AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR, CHENNAI
&
VINAYAKA MISSION'S KIRUPANANDA VARIYAR ENGINEERING COLLEGE, SALEM

VINAYAKA MISSION'S
KIRUPANANDA VARIYAR ENGINEERING COLLEGE

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

(AICTE APPROVED AND NAAC ACCREDITED)

Faculty of Engineering and Technology

REGULATIONS 2021

DEPARTMENT OF COMPUER SCIENCE AND ENGINEERING

Programme:

B.E - COMPUTER SCIENCE AND ENGINEERING

Part Time (3 1/2 Years)

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum

(Semester I to VII)

Regulation 2021

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

VINAYAKA MISSION'S KIRUPANANDA VARIYAR ENGINEERING COLLEGE

VINAYAKA MISSION'S KIRUPANANDA VARIYAR

ENGINEERING COLLEGE, SALEM

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION

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

MISSION

Computer Science and Engineering is committed

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

PROGRAMME OUTCOMES

Engineering Graduates will be able to:

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

PROGRAMME SPECIFIC OUTCOMES (PSOS)

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

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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

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

STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAM – PART TIME STUDENTS

Sl. No.	Category of Courses	Types of Courses	Suggested Breakup of Credits (min – max)
A.	Foundation Courses		12-18
(a)	Humanities and Social Sciences including Management courses		6-9
(b)	Basic Science courses(Maths, Physics & Chemistry)		6-9
B	Professional- Core courses(PCC)		61
C	Elective Courses(EC)		18
(a)	Professional Electives(Classroom/Online)		12-15
(b)	Open Elective(Classroom/Online) Innovation, Entrepreneurship, Skill Development, Emerging Areas like 3D Printing, Artificial Intelligence, Internet of Things etc.		3-9
D	Project work		10
	Minimum Credits to be earned		107

Sl No	Course	Offering Dept	Category	L	T	P	C	Pre - requisite
A.1.Humanities and Social Sciences including Management courses–Credits (6-9)								
1.	Professional Communication and Personality Development	English & Managemen	HSS	0	0	2	1	NIL
2.	Total Quality Management	Managemen t	HSS	3	0	0	3	NIL
3.	Engineering Startups and Entrepreneurial Management	Managemen t	HSS	3	0	0	3	NIL
4.	Universal Human Values – Understanding Harmony	Managemen t	HSS	3	0	0	3	NIL
A. 2. Basic Science Courses –Credits (6-9)								
1	Engineering Mathematics	Mathematic s	BS	2	2	0	3	NIL
2	Mathematics for Computer Engineers	Mathematic s	BS	2	2	0	3	NIL
3	Physical Sciences	Physics & Chemistry	BS	4	0	0	4	NIL
4	Numerical Method and Number Theory	Mathematic s	BS	2	2	0	3	NIL
5	Probability And Queuing Theory	Mathematic s	BS	2	2	0	3	NIL
6	Smart Materials and Nano Technology	Physics	BS	3	0	0	3	NIL
Professional Core Courses – Credits (61)								
1.	Data Structures	CSE	CC	3	0	0	3	NIL
2.	Computer Architecture and Organization	CSE	CC	3	0	0	3	NIL
3.	Operating Systems	CSE	CC	3	0	0	3	NIL
4.	Design & Analysis of Algorithms	CSE	CC	3	0	0	3	NIL
5.	Database Management Systems	CSE	CC	3	0	0	3	NIL
6.	Object Oriented Programming	CSE	CC	3	0	0	3	NIL
7.	Complier Design & Automata Theory	CSE	CC	3	0	0	3	NIL

8.	Computer Networks	CSE	CC	3	0	0	3	NIL
9.	Software Engineering	CSE	CC	3	0	0	3	NIL
10.	Java Programming	CSE	CC	3	0	0	3	NIL
11.	Web Technology	CSE	CC	3	0	2	4	NIL
12.	Artificial Intelligence And Expert System	CSE	CC	3	0	0	3	NIL
13.	Internet of Things	CSE	CC	0	0	0	3	NIL
14.	Cyber Security	CSE	CC	3	0	0	3	NIL
15.	Artificial Intelligence And Expert System Lab	CSE	CC	0	0	4	2	NIL
16.	Database Management Systems Lab	CSE	CC	0	0	4	2	NIL
17.	Object Oriented Programming Lab	CSE	CC	0	0	4	2	NIL
18.	Java Programming Lab	CSE	CC	0	0	4	2	NIL
19.	Data Structures Lab	CSE	CC	0	0	4	2	NIL
20.	Advanced Java Programming	CSE	CC	3	0	0	3	NIL
21.	Object Oriented Analysis And Design	CSE	CC	3	0	0	3	NIL
22.	Networking Lab	CSE	CC	0	0	4	2	NIL
23.	Problem Solving Using Computer	CSE	CC	3	0	0	3	NIL
24.	Computer Programming Lab	CSE	CC	0	0	4	2	NIL
Professional Elective courses(12)								
C. 1. Professional Elective courses relevant to chosen specialization/branch Credits-(12)								
1.	Big Data And Analytics	CSE	PE	3	0	0	3	NIL
2.	Ethical Hacking	CSE	PE	3	0	0	3	NIL
3.	Mobile Computing	CSE	PE	3	0	0	3	NIL

4.	Unix Internals	CSE	PE	2	0	2	3	NIL
5.	Wireless and Sensor Network	CSE	PE	3	0	0	3	NIL
6.	C# And .Net Application Development	CSE	PE	3	0	0	3	Object Oriented Programming
7.	Cloud Computing	CSE	PE	3	0	0	3	NIL
8.	Agile Methodologies	CSE	PE	3	0	0	3	NIL
9.	Machine Learning	CSE	PE	3	0	0	3	NIL
10.	Deep Learning	CSE	PE	3	0	0	3	NIL
11.	Data Visualization	CSE	PE	3	0	0	3	NIL
12.	Data Warehousing and Data Mining	CSE	PE	3	0	0	3	Database Management Systems
13.	Computer Graphics and Multimedia	CSE	PE	3	0	0	3	NIL
14.	E-Learning Techniques	CSE	PE	3	0	0	3	NIL
15.	Network Programming and Management	CSE	PE	3	0	0	3	NIL
16.	Software Testing	CSE	PE	3	0	0	3	NIL
17.	It Infrastructure Management	CSE	PE	3	0	0	3	NIL
18.	Block Chain Technology	CSE	PE	3	0	0	3	NIL
19.	Go Language	CSE	PE	3	0	0	3	NIL
20.	R Programming	CSE	PE	3	0	0	3	NIL
21.	Rich Internet Application	CSE	PE	3	0	0	3	NIL
22.	Advanced Java Programming	CSE	PE	3	0	0	3	NIL
23.	Object Oriented Analysis And Design	CSE	PE	3	0	2	3	NIL

24.	Game Theory	CSE	PE	3	0	0	3	NIL
25.	Information Retrieval Techniques	CSE	PE	3	0	0	3	NIL
26.	Software Quality Management	CSE	PE	3	0	0	3	NIL
27.	Software Testing	CSE	PE	3	0	0	3	NIL
28.	Wireless and Sensor Networks	CSE	PE	3	0	0	3	NIL
29.	Soft Computing	CSE	PE	3	0	0	3	NIL
Open Electives – Electives from Innovation, Entrepreneurship, Skill Development, Emerging Areas etc. Credits -(3-9)								
1.	Engineering Management and Ethics	Management	OEI	3	0	0	3	NIL
2.	Finance and Accounting for Engineers	Management	OEI	3	0	0	3	NIL
3.	Innovation, Product Development and Commercialization	Management	OEI	3	0	0	3	NIL
4.	Social Entrepreneurship	Management	OEI	3	0	0	3	NIL
5.	New Venture Planning & Management	Management	OEI	3	0	0	3	NIL
6.	Software Project Management	CSE	OE-SD	3	0	0	3	NIL
7.	Data science in Python	CSE	OE-SD	3	0	0	3	NIL
8.	Digital Marketing	CSE	OE-SD	3	0	0	3	NIL
9.	3D Printing	Mechanical	OE-EA	3	0	0	3	NIL
10.	Robotics	Mechanical	OE-EA	3	0	0	3	NIL
11.	Biomolecules: Structure, Function in Health and Disease	PCE	OE-EA	3	0	0	3	NIL
12.	Pharmacogenomics	PCE	OE-EA	3	0	0	3	NIL

13.	Municipal Solid and Waste Management	Civil	OE-EA	3	0	0	3	NIL
14.	Disaster Management	Civil	OE-EA	3	0	0	3	NIL
15.	Green Power Generation Systems	EEE	OE-EA	3	0	0	3	NIL
16.	Industrial Drives and Automation	EEE	OE-EA	3	0	0	3	NIL
17.	Food and nutrition Technology	BTE	OE-EA	3	0	0	3	NIL
18.	Green Building and Sustainable Environment	BTE	OE-EA	3	0	0	3	NIL
19.	Biofuel	BTE	OE-EA	3	0	0	3	NIL
20.	Principles of Medical Instrumentation	BME	OE-EA	3	0	0	3	NIL
21.	Biosensors & Transducers	BME	OE-EA	3	0	0	3	NIL
22.	Body Area Networks and Mobile Healthcare	BME	OE-EA	3	0	0	3	NIL
23.	Introduction to Industry 4.0 and Industrial Internet of Things	ECE	OE-EA	3	0	0	3	NIL
24.	Electronic Equipment Design	ECE	OE-EA	3	0	0	3	NIL
25.	Robotics and Automation	ECE	OE-EA	3	0	0	3	NIL
D. Project work								**10**
1	Project work	CSE	PI	0	0	16	10	NIL

	PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOENT	Category	L	T	P	Credit
		HSS	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

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

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

	INTELLECTUAL PROPERTY RIGHTS	Category	L	T	P	Credit
		HSS	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: Not Required

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 - 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.

