kaufman
3. Hadoop: The Definitive Guide by Tom White
4. Hadoop in action - Chuck Lam
5. Hadoop for dummies - Dirk Deroos, Paul C. Zikopoulos, Roman B. Melnyk,Bruce Brown

REFERENCES

1. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series, 2012.
2. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier, 2007
3. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
4. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.
6. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analy
7. tics", Wiley and SAS Business Series, 2012

COURSE DESIGNERS

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36021C03	ETHICAL HACKING AND TECHNIQUES	Categor y	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To course provides basic knowledge about ethical hacking. Students will learn about various tools and techniques used in ethical hacking.

PREREQUISITE: Network Security and Management

COURSE OBJECTIVES

1	To understand types of ethical hacking
2	To study various hacking techniques
3	To understand web security
4	To understand wireless network 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: To understand different types of Hacking	Understand
CO2: To understand and apply various hacking techniques.	Understand and apply
CO3: To identify and prevent website hacking	Understand and apply
CO4: To identify and prevent wireless network hacking.	Understand and apply
CO5: To apply information security tools 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	S	M	-	-	-	-	S	-	-	-	M	M	M	S	M
CO2	S	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	8 Hours
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.	
UNIT II - HACKING TECHNIQUES	**10 Hours**
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, Foot printing, Scanning, and Enumeration. Implementing System Level Hacking- Hacking Windows & Linux.	
UNIT III - WEB SECURITY	**11 Hours**
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.	
UNIT IV - WIRELESS NETWORK HACKING	**9 Hours**
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.	
UNIT V- APPLICATIONS	**7 Hours**
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. Kali Linux cook book by Corey P.Schultz, Bob Perciaccante,Second Edition,Packt Publishing, 2017. 2. Stuart McClure, Joel Scambray, George Kurtz, "Hacking Exposed 6: Network Security Secrets & Solutions", Seventh edition, McGraw-Hill Publisher, 2012. 3. Kevin Beaver, "Hacking for Dummies" Second Edition, Wiley Publishing, 2007. 4. Dafydd Stuttard and Marcus Pinto, "The Web Application Hacker's Handbook: Discovering and Exploiting Security Flaws" Wiley Publications, 2007. 5. 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.	

COURSE DESIGNERS

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36021C01	DATA MINING	Category	L	T	P	Credit
		CC	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: NIL

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:. To understand the basics of data warehousing and mining	Understand
CO2: To learn the data preprocessing, language, architectures, concept description.	Apply
CO3: To learn the association rules and its algorithms.	Apply
CO4: To learn the classification and clustering rules and the respective algorithms	Apply
CO5: To know 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.

COURSE DESIGNERS

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1	Mr. S. Muthuselvan	Assistant Professor	CSE	muthuselvan@avit.ac.in
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35921C05	FOUNDATIONS OF DATA SCIENCE	Category	L	T	P	Credit
		CC	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 – Datafication - 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

Cathy O'Neil and Rachel Schutt, " Doing Data Science, Straight Talk From The Frontline", O'Reilly, 2014.

Jiawei Han, Micheline Kamber and Jian Pei, " Data Mining: Concepts and Techniques", Third Edition. ISBN 0123814790, 2011.

Mohammed J. Zaki and Wagner Miera Jr, "Data Mining and Analysis: Fundamental Concepts and Algorithms", Cambridge University Press, 2014.

Matt Harrison, "Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization , O'Reilly, 2016.

Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2015.

Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly Media, 2012

COURSE DESIGNERS

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1.	Dr.S.Rajaprakash	Associate Professor	CSE / AVIT	rajaprakash@avit.ac.in
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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.	Analyze
CO2 Analyze programs using simple Python statements and expressions.	Analyze
CO3. Analyze control flow and functions concept in Python for solving problems	Analyze
CO4. Construct algorithms using design paradigms like divide and conquer, greedy and dynamic programming for a given problem.	Analyze
CO5. Apply data structures – lists, tuples & dictionaries for representing compound data	Apply
CO6. Analyze the exception, modules and packages in Python for solving 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	-	-	-	-	-	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	L	M	L	-	-	-	-	-	L	S	M	M
CO6	M	M	L	-	M	L	-	-	-	-	-	L	M	M	M

S- Strong; M-Medium; L-Low

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SYLLABUS

UNIT-1 INTRODUCTION

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

UNIT-2 DATA STRUCTURES

Strings-Lists-Tuples-Dictionaries-Sets

UNIT-3 CONTROL STATEMENTS

Flow Control-Selection control Structure-if-if-else-if-elif-else-Nested if iterative control structures-while loop, for loop and range.

UNIT-4 FUNCTIONS

Declaration-Types of Arguments-Fixed arguments, variable arguments, keyword arguments and keyword variable arguments-Recursions-Anonymous functions: lambda- Decorators and Generators.

UNIT-5 EXCEPTION HANDLING

Exception Handling-Regular Expression-Calendars and clock files:File input/output operations-Dictionary operations-Reading and writing in structured files:CSV and JSON.

TEXT BOOKS:

4. Bill Lubanovic, "Introducing Python Modern Computing in Simple Packages", 1st Edition, O'Reilly Media,2014.
5. Programming With Python Book 'Himalaya Publishing House PvtLtd
6. "Dive Into Python"by MarkPilgrim

REFERENCES:

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

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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36021C04	INFORMATION SECURITY	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

To provide an introduction to the need for Information Security in real time and to study techniques involved in it.

PREREQUISITE: NILL

COURSE OBJECTIVES

1.	To study foundational theory behind information security
2.	To study basic principles and techniques when designing a secure system
3.	To study the attacks and defenses work in practice
4.	To learn about the threats for their significance
5.	To learn about the protections and limitations provided by today's technology

COURSE OUTCOMES

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

CO1. To understand the foundational theory behind information security	Understand
CO2. To understand the basic principles and techniques when designing a secure system	Understand
CO3. To learn how today's attacks and defenses work in practice	Understand
CO4. To learn how to assess threats for their significance	Understand
CO5. To infer the protections and limitations provided by today's technology	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	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

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SYLLABUS

INTRODUCTION

An Overview of Computer Security, Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

INFORMATION SECURITY MANAGEMENT

Cryptography- Key management – Session and Interchange keys, Key exchange and generation, Cryptographic KeyInfrastructure, Storing and Revoking Keys, Digital Signatures, Cipher Techniques

SECURITY DESIGN AND ACCESS CONTROL MECHANISMS

Systems: Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem.

SECURITY ATTACKS FOR CLIENT/ SERVER SYSTEMS

Malicious Logic, Vulnerability Analysis, Auditing and Intrusion Detection

INFORMATION SECURITY RISK MANAGEMENT

Network Security, System Security, User Security and Program Security

TEXT BOOK

1. Matt Bishop ,"Computer Security art and science ", Second Edition, Pearson Education

REFERENCE BOOKS

1. Mark Merkow, James Breithaupt " Information Security : Principles and Practices" First Edition, PearsonEducation,
2. Whitman, "Principles of Information Security", Second Edition, Pearson Education
3. William Stallings, "Cryptography and Network Security: Principles and Practices", Third Edition, PearsonEducation.
4. "Security in Computing ", Charles P.Pfleeger and Shari Lawrence Pfleeger, Third Edition.

COURSE DESIGNERS

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1.	Dr.M.Nithya	Professor	CSE	hodcse@vmkvec.edu.in
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36021C06	NETWORK SECURITY AND MANAGEMENT	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course provides basic knowledge on network security and management concepts. Students will learn about cryptography algorithms, hash functions, digital signatures and user authentications.

PREREQUISITE: NIL

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

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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**
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	
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.	

COURSE DESIGNERS

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36021C82	NETWORK SECURITY LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This course provides basic knowledge to install, configure and run network security tools.

PRERQUISITE: Computer Networks

COURSE OUTCOMES

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

CO1. Install, configure, run virtualization tools, SNORT	Understand and Apply
CO2. Perform port scanning using NMAP	Understand and Apply
CO3. Analyze network traffic	Understand and Apply
CO4. Perform security auditing	Understand and Apply
CO5. Demonstrate asymmetric/symmetric algorithms, digital signatures, honeypots, etc.,	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	-	-	-	-	-	-	-	-	-	M	L	M
CO2	M	M	L	-	-	-	-	-	-	-	-	-	M	M	
CO3	S	M	M	-	-	-	-	-	-	-	-	-	S	M	M
CO4	S	M	M	-	-	-	-	-	-	-	-	-	S	M	
CO5	S	M	M	-	-	-	-	-	-	--	-	-	S	M	

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Learn to install Virtual Box /VM ware or any other equivalent software on the host operating system
2. Perform experiments for port Scanning with NMAP, Superscan or any other software.
3. Using NMAP i) Find open ports on a system ii) Find active machines iii) Find the Operating systems, software's, installed in remote systems.
4. Perform experiment to demonstrate how sniff for router traffic using wireshark tool.
5. Perform security auditing using any open source security auditing tools like SomarSoft's Dumpsec.
6. Perform wireless audit of an access point/router using any open source software tools like NetStumbler.
7. Perform experiment on sniff traffic using ARP poisoning.
8. Demonstrate asymmetric / symmetric crypto algorithms, hash and digital signatures using JCRYPT Tool or any other equivalent software's.
9. Demonstrate Intrusion Detection Systems (IDS) using SNORT any other equivalent software tools.

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10. Setup Honey Pot and monitor honypot using KF sensor or any other equivalent software.

REFERENCES:

1. NMAP Network Scanning by Gordon Fydor Lyon, Published by Insecure.com LLC.
2. Wireshark network analysis, second edition, by Laura Chappell,
3. https://www.vmware.com/in/products/workstation-pro/workstation-pro-evaluation.html
4. https://nmap.org/
5. https://www.systemtools.com/somarsoft/index.html?somarsoft.com
6. http://www.netstumbler.com/downloads/
7. https://www.cryptool.org/de/jcryptool
8. https://www.snort.org/
9. http://www.keyfocus.net/kfsensor/

COURSE DESIGNERS

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36021C81	**ETHICAL HACKING AND ITS TECHNIQUES LAB**	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This course provides basic knowledge to install, configure kali linux and explore kali linux tools for ethical hacking.

PRERQUISITE: Computer Networks

COURSE OUTCOMES

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

CO1. Install, configure, run virtualization tools and kali linux	Understand and Apply
CO2. Use information gathering tools	Understand and Apply
CO3. Use exploitation tools	Understand and Apply
CO4. Use sniffing and spoofing tools	Understand and Apply
CO5. Use forensics and social engineering 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	S	L	-	-	-	-	-	-	-	-	-	M	L	M
CO2	M	M	L	-	-	-	-	-	-	-	-	-	M	M	
CO3	S	M	M	-	-	-	-	-	-	-	-	-	S	M	M
CO4	S	M	M	-	-	-	-	-	-	-	-	-	S	M	
CO5	S	M	M	-	-	-	-	-	-	--	-	-	S	M	

S- Strong; M-Medium; L-Low

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LIST OF EXPERIMENTS

1. Learn to install Virtual Box /VM ware or any other equivalent software on the host operating system
2. Learn to install and configure kali Linux in virtual environment.
3. Exploring information gathering tools like arp-scan, nmap, theHarvester, etc.,.
4. Exploring exploitation tools like sqlmap, metasploit framework, etc
5. Exploring sniffing and spoofing tools like wireshark, wifi honey, bettercap, etc.
6. Exploring Forensic tools like Binwalk,bulk-extractor
7. Exploring wireless attacks like Aircrack-ng, Airmon-ng, etc..
8. Exploring social engineering tools.

REFERENCES:

1. Kali Linux cook book by Corey P.Schultz, Bob Perciaccante,Second Edition,Packt Publishing, 2017.
2. https://www.kali.org/downloads/
3. https://static.packt-cdn.com/downloads/KaliLinux2AssuringSecuritybyPenetrationTesting_thirdEdition_ColorImages.pdf
4. https://www.vmware.com/in/products/workstation-pro/workstation-pro-evaluation.html

COURSE DESIGNERS

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35921C81	BIG DATA AND ANALYTICS LAB	Category	L	T	P	Credit
		CC	0	0	4	2

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

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LIST OF EXPERIMENTS

1. Install, configure and run Hadoop and HDFS
2. Implement word count / frequency programs using MapReduce
3. Implement an MR program that processes a weather datasetR
4. Implement Linear and logistic Regression
5. Implement SVM / Decision tree classification techniques
6. Implement clustering techniques
7. Visualize data using any plotting framework
8. Implement an application that stores big data in Hbase / MongoDB / Pig using Hadoop / R.

TEXT BOOKS

1. Big Data and Analytics - Seema Acharya and Subhashini C - Wiley India
2. Big data for dummies - Judith Hurwitz, Alan Nugent,Fern Halper, Marcia Kaufman
3. Hadoop: The Definitive Guide by Tom White
4. Hadoop in action - Chuck Lam
5. Hadoop for dummies - Dirk Deroos, Paul C. Zikopoulos, Roman B. Melnyk,Bruce Brown

REFERENCES

1. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series, 2012.
2. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier, 2007
3. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
4. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with AdvancedAnalytics", Wiley and SAS Business Series, 2012

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Professor	CSE	rjaichandran@avit.ac.in
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35921C03	DATA ANALYTICS USING PYTHON	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

This course will take you from the basics of Python to exploring many different types of data. You will learn how to prepare data for analysis, perform simple statistical analyses, create meaningful data visualizations, predict future trends from data, and more.