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	Mail ID
1	P. S. Balaganapathy	Associate Professor	Management	dydirectormanagementstudies@avit.ac.in
2	A. Mani	Associate Professor	Management	mani@vmkvec.edu.in

	TOTAL QUALITY MANAGEMENT	Category	L	T	P	Credit
		HSS	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.

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:

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	A. Mani	Associate Professor	Management Studies	mani@vmkvec.edu.in
2.	Dr. V. Sheela Mary	Associate Professor	Management Studies	sheelamary@avit.ac.in

	ENGINEERING STARTUPS AND ENTREPRENEURIAL MANAGEMENT	Category	L	T	P	Credit
		HSS	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.

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

	UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY	Category	L	T	P	Credit
		HSS	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.

UNIT V 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

TEXT BOOKS:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

REFERENCES:

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

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

	ENGINEERING MATHEMATICS	Category	L	T	P	Credit
		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

SYLLABUS

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

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

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

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

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

TEXT BOOKS:

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

REFERENCES:

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

COURSE DESIGNERS

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

	MATHEMATICS FOR COMPUTER ENGINEERS	Category	L	T	P	Credit
		BS	2	1	0	3

PREAMBLE

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

PREREQUISITE

Engineering Mathematics

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

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

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

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

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

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

TEXT BOOKS:

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

REFERENCES:

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

COURSE DESIGNERS

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

21PCBS02	PHYSICAL SCIENCES - Part A: ENGINEERING PHYSICS	Category	L	T	P	Credit
		Basic Sciencs	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

SYLLABUS

Unit: I

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

Unit: II

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

Unit: III

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

TEXT BOOKS

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

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

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

REFERENCE BOOKS

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

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

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

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

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

COURSE DESIGNERS

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

21PCBS02	PHYSICAL SCIENCES PART-B - ENGINEERING CHEMISTRY (Common to all Branches)	Category	L	T	P	Credit
		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)

UNIT – III FUELS AND COMBUSTION

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

TEXTBOOK

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

REFERENCES

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

Course Designers:

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

	NUMERICAL METHODS AND NUMBER THEORY	Category	L	T	P	Credit
		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

Engineering mathematics

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	PO4	PO5	PO6	PO7	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

SYLLABUS

SOLUTION OF LINEAR EQUATIONS:

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

INTERPOLATION AND APPROXIMATION:

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

NUMERICAL INTEGRATION AND DIFFERENTIATION:

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

DIVISIBILITY THEORY AND CANONICAL DECOMPOSTIONS:

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

CONGRUENCES AND CLASSICAL THEOREMS:

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

TEXT BOOKS:

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

REFERENCES:

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

COURSE DESIGNERS

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

	PROBABILITY AND QUEUEING THEORY	Category	L	T	P	Credit
		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

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

	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

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	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

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.

TEXT BOOKS:

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

REFERENCES:

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. R. Jaichandran	Associate Professor	CSE	jaichandran@avit.ac.in
2.	Dr.V.Amirthalingam	Associate Professor	CSE	amirthalingam@vmkvec.edu.in

	COMPUTER ARCHITECTURE AND ORGANISATION	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:

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

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To provide knowledge on overview of IAS computer function and addressing modes
2	Hardware and software implementation of arithmetic unit to solve addition, subtraction multiplication and division
3	To provide knowledge of memory technologies, interfacing techniques and subsystem devices
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 Provide fundamentals on machine instructions and addressing modes	Understand
CO2 . Comprehend the various algorithms for computer arithmetic.	Apply
CO3 Analyse the performance of various memory modules in memory hierarchy	Analyse
CO4 Compare and contrast the features of RAID architectures of organization and structure of disk drives	Analyze
CO5 5. Outline the evaluation of multicore architectures and pipeline 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

1.Introduction to Computer Architecture

Overview of IAS Computer, Organization and Architecture, Structure and Function, Machine instructions and addressing modes.
Computer System: Components, Function – Interconnection Structures – Bus interconnection.
.Central Processing Unit

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

3 Memory Organization

Characteristics of Memories, Memory Hierarchy, main Memory,
Cache memory- Memory system overview – Cache memory principles – Elements of Cache design .

4.Secondary storage

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

5.Device Subsystems

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

TEXT BOOKS:
William Stallings, Computer Organization and Architecture 10th Ed, Pearson, 2019
REFERENCES:
1. Hency Patterson, Quantative Approach –Computer Architecture, Elsevier, 4th edition, 2006.
2. Shameem Akhter and Jason Roberts, Multi-Core Programming, 1st edition, Intel Press, 2012
John P. Hayes, Computer Architecture and Organization, McGraw Hill Education, 5 edition, 2017.

COURSE DESIGNERS

S. No.	Name of the faculty	Designation	Department	Mail Id
1	Mr. B.Sundaramurthy	Associate Professor	CSE	sundaramurthy @vmkvec.edu.in
2	Mrs. S.Leelavathy	Assistant. Professors (GII)	CSE	leelavathy@avit. ac.in

	OPERATING SYSTEM	Category	L	T	P	Credit
		CC	2	0	2	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. To Understand the process synchronization concepts for the given scenario in operating systems environment.	Understand
CO3. Able to 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

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

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

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jiachandran	Professor	CSE	rjaichandran@avit.ac.in
2.	B.Sundaramurthy	Associate Professor	CSE	sundaramurthy@vmkvec.edu.in

	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: Data Structures or Problem Solving using Computers.

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

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

S. No.	Name of the faculty	Designation	Department	Email Id
1.	Dr. S. Rajaprakash	Assistant Professor Gr. II	CSE	srajaprakash@avit.ac.in
2.	Mr. M. Annamalai	Associate Professor	CSE	annamalaim@vmkvec.edu.in

	DATABASE MANAGEMENT SYSTEM	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

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

S. No.	Name of the faculty	Designation	Department	Mail Id
1	Mr. S. SenthilKumar	Assistant Professor	CSE	senthilkumar@vmkvec.edu.in
2	Mr. S. Muthuselvan	Assistant Professor Gr. II	CSE	muthuselvan@avit.ac.in

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

PREAMBLE

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

PRERQUISITE

Nil

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

CO1. 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	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M	M	M	M	-	-	-	-	-	M	L	M	M	M
CO2	M	M	M	M	M	-	-	-	-	-	M	L	M	M	M
CO3	M	M	S	M	S	-	-	-	-	-	M	L	S	M	M
CO4	S	M	M	M	S	-	-	-	-	-	M	L	S	M	S
CO5	S	M	M	M	M	-	-	-	-	-	M	L	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO OOPS AND C++

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

DERIVED DATA TYPES AND FUNCTIONS

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

CLASSES AND OBJECTS

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

OPERATOR OVERLOADING AND INHERITANCE

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

STREAMS, FILES AND EXCEPTION HANDLING

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

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

TEXT BOOKS:

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

COURSE DESIGNERS

S.No	Name of the faculty	Designation	Department	Mail Id
1.	Dr. K. Sasikala	Associate Professor	CSE	sasikalak@vmkvec.edu.in
2.	Mr.S. Muthuselvan	Assistant Professor Gr. II	CSE	muthuselvan@avit.ac.in

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

PREAMBLE

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

PREREQUISITE

- Familiarity with working and features of high level languages.
- Background knowledge of computer architecture, data structures and logic or algebra.