PREREQUISITE: NIL

COURSE OBJECTIVES

1	Understand the basics in Python programming in terms of constructs, control statements, string functions
2	To learn to use Pandas DataFrames, Numpy multi-dimentional arrays, and SciPy libraries to work with a various datasets
3	To learn about pandas, an open-source library, and we will use it to load, manipulate, analyze, and visualize cool datasets.
4	To introduce another open-source library, scikit-learn, and we will use some of its machine learning algorithms to build smart models and make cool predictions

COURSE OUTCOMES

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

CO1: Understand the basics in Python programming in terms of constructs, control statements, string functions	Understand
CO2: To use Pandas DataFrames, Numpy multi-dimentional arrays, and SciPy libraries to work with a various datasets	Understand
CO3: To use pandas, an open-source library, and we will use it to load, manipulate, analyze, and visualize cool datasets.	Understand
CO4: To use scikit-learn, and we will use some of its machine learning algorithms to build smart models and make cool predictions	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	S	S	M
CO2	S	M	S	-	M	-	-	-	-	-	-	M	M	S	M
CO3	S	M	S	-	M	-	-	-	-	-	-	M	S	-	M
CO4	S	M	S	-	M	-	-	-	-	-	-	M	S	S	M

S- Strong; M-Medium; L-Low

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SYLLABUS

PYTHON PROGRAMMING:

Python Basics: Your first program – Types - Expressions and Variables - String Operations - Python Data Structures: Lists and Tuples – Sets – Dictionaries - Python Programming Fundamentals: Conditions and Branching – Loops – Functions - Objects and Classes - Working with Data in Python: Reading files with open Writing files with open - Loading data with Pandas - Working with and Saving data with Pandas

IMPORTING DATASETS

Learning Objectives - Understanding the Domain - Understanding the Dataset - Python package for data science - Importing and Exporting Data in Python - Basic Insights from Datasets – Cleaning and preparing the data - Identify and Handle Missing Values - Data Formatting - Data Normalization Sets – Binning - Indicator variables - Summarizing The Data Frame - Descriptive Statistics - Basic of Grouping – ANOVA – Correlation - More on Correlation -

PROBABILITY AND STATISTICS:

Introduction to probability - Sampling and sampling distributions - Hypothesis testing - Two sample testing and introduction to ANOVA - Two way ANOVA and linear regression - Linear regression and multiple regression - Concepts of MLE and Logistic regression - ROC and Regression Analysis Model Building - χ^2 Test and introduction to cluster analysis Clustering analysis - Classification and Regression Trees (CART)

MODEL DEVELOPMENT

Simple and Multiple Linear Regression - Model Evaluation Using Visualization - Polynomial Regression and Pipelines - R-squared and MSE for In-Sample Evaluation - Prediction and Decision Making

MODEL EVALUATION

Model Evaluation - Over-fitting, Under-fitting and Model Selection - Ridge Regression - Grid Search Model Refinement

REFERENCES

1. McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. " O'Reilly Media, Inc.".
2. Swaroop, C. H. (2003). A Byte of Python. Python Tutorial.
3. Jay L. Devore (2011). Probability and Statistics for Engineering and the Sciences. “Cengage Learning”.
4. David W. Hosmer, Stanley Lemeshow (2000). Applied logistic regression (Wiley Series in probability and statistics). “Wiley-Interscience Publication”.
5. Leonard Kaufman, Peter J. Rousseeuw (1990). Finding Groups in Data: An Introduction to Cluster Analysis. “John Wiley & Sons, Inc”.

COURSE DESIGNERS

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1	Mrs.V.Subapriya	Assistant Professor (G II)	CSE	Subapriya.cse@avit.ac.in
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36021C02	DIGITAL FORENSICS	Category	L	T	P	Credit
		CC	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

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35021C01	COMPUTER ARCHITECTURE AND ORGANIZATION	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:

This 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 learn about the design of the processors.
2	To learn about the data transfer.
3	Understand the functional units of a computers, bus structures and addressing modes.
4	Apply the knowledge of algorithms to solve arithmetic problems.

COURSE OUTCOMES

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

CO1 computer organization components.	Understand
CO2 Compute simple arithmetic operations for fixed-point and floating-point addition, subtraction, multiplication & division.	Apply
CO3 Design combinational and sequential digital functions.	Analyse
CO4 Construct an instruction set capable of performing a specified set of operations.	Analyze
CO5 Demonstrate a memory system for a given set of specifications	Analyze
CO6 appluy pipelining concepts	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

SYLLABUS

INTRODUCTION

Computer Organization- Main memory – CPU operation – Interrupt concept – I/ O techniques – Bus concept – Computer performance factors – System performance measurement- High performance techniques – Comparison of Architecture and Organization – Study of Salient features and architectures of Advanced processors (80286, 80386, 80486, Pentium).

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PROCESSOR DESIGN AND CONTROL UNIT

Goals – Design process –Data path organization – Main memory interface – Data path for single instructions- Floatingpoint unit data path – Role of control unit – Reset sequence – Interrupt recognition and servicing – Abnormal situationhandling – Hardwired control unit – Micro programmed control unit.

MEMORY DESIGN & MEMORY MANAGEMENT

Memory types – Functional and usage modes – Memory allocation- Multiple memory decoding – Memory hierarchy – Instruction pre fetch – Memory interleaving – Write buffer – Cache memory –Virtual memory – Associative memory.

INTRA SYSTEM COMMUNICATION AND I/O

I/O controller & driver- Case study: Hard disk controller in IBM PC – I /O ports and bus concepts – Case study: Keyboard interface – Bus cycle – Asynchronous and Synchronous Transfer – Interrupt handling in PC – I/O techniques in PC – Case Study : RS 232 interface – Modern serial I/O interface – Bus arbitration techniques – Hard disk interface inPC.

ADVANCED ARCHITECTURE

Classification of parallelism – Multiple functional units – Pipelining – Vector computing – array processors – High performance architecture – RISC systems – Super scalar architecture – VLIW architecture – EPIC architecture – Multiprocessor systems – Cache coherence problem – Fault tolerance.

TEXT BOOKS:

1. WilliamStallings, "Computer OrganizationAndArchitecture– DesigningForPerformance",SixthEdition, Pearson Education, 2007.

REFERENCES:

2. Govindarajulu, "Computer Architecture and Organization – Design principles and applications" ,TataMcGraw Hill publications, NewDelhi.
3. David A. Patterson And John L. Hennessy, "Computer Organization And Design: The Hardware/SoftwareInterface", Fifth Edition, Morgan Kaufmann,2013.
4. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill,1998.
5. A.K.Ray & K.M.Bhurchandi, "Advanced Microprocessors and peripherals- Architectures, Programming andInterfacing", McGraw-Hill Education (India), 2013 reprint.

COURSE DESIGNERS

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1.	Mr. G. Seenivasan	Assistant. Professor	CSE	seenivasan@vmkvec.edu.in
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36021P04	CYBERCRIMES AND CYBER LAWS	Category	L	T	P	Credit
		EC-PS	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.	

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REFERENCES

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

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36021P08	INTRUSION DETECTION AND PREVENTION SYSTEM	Category	L	T	P	Credit
		EC-PS	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

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36021P12	PENETRATION TESTING	Category	L	T	P	Credit
		EC-PS	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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36021P09	MOBILE COMMUNICATION SECURITY	Category	L	T	P	Credit
		EC-PS	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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36021P01	BIG DATA SECURITY	Category	L	T	P	Credit
		EC-PS	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

NIL

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.

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36021P03	CLOUD COMPUTING SECURITY	Category	L	T	P	Credit
		EC-PS	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

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 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

1. TimMather, Subra Kumaraswamy, Shahed Latif, “Cloud Security and Privacy: An Enterprise Perspective on Risks and 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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36021P07	DATA VISUALIZATION TECHNIQUES	Category	L	T	P	Credit
		EC-PS	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

NIL

COURSE OBJECTIVES

1	To understand how accurately represent voluminous complex data set in web and fro mother 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. KeyFactors – Purpose, visualization function and tone, visualization design options – Datarepresentation, Data Presentation, Seven stages of data visualization, widgets, data visualizationtools.

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

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35921P03	DATA CENTRE 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

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: Understant the data center and Evolution of Data Centre	Understand
CO2: Apply enterprise-level virtualization machines through software management interfaces, Environments connectivity.	Apply
CO3: Apply 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 AdministrationInstant

REFERENCES

1. BrianPerry,ChrisHuss,Jeantet Fields,"VCPVMwareCertifiedProfessionalonvSphere4 StudyGuide"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

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35021P15	DISTRIBUTED COMPUTING	Category	L	T	P	Credit
		EC-PS	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

COMPUTER NETWORKS

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: Understand the characteristics, models and design issues related to distributed systems	Understand
CO2: Implement a distributed file system for a given Operating System	Apply
CO3: Develop Remote Procedure Call based client-server programs	Apply
CO4: Construct a fault tolerant distributed computing system to satisfy the given requirements.	Apply
CO5: Analyze the message complexity of various deadlock detection and prevention algorithms	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	-	-	-	-	S	-	M	-	-	-	-	M	M	-
CO2	S	S	S	M	-	M	-	L	-	-	-	L	S	M	-
CO3	S	-	M	-	M	-	-	M	-	-	-	L	S	S	S
CO4	S	S	S	M	-	S	-	-	-	-	-	M	S	-	S
CO5	S	S	M	M	-	S	S	S	-	-	-	-	M	S	-

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

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

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

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

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

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.

TEXTBOOKS

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design" Fifth edition – 2011-AddisonWesley.

REFERENCES

1. Tanenbaum A.S., Van Steen M., " Distributed Systems: Principles and Paradigms" , Pearson Education,2007.

2. Liu M.L., "Distributed Computing, Principles and Applications", Pearson and education,2004.

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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 Mar2008.
2. Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices", Prentice Hall, 25 Oct2002.
3. Lisa Crispin, Janet Gregory, "Agile Testing: A Practical Guide for Testers and Agile Teams", AddisonWesley, 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 Oct2006.
2. Mike Cohn Publisher, "User Stories Applied: For Agile Software", Addison Wesley, 1 Mar2004

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36021P02	BIO METRICS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

To explore how biological information could be stored in digital form to create biometric resources and how the same may be processed.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand the concepts of Biometrics, to enable design of biometric system
2	To understand the basics of Biometrics and its functionalities
3	To get the exposure the context of Biometric Applications
4	To learn to develop applications with biometric security

COURSE OUTCOMES

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

CO1: Understand about the concepts of biometric matching for identification	Understand
CO2: To identify algorithms for finger biometric technology	Understand
CO3: Apply facial biometrics for identification	Apply
CO4: Analyze iris biometric, voice biometric, physiological biometrics etc. for identification.	Analyze
CO5: To analyze the use of ethical 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	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	L	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

The design cycle of biometric systems – Applications of Biometric systems – Security and priPerson Recognition – Biometric systems –Biometric functionalities: verification, identification – Biometric systems issues.

FINGERPRINT, FACIAL and IRIS RECOGNITION

FINGERPRINT: Friction ridge pattern- finger print acquisition: sensing techniques, image quality –Feature Extraction –matching –indexing. FACE RECOGNITION: Image acquisition: 2D sensors, 3D sensors- Face detection- Feature extraction -matching. Design of an IRIS recognition system-IRIS segmentation- normalization – encoding and matching- IRIS quality –performance evaluation.

BEHAVIORAL BIOMETRICS AND MULTIBIOMETRICS

Ear detection and - gait feature extraction and matching - hand geometry- soft biometrics - sources of multi-biometrics- Acquisition and processing - Fusion levels.

BIOMETRIC CRYPTOGRAPHY

Protection of biometric data –biometric data shuffling scheme- experimental results –security analysis - cryptographic key Reservation - cryptographic key with biometrics-Revocability in key generation system-Adaptations of Generalized key Regeneration scheme –IRIS Biometrics –Face Biometrics –Extension of Key Regeneration scheme.

ETHICAL USAGE

Public sector Implementation – Border Control – Responsibilities –Customer service – Government sector – Agriculture – Academic Research – Online Communications – Environmental situations – External pressure – Distractions – Implementations issues – Future Works

TEXT BOOKS

1. Anil K Jain and Arun A Roass Karthik Nandedkar, "Introduction to Biometrics", Springer,2011.
2. David Check Ling Ngo,Andrew Beng Jin Teoh,Jiankun Hu "Biometric Security" Cambridge,2015.

REFERENCES

1. LI , S . Z. , AND JAIN, A. K. , Eds. Handbook of Face Recognition. Springer, Heidelberg, Germany,2011.
2. MALTONI , D. , MAIO, D. , JAIN, A. K. , AND PRABHAKAR , S . Handbook of Fingerprint Recognition. Springer,2009.
3. JAIN, L.C. , HALICI, U. , HAYASHI, I. ; LEE, S.B., TSUTSUI, S. Intelligent Biometric Techniques in Fingerprint and Face Recognition. CRC Press,1999.

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36021P10	OPEN SOURCE SYSTEMS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

The purpose of an open standard is to increase the market for a technology by enabling potential consumers or suppliers of that technology to invest in it without having to either pay monopoly rent or fear litigation on trade secret, copyright, patent, or trademark causes of action. No standard can properly be described as "open" except to the extent it achieves these goals.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Students will study common open source software licenses, open source project structure
2	To understand distributed team software development, and current events in the open source world
3	To learn free and open source components & tools
4	Students will also work on an open source project and will be expected to make a significant contribution

COURSE OUTCOMES

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

CO1: Explain common open source licenses and the impact of choosing a license	Understand
CO2: Analyze the open source project structure and how to successfully setup a project	Analyze
CO3 Apply the linux based user profile, file security, and file link and management.	Apply
CO4: Knowledge of free and open source tools like libre office, open office.	Apply
CO5: Apply the libre office- presentation like create, open, adding slide, text, background.	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	L	-	L	-	-	-	-	-	-	S	S	S	S
CO2	S	M	M	-	M	-	-	-	-	-	-	M	S	M	-
CO3	S	M	M	M	-	-	-	-	-	-	-	M	S	S	S
CO4	S	S	L	M	M	-	-	-	-	-	-	M	S	M	-
CO5	S	M	L	M	-	-	-	-	-	-	-	M	S	S	S

S- Strong; M-Medium; L-Low

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SYLLABUS

OPEN SOURCE LICENSING

Open Source Licensing, Contract, and Copyright Law-The MIT, BSD, Apache, and Academic Free Licenses-The GPL, LGPL, and Mozilla Licenses-Qt, Artistic, and Creative Commons Licenses-Non-Open Source Licenses.