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT - I INTRODUCTION TO COMPILERS

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

UNIT - II SYNTAX ANALYZER

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

UNIT - III INTERMEDIATE CODE GENERATOR

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

UNIT - IV CODE OPTIMIZATION AND CODE GENERATION

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

UNIT –V AUTOMATA AND REGULAR EXPRESSIONS 9

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

TEXT BOOKS

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

REFERENCES

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

COURSE DESIGNERS

S. No.	Name of theFaculty	Designation	Department	Mail ID
1.	Mrs. T.GEETHA	Assistant Professor	CSE	geetha@vmkvec.edu.in
2.	Mr.S. Muthuselvan	Assistant Professor Gr. II	CSE	muthuselvan@avit.ac.in

	COMPUTER NETWORKS	Category	L	T	P	Credit
		CC	3	0	2	4

PREAMBLE

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

PREREQUISITE

NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

FUNDAMENTALS & LINK LAYER

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

DATA-LINK LAYER & MEDIA ACCESS

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

NETWORK LAYER

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

TRANSPORT LAYER

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

APPLICATION LAYER

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

LIST OF EXPERIMENTS.

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

TEXT BOOKS:

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

REFERENCES:

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

COURSE DESIGNERS

S. No.	Name of the faculty	Designation	Department	Mail Id
1	Mr. S. SenthilKumar	Assistant Professor	CSE	senthilkumars@vmkvec.edu.in
2	Mr. S. Muthuselvan	Assistant Professor Gr. II	CSE	muthuselvan@avit.ac.in

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

PREAMBLE:

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

PREREQUISITE:

NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

SOFTWARE

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

LIFE CYCLE MODELS

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

ANALYSIS MODELING AND DESIGN CONCEPTS

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

REQUIREMENT ENGINEERING TASKS

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

SOFTWARE CONFIGURATION MANAGEMENT

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

TEXT BOOKS:

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

REFERENCES:

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

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email Id
1	Mr. B. Sundaramurthy	Associate Professor	CSE	sundaramuthy@vmkvec.edu.in
2	Dr. R. Bharanidharan	Assistant Professor	CSE	bharanidharan@vmkvec.edu.in

	JAVAPROGRAMMING	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

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

PREREQUISITE

BasicprogrammingKnowledge

COURSEOBJECTIVES

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

COURSEOUTCOMES

Onsuccessfulcompletionofthecourse,studentswillbeableto

CO1.KnowledgeofthestructureandmodeloftheJavaprogramminglanguage	Knowledge
CO2.UsetheJavaprogramminglanguageforvariousprogrammingtechnologies	Understand
CO3.DevelopsoftwareintheJavaprogramminglanguage	Apply
CO4.Evaluateuserrequirementsforsoftwarefunctionalityrequiredtodecidewhetherthe Javaprogramminglanguagecanmeetuserrequirements	Analyse
CO5.Chooseanengineeringapproachtosolvingproblems,Startingfromtheacquiredknowledg eofprogrammingandknowledgeofoperatingsystems.	Evaluation

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

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

S-Strong;M-Medium;L-Low

SYLLABUS

BASICSOFJAVA

Object oriented programming concepts – objects – classes – methods and messages – abstraction and encapsulation – inheritance–abstractclasses–polymorphism.-ObjectsandclassesinJava–definingclasses–methods-accessspecifiers–staticmembers –constructors–finalize method.

ARRAYS,OPERATORS,STRINGS&OBJECTS

Arrays - Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements–Strings-Packages–Java-Doccomments–-Inheritance–classhierarchy–polymorphism–dynamicbinding–finalkeyword–abstractclasses-TheObjectclass–Reflection–interfaces–objectcloning–innerclasses–proxies.

EVENTS&GRAPHICSPROGRAMMING

I/Streams- Filter and pipe streams– Byte Code interpretation- Basics of event handling – event handlers–adapterclasses–actions–mouseevents–AWTeventhierarchy–Graphicsprogramming–Frame–Components–workingwith2Dshapes.

SWING&GENERICPROGRAMMING, APPLETS

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

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

THREADS&SOCKETPROGRAMMING

Multi-threadedprogramming–interruptingthreads–threadstates–threadproperties–threadsynchronization–Executors–synchronizers–SocketProgramming–UDPDatagram–IntroductiontoJavaBeans.

TEXTBOOKS:

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

REFERENCES:

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

COURSEDESIGNERS

S.No.	NameoftheFaculty	Designation	Department	MailID
1	Mrs.V.Subapriya	Assistant Professor-II	CSE	subapriya.cse@avit.ac.in
2	Dr.K.Sasikala	AssociateProfessor	CSE	sasikalak@vmkvec.edu.in

	WEB TECHNOLOGY	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE:

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

PREREQUISITE: NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I- INTRODUCTION TO NETWORKS AND WEB CONCEPTS

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

UNIT II- DYNAMIC HTML & JAVASCRIPT

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

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

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

UNIT III- DATABASE & XML

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

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

UNIT IV -ASP & Session Tracking

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

Exercise: Programs using DOM and SAX parsers.

UNIT V- SERVLETS AND JSP

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

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

TEXT BOOKS:

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

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

REFERENCES:

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

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email Id
1	Dr.R.Jaichandran	Assistant Professor	CSE	jaichandran@avit.ac.in
2	Dr.M.Nithya	Professor	CSE	nithya@vmkvec.edu.in

	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	Category	L	T	P	Credit
		CC	3	0	0	3

PREAMBLE

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

PREREQUISITE

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

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

TEXT BOOKS

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

REFERENCES

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.S.Rajaprakash	Associate professor	CSE	rajaprakash@avit.ac.in.
2	Dr.M.Nithya	Professor	CSE	Nithya@vmkv.ac.in

	INTERNET OF THINGS	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: Able to understand basics in IOT	Understand
CO2: Able to understand Methodology in IOT	Apply
CO3: Able to design IOT applications using Raspberry	Analyze
CO4: Able to design IOT applications using Aurdino and Intel Edison	Analyze
CO5: Able to apply Cloud computing in IOT	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS INTRODUCTION
Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.
IOT METHODOLOGY
IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.
IOT WITH RASPBERRY
Bascis of Raspberry PI, Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services
IOT WITH AURDINO AND INTEL EDISON
Basics of Aurdino, Intel Edison with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks
APPLICATIONS
Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for Iot – Data Analytics for IoT – Software & Management Tools for IoT.
TEXT BOOKS
1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015. **2.** Manoel Carlos Ramon, “Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers”, Apress, 2014.
REFERENCES
1. Marco Schwartz, “Internet of Things with the Arduino Yun”, Packt Publishing, 2014

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Assistant professor G-II	CSE	rjaichandran@avit.ac.in
2.	Dr.M. Nithya	Professor	CSE	nithya@vmkv@edu.in

	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 malwares and security tobe followed in evolving technologies

PREREQUISITE : COMPUTER NETWORKS

COURSE OBJECTIVES

1.	To understand the fundamentals of cryptography
2.	To understand network security concepts
3.	To understand different types of malwares
4.	To learn applying security in evolving technologies
5.	To learn about cyber laws and Firensics

COURSE OUTCOMES

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

CO1: Able to understand basics concepts in cryptography	Understand
CO2: Able to understand and apply network security concepts	Understand and Apply
CO3: Able to prevent different types of malwares	Apply
CO4: Able to apply security concepts in emerging technologies	Analyze and Apply
CO5: Able to investigate cyber crimes	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS:

UNIT I- INTRODUCTION TO CRYPTOGRAPHY

Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key, Message, Authentication, Hash Function, Digital Signatures, Firewalls- Types of Firewalls, Security Protocols.

UNIT II – NETWORK SECURITY

Network packet Sniffing, DOS/ DDOS attacks, Vulnerabilities and Attacks, Intrusion detection and Prevention Techniques, Host based Intrusion prevention Systems,

UNIT III - MALWARES

Types of Malware: Virus, Worms, Trojans, Rootkits, Robots, Adware's,Spywares, Ransom wares, Zombies, Honey pots, etc.

UNIT IV – SECURITY IN EVOLVING TECHNOLOGIES

Biometrics, Mobile Computing and Hardening on android and ios, IOT Security, Web server configuration and Security, Basic security for HTTP Applications and Web Services like SOAP, REST etc., Identity Management

and Web Services, Authorization Patterns, Security Considerations, Challenges.

UNIT V - CYBER LAWS & FORENSICS

Cyber Security Regulations, Roles of International Law, Cyber Security Standards,National Cyber Security Policy 2013. Introduction to Cyber Forensics, Need of Cyber Forensics, Cyber Evidence,Documentation and Management of Crime Sense,National Cyber Security Policy 2013. Introduction to Cyber Forensics, Need of Cyber Forensics, Cyber Evidence,Documentation and Management of Crime Sense.