OPEN SOURCE OPERATING SYSTEM

Linux history-distributions-licensing-installing Linux-working with directories-working with files-working with file contents-the Linux file tree. shell expansion: commands and arguments-control operators-shell variables-file globing. Pipes and commands: I/O redirection-filters -regular expressions. Introduction to vi – scripting: scripting introduction-scripting loops-scripting parameters

LINUX USER MANAGEMENT

local user management- introduction to users-user management-user passwords-user profiles -groups. file security: standard file permissions-advanced file permissions-access control lists-file links.

LIBRE OFFICE –WORD, SPREAD SHEET

Introduction of libre office- WRITER — THE WORD PROCESSOR: Opening a Document -Laying Out the Page-Setting paper size, margins, and orientation -Creating headers and footers -Numbering pages -Entering and Editing Text-Modifying text-Moving and copying text.

CALC — THE SPREADSHEET: Creating a Spreadsheet -Inputting Your Data -Entering your data -Editing your data -Filling cells automatically -Managing Columns and Rows-Copying, pasting, cutting, dragging, and dropping your cells -Adding the Art -Formula Basics.

LIBRE OFFICE- PRESENTATION

IMPRESS — THE PRESENTATION Creating a Presentation -Opening an existing presentation -Adding Slides -Adding text to a slide -Saving Your Presentation for Posterity - Making Presentations Picture Perfect -Adding Images -Clipping art -Drawing objects -Coloring Backgrounds - Creating a plain-colored background -Creating a gradient background.

TEXT BOOKS

1. Understanding Open Source and Free Software Licensing By Andrew M. St. Lauren , August 2004 , Pages: 207. (UnitI)

2. Linux study link:https://itsfoss.com/learn-linux-for-free/ (Unit II &Unit III).

3.https://www.libreoffice.org/assets/Uploads/Documentation/en/GS51-GettingStartedLO.pdf (Unit IV &V)

REFERENCES

1. Andy channelle (2009), “Beginning OpenOffice 3”,Aprèss.

2. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, Sixth Edition, OReilly Media, 2009.

3. N. B. Venkateshwarlu (Ed); Introduction to Linux: Installation and Programming, B S Publishers;2005.

4. Matt Welsh, Matthias Kalle Dalheimer, Terry Dawson, and Lar Kaufman, Running Linux, Fourth Edition, O'Reilly Publishers,2002.

5. Carla Schroder, Linux Cookbook, First Edition, O'Reilly Cookbooks Series,2004.

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35921P10	KNOWLEDGE BASED DECISION SUPPORT SYSTEMS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

The purpose of this course is to impart knowledge on decision support systems and implementation.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To familiarize decision support systems and their characteristics
2	To study about Intelligent DSS and applications of DSS
3	To learn Collaborative Computing Technologies
4	To learn the technologies related to decision support systems
5	To learn Electronic Commerce and Management-Support Systems.

COURSE OUTCOMES

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

CO1: Understand decision making and computerized support	Understand
CO2: Able to Understand Business Intelligence ,Data Warehousing and Data Mining	Understand
CO3: Understand Collaboration, Communication, Enterprise Decision	Apply
CO4: Able to Understand Artificial Intelligence and Expert Systems over the Internet.	Apply
CO5: Able to Understand Electronic Commerce and Management-Support 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	S	M	L	-	-	-	-	-	-	M	**S**	M	M
CO2	M	S	S	S	M	-	-	-	-	-	-	M	M	M	M
CO3	S	M	S	M	M	-	-	-	-	-	-	M	M	-	M
CO4	S	M	S	S	M	-	-	-	-	-	-	M	**S**	S	S
CO5	S	M	M	M	S	-	-	-	-	-	-	-	M	M	-

S- Strong; M-Medium; L-Low,

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SYLLABUS

DECISION MAKING AND COMPUTERIZED SUPPORT

Management Support Systems: An Overview - Decision Making, Systems, Modeling, and Support.

DECISION SUPPORT SYSTEMS

Decision Support Systems: Overview - Modeling and Analysis – Business Intelligence: Data Warehousing, Data Acquisition, Data Mining, Business Analysis, and Visualization - Decision Support System Development.

COLLABORATION, COMMUNICATION, ENTERPRISE DECISION

Collaborative Computing Technologies: Group Support Systems -Enterprise Information Systems - knowledge Management.

EVIDENCE COLLECTION AND FORENSICS TOOLS

Artificial Intelligence and Expert Systems: Knowledge-Based System – Knowledge Acquisition, Representation, and Reasoning - Advanced Intelligent Systems - Intelligent Systems over the Internet.

IMPLEMENTING IN THE E-BUSINESS ERA

Electronic Commerce - Integration, Impacts, and the Future of the Management-Support Systems.

TEXT BOOKS

1. Efraim Turban, Jay Aronson E., Ting-Peng Liang, "Decision Support Systems and Intelligent Systems", 7th Edition, Pearson Education, 2013.

REFERENCES

1.Michel R. Klein and Leif B. Methlie, "Knowledge-Based Decision Support Systems With Applications in Business" , Wiley; 2nd edition

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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 InformationRetrieval with pertinence to modeling, query operations and indexing.

PREREQUISITE

DATA MINING & DATA WAREHOUSING

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 Searchengine.

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), SecondEdition

2.Textbook Retrieval Systems In Information Management by GGChowdhury

REFERENCES

1. ChristopherD.Manning,PrabhakarRaghavan,HinrichSchutze,IntroductiontoInformationRetrieval,Cambridge University Press, First South AsianEdition

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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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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35921P14	VIRTUALIZATION TECHNIQUES	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

ThissyllabusisintendedfortheEngineeringstudentsandenablethemtounderstandthebasicsvirtualizationandvirtual machines.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand the concepts of virtualization and virtual machines
2	To understand the implementation of process and system virtual machines
3	To explore the aspects of high level language virtual machines
4	To gain expertise in server, network and storage virtualization
5	To understand and deploy practical virtualization solutions and enterprise solutions

COURSE OUTCOMES

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

CO1: Install and configure virtualization technology such as VMware	Apply
CO2: Configure and manage virtual network and storage such as vCenter server or ESxi	Apply
CO3: Deploy, manage and migrate virtual machines.	Apply
CO4: Describe the architecture of a Data Center environment with RAID and Intelligent Storage Systems.	Apply
CO5: Configure and manage a Storage Area Network (SAN).	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	S	-	M
CO2	S	M	L	-	M	-	-	-	-	-	-	L	-	M	-
CO3	S	S	M	-	-	-	-	-	-	-	-	M	S	-	M
CO4	S	S	L	-	-	-	-	-	-	-	-		-	M	-
CO5	S	M	L	-	L	-	-	-	-	-	-	L	M	-	S

S- Strong; M-Medium; L-Low

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SYLLABUS

OVERVIEW OF VIRTUALIZATION

System architectures - Virtual Machine basics - Process vs System Virtual Machines - Taxonomy. Emulation: Basic Interpretation - Threaded Interpretation - Precoded and Direct Threaded Interpretation - Binary Translation. System Virtual Machines - Key concepts - Resource utilization basics.

PROCESS VIRTUAL MACHINES

Implementation – Compatibility – Levels – Framework – State Mapping – Register – Memory Address Space – Memory Architecture Emulation – Memory Protection – Instruction Emulation – Performance Tradeoff - Staged Emulation – Exception Emulation – Exception Detection – Interrupt Handling – Operating Systems Emulation – Same OS Emulation – Different OS Emulation – System Environment

HIGH LEVEL LANGUAGE VIRTUAL MACHINES AND SERVER VIRTUALIZATION

HLL virtual machines: Pascal P-Code – Object Oriented HLLVMs - Java VM architecture - Java Native Interface - Common Language Infrastructure. Server virtualization: Partitioning techniques - virtual hardware - uses of virtual servers - server virtualization platforms.

NETWORK AND STORAGE VIRTUALIZATION

Design of Scalable Enterprise Networks – Layer2 Virtualization – VLAN - VFI - Layer 3 Virtualization – VRF - Virtual Firewall Contexts - Network Device Virtualization - Data- Path Virtualization - Routing Protocols. Hardware Devices – SAN backup and recovery techniques – RAID – Classical Storage Model – SNIA Shared Storage Model – Virtual Storage: File System Level and Block Level.

APPLYING VIRTUALIZATION

Multi-threaded programming – interrupting threads – thread states – thread properties – thread synchronization – Executors – synchronizers – Socket Programming – UDP Datagram – Introduction to Java Beans.

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”, APress2005.

5. Kenneth Hess , Amy Newman, “Practical Virtualization Solutions: Virtualization from the Trenches”, Prentice Hall, 2010.

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36021P14	USER INTERFACE DESIGN	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enables them to implement the basics and in-depth knowledge about User Interface Design so that the students will gain an understanding of the critical importance of user interface design and industry standard methods.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To impart basic knowledge in various user interfaces so that the student will understand the importance of user interface design
2	To inculcate the knowledge of key theories and frameworks that underlie the design of most interfaces today
3	To lay foundation for learning industry standard methods for approaching user interface design
4	Position their knowledge and skills against current social and ethical concerns

COURSE OUTCOMES

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

CO1: Understand functions and importance of Human Computer Interface, Characteristics of GUI and Direct manipulation graphical system.	Understand
CO2: Understand User interface design process and the basic business functions	Understand
CO3: Apply the characteristics and presentation styles, device based controls and Screen-based controls of Windows	Apply
CO4: Implement the concept of network security for web pages and multimedia.	Analyze
CO5: Design Windows layout-test: Prototypes network security and testing tools.	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	L	M	-	-	-	-	-	-	M	**S**	-	-
CO3	S	-	L	-		-	-	-	-	-	-	M	**S**	M	M
CO4	S	M	L	L	M	-	-	-	-	-	-	L	**S**	M	M
CO5	S	M	L	-	M	-	-	-	-	-	-	M	**S**	M	-

S- Strong; M-Medium; L-Low

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SYLLABUS

INTRODUCTION

Introduction-Importance – Human Computer Interface – Characteristics of GUI – Direct manipulation graphical system- Web user interface – Popularity – Characteristics and Principles

USER INTERFACE DESIGN PROCESS

User interface design process – Obstacles – Usability – Human characteristics in design – Human interaction speed – Business functions – Requirements analysis – Direct – Indirect methods – Basic business functions – Design standards – System Timings – Human consideration in screen design – Structures of menus – Functions of menus – Contents of menu – Formatting – Phrasing the Menu – Selecting menu choice – Navigating menus – Graphical menus

WINDOWS

Windows: Characteristics – Components – Presentation styles – types – Managements – Organizations – Operations – Web systems- device- based controls: Characteristics – Screen-based controls: Operate control – Text boxes – Selection control – Combination control – Custom control – Presentation control.

NETWORK SECURITY

Text for web pages – Effective feedback – Guidance & assistance – Internationalization – Accessibility – Icons – Image – Multimedia – Coloring.

WINDOWS LAYOUT- TEST

Windows layout-test: Prototypes – Kinds of tests – Retest – Information search – Visualization – Hypermedia – WWW –Softwaretools.

TEXTBOOKS

1. Maurice J. Bach, "The Design of the Unix Operating System", Pearson Education 2002. 1. Wilbent. O. Galitz ,“The Essential Guide to User Interface Design”, John Wiley &Sons

2.Designing Interfaces : Patterns For Effective Interaction Design 2nd Edition By JeniferTidwell

REFERENCES

1. Ben Sheiderman, “Design the User Interface”, PearsonEducation.

2. Alan Cooper, “The Essential of User Interface Design”, Wiley – Dream TechLtd.

COURSE DESIGNERS

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36021P11	**OPTIMIZATION TECHNIQUES**	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

Optimization techniques helps in solving problems in different environments that need decisions like, Inventory control problems, Maintenance and Replacement problems, Sequencing and Scheduling problems, Assignment of Jobs to applicants, Transportation problems, Network problems and Decision models. Entire subject is useful for all resource managers of variousfields.

PREREQUISITE - NIL

COURSE OBJECTIVES

1	To be thorough with linear programming problem and formulate a real world problem as a mathematical programming model.
2	To acquire knowledge of linear programming, assignment and transportation problems.
3	To acquire skills in handling techniques of PERT, CPM and sequencing model.
4	To be get exposed to the concepts of Inventory control.
5	To study decision theory and game theory techniques to analyze the real world systems.

COURSE OUTCOMES

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

CO1. Formulate and Solve the Linear programming problem.	Apply
CO2. Solve specialized linear programming problems like the Transportation and Assignment problems.	Apply
CO3. Predict the shortest path in network problems.	Analyze
CO4. Design a continuous or periodic review inventory control system.	Apply
CO5. Solve larger problem using technical knowledge and complete tasks on 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	S	S	M	M	M	-	-	-	-	-	-	S	M	M	M
CO2	S	S	M	M	M	-	-	-	-	-	-	S	M	S	M
CO3	S	S	S	M	M	-	-	-	-	-	-	S	M	S	M
CO4	S	S	S	M	M	-	-	-	-	-	-	S	M	S	M
CO5	S	S	S	M	M	-	-	-	-	-	-	S	M	S	M

S- Strong; M-Medium; L-Low

SYLLABUS

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LINEAR PROGRAMMING: Linear programming problem – Graphical method - Simplex method – Big M method – Duality principle.