TEXT BOOKS

1. William Stallings, "Cryptography and Network Security", 8 th Edition Pearson Education/PHI, 2020.

2. V.K. Jain, "Cryptography and Network Security", 1 st edition Khanna Publishing House, 2020.

Referances:

3. Gupta Sarika, "Information and Cyber Security", Khanna Publishing House, Delhi.

4. Atul Kahate "Cryptography and Network Security" | 4th Edition Paperback – 8 May 2019

5. V.K. Pachghare, "Cryptography and Information Security", PHI Learning

6. Nina Godbole, "Information System Security", Wiley

7. Bothra Harsh, "Hacking", Khanna Publishing House, Delhi..

8. James Graham, Richard Howard and Ryan Olson, "Cyber Security Essentials", CRC Press, Taylor & Francis Group, 2011.

9.. By Dan Shoemaker, Ph.D., William Arthur Conklin, Wm Arthur Conklin, "Cyber security: The Essential Body of Knowledge", Cengage Learning, 2012.

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Professor	CSE	rjaichandran@avit.ac.in
2	Dr.M.Nithya	Professor	CSE	nithya@vmkvec.edu.in

	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

To gain programming knowledge in Artificial Intelligence

PREREQUISITE

Programming experience of Artificial Intelligence.

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

LIST OF EXPERIMENTS:

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

TEXT BOOKS

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

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

REFERENCES

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

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

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.S.Rajaprakash	Associate professor	CSE	rajaprakash@avit.ac.in.
2.	Dr.Nithya	Professor	CSE	Nithya@vmkv.ac.in

	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.

PREREQUISITE: Nil

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

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

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

References:

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

Course Designers:

S.No	Name of the faculty	Designation	Department	Email Id
1	Ms. A. Kasthuri	Assistant Professor	CSE	kasthuri@vmkvec.edu.in
2.	Dr.R.Jaichandran	Assistant Professor	CSE	jaichandran@avit.ac.in

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

PREAMBLE

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

PRERQUISITE: NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	M	M	M	M	S	-	-	-	-	-	-	-	M	M	M
CO2	M	M	M	M	M	-	-	-	-	-	-	-	M	M	M
CO3	M	M	S	M	S	-	-	-	-	-	-	-	M	M	M
CO4	S	M	M	M	M	-	-	-	-	-	-	-	M	M	S
CO5	S	M	M	M	M	-	-	-	-	-	-	-	M	M	S

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Write a program to illustrate function overloading feature

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

REFERENCES:

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

COURSE DESIGNERS

S.No	Name of the faculty	Designation	Department	Email Id
1.	Dr. K. Sasikala	Associate Professor	CSE	sasikalak@vmkvec.edu.in
2.	Mr.K.Karthik	Assistant Professor	CSE	karthik@avit.ac.in

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

PREAMBLE

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

PREREQUISITE

Object Oriented Programming Lab

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS.

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

References:

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. K. SASIKALA	Associate Professor	CSE	sasikalak@vmkvec.edu.in
2.	R.Shobana	Assistant Professor(G II)	CSE	muthuselvan@avit.ac.in

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

PREAMBLE

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

PRERQUISITE

NIL

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS:

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

10. Heap Sort
11. Quick Sort

REFERENCES:

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

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. R. Jaichandran	Associate Professor	Computer science and engineering	jaichandran@avit.ac.in
3	Dr. M. Nithya	Prof & Head	Computer science and engineering	nithya@vmkvec.edu.in

	ADVANCED JAVA PROGRAMMING	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

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

PREREQUISITE

Java Programming

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

JAVA FUNDAMENTALS

Java I/O streaming – filter and pipe streams – Byte Code interpretation - reflection – Dynamic Reflexive Classes – Threading – Java Native Interfaces- Swing.

NETWORK PROGRAMMING IN JAVA

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

APPLICATIONS IN DISTRIBUTED ENVIRONMENT

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

MULTI-TIER APPLICATION DEVELOPMENT

Server side programming – servlets – Java Server Pages - Applet to Applet communication – applet to Servlet communication - JDBC – Using BLOB and CLOB objects – storing Multimedia data into databases – Multimedia streaming applications – Java Media Framework.

ENTERPRISE APPLICATIONS

Server Side Component Architecture – Introduction to J2EE – Session Beans – Entity Beans – Persistent Entity Beans – Transactions.

TEXT BOOK

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

REFERENCE BOOKS

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Mrs.S. Leelavathy	Assistant Professor	CSE	leelavathy@avit.ac.in
2.	Dr.K.Sasikala	Associate Professor	CSE	sasikalak@vmkvec.edu.in

	OBJECT ORIENTED ANALYSIS AND DESIGN	Category	L	T	P	Credit
		PE	3	0	2	4

PREAMBLE

This syllabus is intended for the Engineering students and enable them to lean about basic concepts of designing object oriented systems and its application in Programming. This syllabus helps the students to develop software by identifying and implementing a set of objects and their interactions to meet the desired objectives.

PREREQUISITE

Object Oriented Programming.

COURSE OBJECTIVES

1.	To impart basic knowledge in analyzing the software systems so that the student will understand the object oriented concepts and they can design the object oriented systems effectively.
2.	To inculcate the knowledge of various UML (Unified Modeling language)diagrams
3.	To lay foundation for practical applications of object oriented concepts in programming aspects

COURSE OUTCOMES

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

CO1: To learn about various UML diagrams and design patterns	Understand
CO2: To do case study on various real time systems and applying design patterns	Apply
CO4: To Practice the for the basic concepts	Apply
CO4: To implement the design to code and perform testing	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO OOAD

Introduction to OOAD – Unified Process - UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

DESIGN PATTERNS

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller – Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioral – Strategy – observer

CASE STUDY

Case study – the Next Gen POS system, Inception –Use case Modeling – Relating Use cases – include, extend and generalization – Elaboration – Domain Models – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition

APPLYING DESIGN PATTERNS

System sequence diagrams – Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement – UML class diagrams – UML interaction diagrams – Applying GoF design patterns

CODING AND TESTING

Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing

TEXT BOOKS

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development‖, Third Edition, Pearson Education

2.Object Oriented Analysis And Design By Brahama Dathan & Sranath Ramnath

REFERENCES

1. Simon Bennett, Steve Mc Robb and Ray Farmer, ―Object Oriented Systems Analysis and Design Using UML‖, Fourth Edition, Mc-Graw Hill Education
2. . Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable Object-Oriented Software‖, Addison-Wesley

Martin Fowler, ―UML Distilled: A Brief Guide to the Standard Object Modeling Language‖, Third edition, Addison Wesley

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.S.Senthilkumar	Assistant Professor	CSE	ssenthilkumar@vmkvec.edu.in
2.	Mrs.S. Leelavathy	Assistant Professor	CSE	leelavathy@avit.ac.in

	NETWORKING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

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 and solution at each layer for given application. Trace the flow of information from one node to another node in the network.

PREREQUISITE

NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

S- Strong; M-Medium; L-Low

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. Create a socket for HTTP for web page upload and download.
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. Implementation Of File Transfer Protocol
11. Remote Command Execution Using UDP
12. ARP Implementation Using UDP

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. S. Senthilkumar	Assistant Professor	CSE	senthilkumars@vmkvec.edu.in
2.	Mr. K. Karthik	Assistant Professor	CSE	karthik@avit.ac.in

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

PREAMBLE

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

PRERQUISITE

Nil

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction to problem solving with computers - Computing Systems:

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

Algorithm Design: Fundamental algorithms:

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

Merging, Sorting and Searching Techniques:

Two way merge – sorting by selection sort – sorting by exchange – sorting by insertion – linear search – binary search Array techniques: Array order reversal – Statistical measurement - array counting - array Partitioning Text Processing and Pattern Searching: Key word search – text line editing –linear pattern search.

Programming Concepts:

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

Modular Programming and Functions:

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

TEXT BOOK:

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

REFERENCES:

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

COURSE DESIGNERS

S. No	Name of the Faculty	Designation	Department	Mail ID
1.	Mr. B. Sundharamurthy	Assistant Professor	CSE	sundharamurthy@vmkvec.edu.in
2.	Mr.K.Karthik	Assistant Professor	CSE	karthik@avit.ac.in

	COMPUTER PROGRAMMING LAB	Category	L	T	P	Credit
		CC	0	0	4	2

PREAMBLE

This course is designed to complement the course Problem Solving using Computer. The purpose of this laboratory course is to give hands on training to the students in understanding and practicing the programming concepts and algorithms. This will improve the problem solving capability of the students.

PRERQUISITE NIL

COURSE OUTCOMES

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

CO1 Write, compile, debug, link and execute C program for the given specification/application	Apply
CO2. Design and implement algorithms involving decision structures, loops, arrays and pointers.	Apply
CO3. Use different data structures for solving the given problem using computer	Apply
CO4. Create/update data files.	Apply
CO5. Analyze the implementation complexity of algorithm by modularizing the problem into small modules for the given problem	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

LIST OF EXPERIMENTS

1. Basic programs to understand different types of data, operators and expressions.
2. Programs using control structures
   - i) Factorial of a number
   - ii) Fibonacci series
   - iii) Generating prime numbers
   - iv) Generating Armstrong numbers
   - v) Greatest common divisor
3. Programs using arrays
   - i) Merging of arrays
   - ii) Array order reversal
   - iii) Selection sort
   - iv) Bubble sort
   - v) Insertion sort
4. Programs using strings
   - i) Palindrome checking
   - ii) String sorting
   - iii) Linear pattern search
   - iv) Text line editing

5. Programs using functions
6. Programs using pointers
7. Programs using structures
8. Programs using file structure

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr. B. Sundharamurthy	Assistant Professor	CSE	sundharamurthy@vmkvec.edu.in
2	Mr.K.Karthik	Assistant Professor	CSE	karthik@avit.ac.in

	BIG DATA AND ANALYTICS	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

Big data provides unprecedented opportunities to drive information-based innovation in economies, healthcare, publicsafety, education, transportation and almost every human endeavour. Big data also creates risk to both individuals andsocietyunless effectivegovernance isinplace.

PREREQUISITE : DBMS&DataMining

COURSEOBJECTIVES

1	Tounderstandhowbigdataanalyticscanleverageintoakeycomponent
2	Tounderstandthebigdatatoolswiththeirapplications
3	Tounderstandthebigdatareportsfortheexistingtools

COURSEOUTCOMES

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

CO1: Tounderstandthebasicsofdigitaldataandintroductiontobigdata	Understand
CO2: To learn the basic bigdata challenges,important and technologies.	Apply
CO3: TolearntheHadooparchitectureandtechnologies.	Apply
CO4: To learn the big data applications likeMongoDB,Cassandra and Hive.	Apply
CO5: To learn the Pig and Jasper Reports..	Apply

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

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

S-Strong;M-Medium;L-Low

SYLLABUS

DIGITAL DATA AND INTRODUCTION TO BIG DATA

TypesofDigitalData-StructuredData-Semi-StructuredData-UnstructuredData-IntroductiontoBigData-WhatisBigData–Characteristics of Big data-WhyBigData–Applications of Big data-TraditionalBusinessIntelligence(BI)versusBigData-TypicalHadoopEnvironment-CoexistenceofBigDataandDataWarehouse.

BIG DATA ANALYTICS

BigDataAnalytics-ClassificationofAnalytics with examples-GreatestChallengesthatPreventBusinessesfromCapitalizingonBigData-GreatestChallengesthatPreventBusinessesfromCapitalizingonBigData-TechnologiesforMeettheChallengesPosedbyBigData-DataScience-DataScientist-AnalyticsTools.

HADOOP

IntroductiontoHadoop-HadoopComponents-HadoopConceptualLayer-HighLevelArchitectureofHadoop-BusinessValueofHadoop–GFS-HadoopDistributedFileSystem-ProcessingDatawithHadoop-MapReduceDaemons-MapReduceworking-MapReduceExample-ManagingResourcesandApplicationwithHadoopYARN-HadoopEcosystem.

MONGODB, CASSANDRA AND HIVE

MongoDB-RDBMSandMongoDB-DataTypesinMongoDB-CRUD-IntroductiontoApacheCassandra-FeaturesofCassandra-CQLDataTypes-CQLSH-Keyspaces-CRUD-Collections-UsingaCounter-TimeToLive(TTL)-Alter-ImportandExport-ExporttoCSV-ImportfromCSV-ImportfromSTDIN-ExporttoSTDOUT-SystemTables-PracticeExamples-IntroductiontoHive-HiveArchitecture-HiveDataTypes-HiveFileFormat-HiveQueryLanguage-RCFILEImplementation-SERDE-UDF.

PIG AND JASPER REPORTS

AnatomyofPig-PigonHadoop-PigPhilosophy-UseCaseforPig:ETLProcessing-PigLatinOverview-DataTypesinPig-RunningPig-ExecutionModesofPig-HDFSCommands-RelationalOperators-EvalFunction-ComplexDataType-PiggyBank-UDF(UserDefinedFunction)-ParameterSubstitution-DiagnosticOperator-WordCountExample-WhentousePig?-WhenNOTtousePig?-PigatYahoo-PigversusHive-HiveVsPig-IntroductiontoJasperReports,JaspersoftStudio-ConnectingtoMongoDBNoSQLdatabase-ConnectingtoCassandraNoSQLDatabases

TEXT BOOKS

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

REFERENCES

1. FrankJOhlhorst,"BigDataAnalytics:TurningBigDataintoBigMoney",WileyandSASBusinessSeries,2012.
2. ColleenMccue,"DataMiningandPredictiveAnalysis:IntelligenceGatheringandCrimeAnalysis",Elsevier,2007
3. MichaelBerthold,DavidJ.Hand,IntelligentDataAnalysis,Springer,2007.
4. AnandRajaramanandJeffreyDavidUllman,MiningofMassiveDatasets,CambridgeUniversityPress,2012.
5. BillFranks,"TamingtheBigDataTidalWave:FindingOpportunitiesinHugeDataStreamswithAdvancedAnalytics",WileyandSAS BusinessSeries,2012

COURSE DESIGNERS

S.No.	NameoftheFaculty	Designation	Department	MailID
1	S.Muthuselvan	AssistantProfessor	CSE	muthuselvan@avit.ac.in
2	Dr.S.Senthilkumar	AssociateProfessor	CSE	vmkvec.itsenthilkumar@gmail.com

	ETHICAL HACKING	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

To analyze the basic concepts of security and hacking process

PREREQUISITE

NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

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

HACKING TECHNIQUES

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

WEB SECURITY

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

WIRELESS NETWORK HACKING

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

APPLICATIONS

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

TEXT BOOKS

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

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

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

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

REFERENCES

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Associate Professor(G-II)	CSE	rjaichandran@avit.ac.in
2	M. Annamalai	Assistant Professor	CSE	annamalaim@vmkvec.edu.in

	MOBILE COMPUTING	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

To learn the standards and issues in Mobile Computing.

PREREQUISITE

COMPUTER NETWORKS

COURSE OBJECTIVES

1	To Learn wireless transmission Basics
2	To learn different Architectures of Communication Systems
3	To learn protocols in Mobile Network and Transport Layer

COURSE OUTCOMES

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

CO1: Explain the basics of wireless transmission and signal processing	Understand
CO2: Understand the concept of cellular network	Understand
CO3: Understand the concept of wireless lan network	Understand
CO4: Apply the concept of mobile network and transport layer	Apply
CO5: Identify and learn the adhoc wireless network	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	-	-	-	-	-	-	S	M	M	M
CO2	S	M	L	-	M	-	-	-	-	-	-	S	M	M	-
CO3	S	M	L	-	M	-	-	-	-	-	-	M	-	S	-
CO4	S	M	L	-	M	-	-	-	-	-	-	M	S	S	S
CO5	S	M	L	-	M	-	-	-	-	-	-	M	M	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction – wireless transmission – radio propagation – signals and propagation – antennas – multiplexing and modulation – spectrum - operation of cellular systems, planning a cellular system, analog & digital cellular systems.

MOBILITY AND BANDWIDTH MANAGEMENT IN CELLULAR NETWORKS

Call setup in mobile IP Network - Handoff Management - Mobility Models - Bounds on Bandwidth - Algorithms for Channel Assignment - Coalesced CAP - Localization of Mobile Nodes - Benchmark Instances.

WIRELESS LAN

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

MOBILE NETWORK LAYER AND TRANSPORT LAYER

Reference model -Handover Location Management -Mobile QOS-Access Point Control Protocol, Mobile IP-DHCP- Mobile transport layer-Traditional TCP-Indirect snooping-Mobile TCP- Wireless Application protocol.

ADHOC WIRELESS NETWORKS

Introduction-Issues in Adhoc Wireless Networks-Adhoc Wireless Internet-Routing protocols in Ad Hoc networks-Security in Ad hoc networks. Case Studies: Automatic transfer of Plans- Identifying the callee.

TEXT BOOKS

1. Jochen Schiller, “Mobile Communications”, Addison Wesley, 2000.
2. C.Siva Ram Murthy and B.S Manoj “Ad hoc Wireless Networks”, Pearson Education,2007.
3. K. Sinha, S.C. Ghosh and Bhabani P. Sinha "Wireless Networks and Mobile Computing", CRC Press, 2015.