TRANSPORTATION MODEL: Transportations problem – Assignment problem – Under Assignment - Travelling salesman problem.

NETWORK MODEL: Project Network – CPM and PERT Networks – Critical path scheduling – Sequencing Models.

INVENTORY MODELS: Inventory Model – Economic Order Quantity Model – Purchasing Model (with and without shortages) – Manufacturing Model (with and without shortages) - Stochastic Inventory Model (Stock in discrete and continuous units).

DECISION MODEL: Decision Model – Game theory – Two Person Zero sum game – Algebraic solutions Graphical solutions – Replacement model – Model based on Service life – Economic life single / multivariable search technique.

TEXTBOOKS:

1. H.A.Taha, "Operations Research: An Introduction", Prentice Hall of India, 1999, sixthedition.
2. Kanti Swarup, P.K.Gupta, Man Mohan, "Operations Research" S.Chand & Sons, New Delhi,(2010).

REFERENCES:

1. Sundarasen.V, Ganapathy subramaniyam .K.S,Ganesan.K. "Resource Management Techniques", A.R. Publications, Chennai(2013).
2. Premkumar Gupta, D.S. Hira, "Operations Research" S. Chand & company NewDelhi.

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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 dimensional 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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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

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36021P06	DATA ANALYTICS	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This course is to introduce the concepts of data modeling techniques using Machine Learning for Data Analytics to increase the job opportunities of B. Tech. students in corporate sectors as well as government agencies can be extended to the other streams like IT and ECE. This will not only enhance their job opportunity through the placement cell but also they can take up their project work, in this new field, in final year.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	To understand data and usage of data in solving real time problems
2	To introduce general idea of database management systems
3	To explains the fundamental concepts of big data analytics and data visualization

COURSE OUTCOMES

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

CO1: Understand data and usage of data in data analytics	Understand
CO2: Apply data analytics techniques for visualization through Excel	Apply
CO3: Examine how to visualize trends and discover insights of data	Apply
CO4: Apply Entity- Relationship (E-R) model from specifications and transform it into relational model	Apply
CO5: Analyze and design multidimensional data models	Analyse
CO6: Design SQL queries to perform CRUD operations on database (Create, Retrieve, Update, and Delete)	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								M		
CO2	S	M			M				M	M				M	
CO3	M	S			M				M	M					
CO4	M	S			M				M			M		M	
CO5	M	S			M				M	M		M			
CO6	M	S			M				M			M	M	M	

S- Strong; M-Medium; L-Low

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INTRODUCTION TO DATA ANALYTICS

Introduction, MS Excel Basics (options: Create, Save Rename, Add, Delete), Editing data in Worksheet (options: Insert, Select, Delete, Copy & Paste, Find & Replace) Formatting Cells, Worksheets (operations: Add/Remove Columns & Rows, Hiding/Unhiding Columns & Rows, Merging Cells), Setting Colors.

MANIPULATION OF EXCEL DATA

Working with Formula: Data Filtering, Sorting, Use of Range, Functions: SUM(), AVERAGE(), MAX() & MIN(), COUNT() & COUNTA(), IF(), Data Representation using Charts & Graphs, Creation of Pivot table, Create a Chart, Change Chart Type, Switch Row/Column, labels and legends, Print Area.

BASICS OF DBMS

Introduction, Characteristics, Data models (Entity-Relationship Model, Relational Model, Network model), Relational algebra.

DATA VISUALIZATIONS:

Getting started with basic design templates, Multidimensional Models, Basic Design, Chart Generation, Dashboard Creation, Data Visualization.

BASICS OF OPEN SOURCE RDBMS:

Introduction, Installation, MySQL Commands (Administrative Commands), Various Syntax of SQL, DDL and DML Commands.

TEXT BOOKS

1. Microsoft Excel 2013 Step by Step, Curtis D. Frye, Microsoft Press 2013.
2. Database System Concepts, Abraham Silberschatz, Prof. Henry F. Korth, and S. Sudarshan, McGraw-Hill Education Publications, 3rd Edition.

REFERENCES

1. Learning Tableau, Joshua N. Milligan, ISBN 139781784391164, PACKT Books - Packt Publishing.

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36021P13	**PROBLEM IDENTIFICATION AND DESIGN THINKING**	Category	L	T	P	Credit
		EC-PS	3	0	0	3

PREAMBLE

This course applies to everyday problems in order to create human-centered innovations. Envisioned as a collaborative lab, it fosters the integration of research, problem-forming and problem-solving, aesthetics, technology, prototyping, and publishing, with a strong focus on user's needs. It will address design needs through research on end users, creating a human-centric point of view as a guide. It will drive students to experiment with ideas, to analyze case studies and to build rapid prototypes, in order to test and communicate the proposed product.

PREREQUISITE

NIL

COURSE OBJECTIVES

1	Introduce students to a discipline, design thinking that enhances innovation activities in terms of value creation, speed, and sustainability. Be exposed to architectural styles and views
2	Strengthen students individual and collaborative capabilities to identify problems/issues/needs, develop sound hypotheses, collect and analyze appropriate data, and develop ways to collect meaningful feedback in a real-world environment
3	Teach students to translate broadly defined opportunities into actionable innovation possibilities and recommendations for key stakeholders and their organizations

COURSE OUTCOMES

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

CO1: Explain how design thinking can be applied in a wide range of contexts, from the personal to the global	Understand
CO2: Understand how to please and win as a designers	Understand
CO3: Initiate an attitude of playfulness to aid design thinking	Apply
CO4: Use computing tools and online environments	Apply
CO5: Apply your skills in thinking and visualizing images, words, colour, shapes etc.	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			
CO2	S								M						
CO3														L	L
CO4		S	S		S				M			M		L	L
CO5		S	S		S				M			M		L	L

S- Strong; M-Medium; L-Low

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SYLLABUS

STAGES OF THINKING:

Why Design Thinking, The Design Process, Stages of Design Thinking, Research- Identifying drivers, Information gathering, Target groups, Samples and feedback

IDEA GENERATION:

Idea generation- Basic design, Themes of thinking, Inspiration and References, Brainstorming ,Value, Inclusion, Sketching, Presenting ideas , Refinement - Thinking in images, Thinking in signs, Appropriation , Humour, Personification, Visual metaphors, Modification, Thinking in words, Words and language , Type 'faces', Thinking in shapes, Thinking in proportions, Thinking in color

REFINEMENT:

Thinking in images – Thinking in signs – Appropriation – Humour – Personification – Visual metaphors – Modification – Thinking in words – Words and language – Type 'faces' – Thinking in shapes – Thinking in proportions – Thinking in colour

PROTOTYPING:

Developing designs, 'Types' of prototype, Vocabulary, Implementation-Format, Materials, Finishing, Media, Scale, Series/Continuity

DESIGNING TO WIN/ PLEASE:

Formula One Designing – Radical innovation – City / Car Design – Learning from Failures – Design Process and Working Methods – Product Innovations – Learning from Failures – Design Process and Working Methods

TEXT BOOKS

1. Designing for Growth: A Design Thinking Tool Kit for Managers, Jeanne Liedtka and Tim Ogilvie , Columbia University Press, 2011
2. Design Thinking: Understanding How Designers Think and Work, Niger Cross , BERG 2011

REFERENCES

1.The Art of Innovation: Lessons in Creativity From IDEO, Tom Kelly , America's Leading Design Firm (Profile Books, 2002)

2. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Tim Brown,Harper Business, 2009

3. The Design of Business: Why Design Thinking Is The Next Competitive Advantage, Roger Martin, (Harvard Business Review Press, 2009)

4. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers , Alexander Osterwalder and Yves Pigneur , John Wiley and Sons, 2010

5. Design Thinking: Understanding How Designers Think and Work, Nigel Cross , Bloomsbury Academic, 2011

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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 SolvingUsing 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 BooleanArrays-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 andDensity-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.

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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

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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

COURSE DESIGNERS

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1.	Dr. S. Rajaprakash	Associate Professor	CSE	rajaprakash@avit.ac.in
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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 – 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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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

Course Designers:

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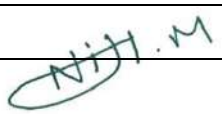

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34121I13	**ESSENTIALS OF INFORMATION TECHNOLOGY**	Category	L	T	P	Credit
		EC-IE	3	0	0	3

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.

Course Designers:

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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:

INFOSYS

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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.

COURSE DESIGNERS

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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

COURSE DESIGNERS

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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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SYLLABUS

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
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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

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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:

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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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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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34121O01	ENGINEERING STARTUPS AND ENTREPRENEURIALMANAGEMENT	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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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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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.

Unit 2 - Patents & Copyright

Patents - Elements of Patentability: Novelty , Non Obviousness (Inventive Steps), Industrial Application - Non -

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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 Intelectual 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 Intelectual 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.

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.

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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 APPLICATION	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	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	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

SYLLABUS

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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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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

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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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.A.Nirmala	Assistant Professor GII	Biotechnology	nirmalabt@avit.ac,in
2	Mrs.C.Nirmala	Associate professor	Biotechnology	nirmala@vmkvec.edu.in

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34421O02	**INDUSTRIAL ROBOTICS**	**Category**	**L**	**T**	**P**	**Credit**
		OE-EA	**2**	**1**	**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
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

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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.
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

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36921O01	**BIOMOLECULES - STRUCTURE, 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
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

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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.

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

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

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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 WASTEMANA GEMENT	Category	L	T	P	Credit
		OE-EA	3	0	0	3

Preamble

Structure is an arrangement and organization of inter related elements in a material object or system,or the object or systems organized. Material structures include m and e objects such as building sand machine sand natural objects such as biological organisms,minerals and chemicals.

Prerequisite: Nil

Course Objectives

1.	The on-site/off-site process in g of the same and the disposal methods.
2.	Thestudentisexpectedtoknowaboutthevariouseffectsanddisposaloptionsforthemunicipalsolidwaste.
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, Wind and Water Driven Disasters.	Understand
CO2.Identify the potential deficiencies of existing buildings for Earthquake disaster and suggests uitableremedial measures.	Understand
CO3.Derive the guidelines for the precautionary measures and rehabilitation measures for Earthquake disaster.	Apply
CO4.Derivetheprotectionmeasuresagainstfloods,cyclone,landslides	Apply
CO5.Understandtheeffectsofdisastersonbuiltstructuresin 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:

Concept of disaster; 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:

Response time, frequency and forewarning levels of different hazards; Characteristics and damage potential of natural hazards; hazard assessment; Dimensions of vulnerability factors; vulnerability assessment; Vulnerability and disaster risk; Vulnerabilities to flood and earthquake hazards.

DISASTER MANAGEMENT MECHANISM: Concepts of risk management and crisis

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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 andStressManagement; RumourandPanicManagement; MinimumStandardsofRelief;ManagingRelief;Funding.

DISASTER MANAGEMENT IN INDIA:

Strategies for disaster management planning; Steps for formulating a disasterriskreductionplan;DisastermanagementActandPolicyinIndia;Organisationalstructurefordisastermanagemen tin India; 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.
4. ManualonNaturalDisasterManagementinIndia,NCDM,NewDelhi,2000
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

Sl No	Name of the Faculty	Designation	Department	Mail ID
1	Dr.L.Chitra	Professor	EEE/AVIT	chitra@avit.ac.in
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38121O02	**INTRODUCTION TO BIO-FUELS**	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

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr.A.Balachandar	Assistant Professor – Gr-II	Biotechnology	Balachandar.biotech@avit.ac.in
2	Dr.M.Sridevi	Professor & Head	Biotechnolgy	sridevi@vmkvec.edu.in

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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.

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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.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. N.Babu	Professor	BME	babu@vmkvec.edu.in
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4	Ms. Lakshmi Shree	Assistant Professor	BME	lakshmishree.bme@avit.ac.in

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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, Piezo resistive 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.

COURSE DESIGNERS

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3	Mr.V.Prabhakaran	Assistant Professor (Gr-II)	BME	Prabhakaran.bme@avit.ac.in
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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

S.No.	Name of the Faculty	Designation	Department	Mail ID
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34721O01	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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36021R01	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

This document lists the contents required for the academic project report done as part of the MCA Curriculum. Section names have been listed with description. The descriptions have been provided in italics. Important: This page and the text in italics present throughout this document are to give you guidance. Please do not include them in your project report.

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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36021M81	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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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.

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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.
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	Mr. K.Karthik	Associate Professor	CSE	karthik@avit.ac.in

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36021T81	**INTERNSHIP**	**Category**	**L**	**T**	**P**	**Credit**
		PI-IT	**-**	**-**	**-**	**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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34121Z81 - YOGA AND MEDITATION

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
		MC	2	0	0	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 that address 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 dialogue and bring a fresh perspective on transgender and gender non-conformingindividuals.
4	To create awareness among the students and to help them face gender stereotype issues.
5	To help the students understand 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

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	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 **6hrs**

Definition of Sex – Definition of Gender - Sex Vs. Gender - Social Construction of Gender and Gender Roles – Gender Stereotypes - 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

Gender Sensitization -Need and Objective - Gender Sensitivity Training at Workplace – GenderSensitization in Judiciary - Gender Sensitization in School Curriculum.

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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
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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:

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies toincrease 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

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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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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.

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

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