REFERENCES

1. Mobile Computing Principles-Reza B’Far-Cambridge University Press-2005.
2. Uyless Black, “Mobile and Wireless Networks”, Prentice Hall , 1996.
3. Willian C.Y.Lee, Mobile Communication Design Fundamentals, John Wiley, 1993.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	V.Subapriya	Assitant Professor (G-II)	CSE	subapriyacse@avit.ac.in
2	Dr.M.Nithya	Professor	CSE	nithya@vmkvec.edu.in

	UNIX INTERNALS	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

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

PREREQUISITE

NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

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

DISK BLOCKS

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

FILE SYSTEM

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

PROCESS MANAGEMENT

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

MEMORY MANAGEMENT

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

TEXT BOOKS

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

REFERENCES

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	V.Subapriya	Assitant Professor (G-II)	CSE	subapriyacse@avit.ac.in
2	Dr.V.Amirthalingam	Associate Professor	CSE	Amirthalingam@vmkvec.edu.in

	WIRELESS AND SENSOR NETWORKS	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

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

PREREQUISITE

Fundamentals of communication systems and digital systems and basic programming

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION OVERVIEW AND APPLICATIONS OF WIRELESS SENSOR NETWORK

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

BASIC WIRELESS SENSOR TECHNOLOGY AND SYSTEMS:

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

SENSOR NETWORKS – INTRODUCTION & ARCHITECTURES

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

TRANSPORT CONTROL AND MIDDLEWARE FOR WIRELESS SENSOR NETWORKS

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

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

SENSOR NETWORK SECURITY

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

TEXT BOOKS

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

REFERENCES

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. Nitishagarwal	Associate Professor	CSE	nitishaaggarwal@avit.ac.in
2	Dr.K.Sasikala	Associate Professor	CSE	sasikala@vmkvec.edu.in

	SOFT COMPUTING	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

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

PREREQUISITE

Artificial Intelligence and Expert Systems

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

FUZZY SET THEORY

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

OPTIMIZATION

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

NEURAL NETWORKS

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

NEURO FUZZY MODELING

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

APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

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

TEXT BOOKS

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

REFERENCES

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	R.Shobana	Associate Professor	CSE	shobana@avit.ac.in
2.	Dr.K.Sasikala	Associate Professor	CSE	sasikala@vmkvec.edu.in

	C# AND .NET APPLICATION DEVELOPMENT	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

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

PREREQUISITE

JAVA PROGRAMMING

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION:

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

OBJECT ORIENTED ASPECTS OF C#:

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

I/O AND NETWORK PROGRAMMING:

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

ADO.NET: #:

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

ASP.NET AND WEB SERVICES:

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

TEXT BOOK

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

REFERENCE BOOKS

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr. M. Nithya	Prof & Head	Computer science and engineering	nithya@vmkvec.edu.in
2.	Mrs. R. Shobana	Assistant Professor (GII)	Computer Science And Engineering	shobana@avit.ac.in

	CLOUD COMPUTING	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

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

PREREQUISITE NIL

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Professor	CSE	rjaichandran@avit.ac.in
2.	T.Geetha	Assistant professor	CSE	geetha_kcs@yahoo.com

	AGILE METHODOLOGIES	Category	L	T	P	Credit
		PE	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

Software Engineering

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

SYLLABUS

FUNDAMENTALS OF AGILE

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

AGILE SCRUM FRAMEWORK

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

AGILE TESTING

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

AGILE SOFTWARE DESIGN AND DEVELOPMENT

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

INDUSTRY TRENDS

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

TEXT BOOKS

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

REFERENCES

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

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	S. Muthuselvan	Assistant Professor	CSE	muthuselvan@avit.ac.in
2	M. Annamalai	Assistant Professor	CSE	annamalaim@vmkvec.edu.in

	MACHINE LEARNING	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

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

PREREQUISITE: Nil

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

CO1: Understand the key concepts of machine learning	Understand
CO2: Understand and apply supervised learning and classification techniques	Understand
CO3: Apply the concept of unsupervised learning and Clustering for applications	Apply
CO4: Unerstand theoretical and practical aspects o dimensionality reduction	Understand
CO5: Understand theoretical and practical aspects of reinforcement learning	Understand

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Machine Learning - Examples of machine learning applications- Types of machine learning –Model selection and generalization – Guidelines for Machine Learning Experiments

SUPERVISED LEARNING

Classification - Decision Trees – Univariate Tree –Multivariate Tree - Pruning –Perceptron – Multilayer Perceptron - Back Propagation – Cross Validation and Resampling Methods

UNSUPERVISED LEARNING

Clustering- Mixture densities -K-means - EM Algorithm – Supervised Learning After Clustering- Hierarchical Clustering

DIMENSIONALITY REDUCTION

The Curse of Dimensionality –Subset Collection - Principal Component Analysis - Factor Analysis – Linear Discriminant Analysis, Accuracy, Precision, recall, F measure.

REINFORCEMENT LEARNING

Single State Case – Elements of Reinforcement Learning - Model Based Learning – Temporal Difference Learning – Generalization in Reinforcement Learning - Policy Search

TEXT BOOKS

1. EthemAlpaydin, Introduction to Machine Learning MIT Press, 2014.

REFERENCES

1. Tom M Mitchell, Machine Learning, First Edition, McGraw Hill Education, 2013
2. Richard S. Sutton and Andrew G. Barto: Reinforcement Learning: An Introduction. MIT Press

COURSE DESIGNER

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Professor	CSE	rjaichandran@avit.ac.in
2	Mrs.A.Kasthuri	Assitant Professor	CSE	kasthuri@vmkvec.edu.in

	DEEP LEARNING	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

This course provides an introduction to the basics of machine learning, neural networks, and Deep learning techniques. This course also provides the learning practice and acquires knowledge on deep learning tools.

PREREQUISITE: Machine Learning

COURSE OBJECTIVES

1	To study the basics of machine learning, neural networks and deep learning
2	To study the present the mathematical, statistical and computational challenges of building deep neural networks
3	To study the dimensionality reduction techniques
4	To know deep learning techniques to support real-time applications
5	To examine the case studies of deep learning techniques

COURSE OUTCOMES

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

CO1: Understand basics of machine learning, neural networks and deep learning	Understand
CO2: Implement various deep learning models	Apply
CO3: Realign high dimensional data using reduction techniques	Apply
CO4:Understand and apply scaling up machine learning techniques and associated computing techniques and technologies	Apply
CO5: Analyze optimization and generalization in deep learning	Apply
CO6: Explore the deep learning application	Create

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introduction to machine learning- Linear models (SVMs and Perceptions, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximate.

DEEP NETWORKS

History of Deep Learning- A Probabilistic Theory of Deep Learning- Backpropagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks Convolutional Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning.

DIMENSIONALITY REDUCTION

Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization.

OPTIMIZATION AND GENERALIZATION

Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization- Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience.

CASE STUDY AND APPLICATIONS

Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec - Joint DetectionBioInformatics- Face Recognition- Scene Understanding- Gathering Image Captions.

REFERENCE BOOKS

1. CosmaRohillaShalizi, Advanced Data Analysis from an Elementary Point of View, 2015.
2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
3. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning, MIT Press, 2016.
4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Professor	CSE	rjaichandran@avit.ac.in
2	A.Kasthuri	Assitant Professor	CSE	kasthuri@vmkvec.edu.in

	DATA VIRTUALIZATION	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

This course focuses on the challenges in setting up a data center. Resource monitoring using hypervisors and access control to virtual machines will be covered in depth in this course. Setting up of a virtual data center and how to manage them with software interfaces will be discussed in detail

PREREQUISITE

Database Management System

COURSE OBJECTIVES

1	To learn the concepts of Web design patterns and page design
2	To understand and learn the scripting languages with design of web applications
3	To learn the maintenance and evaluation of web design
4	To learn about Resource monitoring and virtual machine data Protection

COURSE OUTCOMES

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

CO1: Explain the concept of data center and Evolution of Data Centre	Understand
CO2: Apply enterprise-level virtualization machines through software management interfaces, Environments connectivity.	Apply
CO3: Illustrate the virtualization deployment, modification, management; monitoring and migration methodologies	Apply
CO4: Analyze the utility in Windows Vista and later, displays information about the use of hardware and software resources in real time.	Analyze
CO5: Develop the resource monitoring and virtual machine data Protection skills.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

SYLLABUS

DATA CENTER CHALLENGES

How server, desktop, network Virtualization and cloud computing reduce data centre footprint, environmental impact and power requirements by driving server consolidation; Evolution of Data Centres: The evolution of computing infrastructures and architectures from standalone servers to rack optimized blade servers and unified computing systems (UCS).

ENTERPRISE-LEVEL VIRTUALIZATION

Provision, monitoring and management of a virtual datacenter and multiple enterprise-level virtual servers and virtual machines through software management interfaces; Networking and Storage in Enterprise Virtualized Environments - Connectivity to storage area and IP networks from within virtualized environments using industry standard protocols

VIRTUAL MACHINES & ACCESS CONTROL

Virtual machine deployment, modification, management; monitoring and migration methodologies.

RESOURCE MONITORING

Physical and virtual machine memory, CPU management and abstraction techniques using a hypervisor

VIRTUAL MACHINE DATA PROTECTION

Backup and recovery of virtual machines using data recovery techniques; Scalability - Scalability features within Enterprise virtualized environments using advanced management applications that enable clustering, distributed network switches for clustering, network and storage expansion; High Availability : Virtualization high availability and redundancy techniques.

TEXT BOOKS

1. Mickey Iqbal, "IT Virtualization Best Practices: A Lean, Green Virtualized Data Center Approach", MC Press [ISBN: 978-1583473542] 2012.

2. Mike Laverick, "VMware vSphere 4 Implementation" Tata McGraw-Hill Osborne Media; 1 edition [ISBN: 978-0071664523], 2012.

3. Jason W. McCarty, Scott Lowe, Matthew K. Johnson, "VMware vSphere 4 Administration Instant

REFERENCES

1. Brian Perry, Chris Huss, Jeantet Fields, "VCP VMware Certified Professional on vSphere 4 Study Guide" Sybex; edition [ISBN: 978-0470569610], 2013.

2. Jason Kappel, Anthony Velte, Toby Velte, "Microsoft Virtualization with Hyper-V: Manage Your Datacenter with Hyper-V, Virtual PC, Virtual Server, and Application Virtualization" McGraw-Hill Osborne [ISBN: 978- 007161

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	K.Karthik	Assistant Professor	CSE	karthik@avit.ac.in
2	A.Kasthuri	Assistant Professor	CSE	kasthuri@vmkvec.edu.in

	DATA WAREHOUSING AND DATA MINING	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

Data warehousing and data mining is one of the most advanced fields of computer science which involves use of Mathematics, Statistics, Information Technology and information Sciences in discovering new information and knowledge from large databases It is a new emerging interdisciplinary area of research and development which has created interest among scientists of various disciplines.

PREREQUISITE

Database Management System

COURSE OBJECTIVES

1.	Distinguish a data warehouse from an operational database system, and appreciate the needs for developing a data warehouse for large corporation.
2.	Describe the problems and processes involved in the development of a data warehouse
3.	To explain the process of data mining and its importance.

COURSE OUTCOMES

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

CO1:. 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

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

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr. S. Muthuselvan	Assistant Professor	CSE	muthuselvan@avit.ac.in
2.	Dr. K. Sasikala	Assistant Professor	CSE	sasikalak@vmkvec.edu.in

	COMPUTER GRAPHICS AND MULTIMEDIA	Category	L	T	P	Credit
		PE	3	0	0	3

Preamble

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

Prerequisite NIL

Course Objective

	To implement the orthographic projections of points, straight lines, plane surfaces and solids.
	To construct the orthographic projections of sectioned solids and true shape of the sections.
	To develop lateral surfaces of the uncut and cut solids.
	To draw the pictorial projections (isometric and perspective) of simple solids.
	To sketch by free hand the orthographic views from the given pictorial view.

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

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

Syllabus:

Unit 1: INTRODUCTION TO COMPUTER GRAPHICS : Brief Survey of Computer Graphics – Graphics Systems: Video Display Devices – Types – Raster-Scan Systems and Random-Scan Systems – Input Devices – Hard-Copy Devices – Graphics Software.

Unit-2: OUTPUT PRIMITIVES AND THEIR ATTRIBUTES Line-Drawing (DDA and Bresenham's) Algorithms – Circle-Generating (Midpoint) Algorithm – Ellipse-Generating (Midpoint) Algorithms- Area-Filling (Boundary-Fill and Flood-Fill) Algorithms - Line Attributes - Color and Grayscale Levels – Character Attributes – Inquiry Functions.

Unit 3: TWO-DIMENSIONAL TRANSFORMATIONS AND VIEWING: Basic Transformations - Matrix Representations and Homogeneous Coordinates – Composite Transformations - Other Transformations – Window-to- Viewport Coordinate Transformation – Clipping Algorithms: Cohen-Sutherland Line Clipping and Sutherland- Hodgeman Polygon Clipping – Basic Modeling Concepts - Interactive Input Methods: Logical Classification of Input Devices – Interactive Picture-Construction Techniques.

Unit-4: THREE-DIMENSIONAL CONCEPTS: Three-Dimensional Display Methods: Parallel and Perspective Projections – Depth Cueing - Visible Line and Surface Identification – Polygon Surfaces: Polygon Tables, Plane Equations and Polygon Meshes - Three-Dimensional Transformations: Basic, Other and Composite Transformations.

Unit-5 : THREE-DIMENSIONAL VIEWING : Viewing Pipeline and Coordinates – Transformation from World to Viewing Coordinates – Projection Transformations - Matrices - View Volumes - Hidden Surface and Hidden Line Elimination Methods: Back-Face Detection , Depth-Buffer and A-Buffer Methods –Wireframe Methods- Light Sources – RGB,CMY and HLS Color Models – Computer Animation: Design of its Sequences and Language

Text Books

1. **Donald Hearn and Pauline Baker M, "Computer Graphics", Prentice Hall, New Delhi, 2007 (UNIT V).**
2. **Elements of Multimedia *By Sreeparna Banerjee*Published May 8, 2019 by Chapman and Hall/CRC 203 Pages 49 B/W Illustrations**

Reference Books

1. **Introduction to Computer Graphics and Multimedia by Anirban Mukhopadhyay**
2. Introduction to Computer Graphics

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	S.Leelavathy	Assitant Professor	CSE/ AVIT	leelavathy@avit.ac.in
2	A.Kasthuri	Assitant Professor	CSE	kasthuri@vmkvec.edu.in

	E-LEARNING TECHNIQUES	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

It is used to reducethe communication gap between students and tutors, without time and location constraints.

PREREQUISITE–NIL

COURSEOBJECTIVES

1.	To enable the students to understand the concept of e-learning
2.	To make the students to understand the technology mediated communication
3.	To make the students to understand the role of information technology in virtual classroom and university.

COURSEOUTCOMES

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

Understand the phases of activities in models of E-learning	Understand
Identify appropriate E-Learning instructional methods and delivery strategies	Analysis
Choose appropriate E-learning Authoring tools	Understand & Apply
Design a simple web page with animated web advertisement	Design
Evaluate the future of e-learning technology	Evaluate

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

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

S-Strong;M-Medium;L-Low

SYLLABUS

CONCEPT OF E-LEARNING

Nature, Scope, History – Evolution of E-Learning –Components of ELearning – Virtual classroom: Teleconferencing, Audio and Video conferencing.

STRATEGIES OF E-LEARNING

Process of E-Learning: Knowledge Acquisition– Sharing of Knowledge – Utilization of Knowledge – E-Learning Instructional Grounds: Behaviorism, Cognitivism and Constructivism

MODELS OF E-LEARNING

Role of Web-Based Instruction in Learning – Models of WBI: Instructional Design Model (ISD) & Hyper Media Design Model (HMD) – Computer Languages for Designing WBI

MULTI/HYPER MEDIA FOR E-LEARNING CONCEPT

Characteristics and Applications – Teaching Techniques through Multi/Hyper Media – Multimedia & Learning – Multimedia for Co-operative and Collaborative Learning Strategies – Advantages & Disadvantages of Multi/Hyper Media.

FUTURE OF E-LEARNING TECHNOLOGY

Challenges of Distance Education – Electronic Media in Distance Education – Open Educational Resources / Open Learning – Internet in Distance Education – Virtual University System.

TEXTBOOKS

1. Integrating Technology into Teaching and Learning: Concepts and Applications, Michael D. Wiliams, Prentice Hall,2000.

REFERENCES

1. The Integrated Technology Classroom, Joan Riedl, Allyn and Bacon, 1995.

2. E-Learning Concepts and Practice, Bryn Holmes and John Gardiner,Pine Forge Press, 2006.

CourseDesigners:

S.No.	NameoftheFaculty	Designation	Department	MailID
1.	V.Subapriya	AssistantProfessor	CSE/AVIT	subapriyacse@avit.ac.in
2.	A.Kasthuri	AssistantProfessor	CSE/VMKVEC	kasthuri@vmkvec.edu.in

	NETWORK DESIGN AND MANAGEMENT	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

Ability to access, compile and use MIBs, to implement a Network Management System, and to formulate SLAs and Policies for Network Management.

PREREQUISITE

Computer Networks

COURSE OBJECTIVES

1	Appreciate methods of analysis and problem-solving techniques for network management
2	Understand SNMP message formats
3	Integrate SNMP, SMI, and Web-based management
4	Understand the importance of SLAs and Policies in Network Management
5	To understand the concept of MPLS

COURSE OUTCOMES

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

CO1: Realize the methods of analysis and problem-solving techniques for network management	Apply
CO2: Describe the tools and applications used for network management	Apply
CO3: The ability to make a critical evaluation of the theories, techniques and systems used in planning, design, implementation and security of modern communication networks as well as the services they support	Analyze
CO4: Configure Protocol, methods and Policies to deploy the Network Management Architecture	Analyze
CO5: Examines broader issues associated with network management including Models Provisioning Issues, Mechanisms and Management Interfaces	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

OVERVIEW

Requirements for the Management of Networked Systems, Management Scenarios, Management Functions, Organizational Aspects of Management, Time Aspects of Management, Network Management Standards and Models.

IP Network Management

Introduction, Configuration Methods, Management Information Base, Simple Network Management Protocol, Extensible Markup Language, Common Object Request Broker Architecture, Configuration Protocols, Statistics collection, Policy Control, IP-Based Service Implementation, OSS, Provisioning Issues, Network Management Issues, OSS Architecture

SNMP & RMON

Organization and Information Models, Communication and Functional Models, Features of SNMPv1, SPMPv2 and SNMPv3, RMON SMI and MIB, Features of RMON1 and RMON2.

Network Management Architecture

Introduction, Defining Network Management, Network Management Mechanisms, Architectural Considerations.

MPLS Network Management

Introduction to MPLS, MPLS Applications, Key Aspects of MPLS Network Management, MIB Modules for MPLS, Overview of MPLS Management Interfaces, SNMP support for MPLS.

TEXT BOOKS

1. Farrel et al., "Network Management - know it all", Morgan Kauffman Publishers, Elsevier Press.
2. Subramanian Mani, "Network Management – Principles and Practice", Pearson Education India.
3. Burke Richard, "Network Management – Concepts and Practice", Pearson Education India.

REFERENCES

1. An Engineering Approach to Computer Networks-S.Keshav,2ndEdition,Pearson Education.
2. Understanding communications and Networks,3rd Edition, W.A.Shay,Cengage Learning

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	V.Subapriya	Assistant Professor	CSE	subapriyacse@avit.ac.in
2	A.Kasthuri	Assistant Professor	CSE	kasthuri@vmkvec.edu.in

	SOFTWARE TESTING	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

The rapid development of automated aids to development and testing increases the need of change from manual testing to automated testing. Effective software testing maintains software quality. Software quality assurance starts from the beginning of a project, right from the analysis phase and thus understanding the role of software testing is very much mandatory. The primary outcome of the course is to provide exposure on research trends in Software Test Automation and Quality Assurance by sharing the research expertise with peers and gain research competence from Industry and Academicians.

PREREQUISITE

Software Engineering

COURSE OBJECTIVES

1	The students will be able to differentiate between quality control, quality management and quality assurance
2	The students will be able to discuss the different components of SQA system
3	The students will be able to discuss different software quality factors models
4	The students will be able to understand the rational for the SE code of ethics and discuss them

COURSE OUTCOMES

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

CO1: Various test procesess and continuous quality improvement	Understand
CO2: Methods of test generation from requirements	Apply
CO3: Test adequacy assessment using: control flow, data flow, and program mutations	Apply
CO4: Combinatorial test generation	Analyze
CO5: Application of software testing techniques in commercial environments	Evaluate

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

PRINCIPLES OF TESTING

Need for Testing—Psychology of testing—Testing economics—white box testing , Black box testing, Grey box Testing—Retesting regression Testing—Verification and Validation Testing Strategies—Levels of Testing—Unit, Integration ,System Testing, Acceptance Testing .

TEST CASE DESIGN

Test case Design Strategies – Using Black Bod Approach to Test Case Design – Random Testing – Requirements based testing – Boundary Value Analysis – Equivalence Class Partitioning – State-based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing – Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Evaluating Test Adequacy Criteria

LEVELS OF TESTING

The need for Levers of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing – Compatibility testing – Testing the documentation – Website testing.

TEST MANAGEMENT

People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

AUTOMATED TESTING AND TEST TOOLS & BUG REPORTING

Automated Testing and Test Tools: -benefits-Test Tools-Software Test Automation-Bug Bashes and Beta Testing-Writing and Tracking Test Cases: Goals-Test Case Planning Overview-Bug's Life cycle-Bug-Tracking System-Software Quality Assurance.

9 - hours

TEXT BOOKS

1. Srinivasan Desikan and Gopalaswamy Ramesh, " Software Testing – Principles and Practices", Pearson education, 2006.
2. Aditya P.Mathur, "Foundations of Software Testing", Pearson Education,2008.
3. William Perry, "Effective Methods for Software Testing", Second Edition, John Willey & Sons, 2000.

REFERENCES

1. Boris Beizer, "Software Testing Techniques", Second Edition,Dreamtech, 2003
2. Elfriede Dustin, "Effective Software Testing", First Edition, Pearson Education, 2003.
3. RenuRajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2004..

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.R.Jaichandran	Professor	CSE	jaichandran@avit.ac.in
2	V.Amirthalingam	Asso .Professor	CSE	Amirthalingam@vmkvec.edu.in

	IT INFRASTRUCTURE AND MANAGEMENT	Category	L	T	P	Credit
		PE	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

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.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	V.Subapriya	Assistant Professor	CSE	subapriyacse@avit.ac.in
2	Mr.B.Sundaramurthy	Associate Professor	CSE	sundaramurthy@vmvkec.edu.in

	BLOCK CHAIN TECHNOLOGY	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

Blockchain has the potential to change almost every industry. It can create a more efficient and prosperous world where people can connect with each other without the need for intermediariesThiscoursewillgiveawareness of the new challenges that exist in monetizing businesses around block chains and smart contracts

PREREQUISITE–NIL

COURSEOBJECTIVES

1.	It provides the function of Blockchains as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable
2.	It covers the technological underpinnings of blockchain operations as distributed data structures and decision making systems.
3.	It provides a critical evaluation of existing "smart contract" capabilities and platforms.

COURSEOUTCOMES

Onthesuccessfulcompletionofthecourse,studentswillbeableto

Understand the structure of a blockchain	Understand
Understand what constitutes a "smart" contract, what are its legal implications and what it can and cannot do, now and in the near future,	Understand & Apply
Evaluate the setting where a blockchain based structure may be applied, its potential and its limitations	Evaluate
Analyze the incentive structure in a block chain based system and critically assess its functions, benefits and vulnerabilities;	Analyze
Analyze to what extent smart and self-executing contracts can benefit automation, governance, transparency and the Internet of Things (IOT),	Analyze

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

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

S-Strong;M-Medium;L-Low

SYLLABUS

INTRODUCTION

An Overview of Bit coin -Alternative coins and networks-Bit coin versus Cryptocurrencies versus Block chain-Distributed Ledger Technology (DLT)- HyperLedger-Ethereum.

TRUST AND VUNERABILITY

Short history of the scaling out of human trust, high and Low trust societies, Types of Trust model: Peer-to-Peer, Leviathan, and Intermediary, Cryptocurrency and Markets.

BLOCKCHAIN AND ITS TYPES

How Blockchain (and Bitcoin) Work, Peer to Peer network, Bitcoin and block sizes, Mining and Cryptocurrencies, Types of Blockchain and Enterprise, Public and Private Blockchains.

CONSENSUS

Consensus Building, Problems with Blockchain, Bitcoin and Ethereum

BLOCKCHAIN APPLICATIONS

Use Cases: Open Bazaar and Safe market as decentralized information and reputation (super) marketplaces, reputation brokerages and smart dark net marketplaces (Daemon), Additional functions of decentralized markets
beyond mere products.

TEXTBOOKS

1.Block chain: Blueprint for a New Economy 1st Editionby Melanie Swan

REFERENCES

1. "Mastering Bitcoin: Unlocking digital cryptocurrencies", by Andreas M.AntonopoulosJamesDoveyandAshFurrow,"BeginningObjectiveC",Apress,2012.
2. "Ethereum: Blockchains, Digital Assets, Smart Contracts, Decentralized Autonomous Organizations", by Henning Diedrich

CourseDesigners:

S.No.	NameoftheFaculty	Designation	Department	MailID
1.	V.Subapriya	Assistant Professor	CSE/AVIT	subapriyacse@avit.ac.in
2.	Dr.M.Nithya	Professor	CSE/VMKVEC	nithya@vmkvec.edu.in

	GO PROGRAMMING	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE:
GO Programming Language for statistical data manipulation and analysis. It was inspired by and is most compatible with the statistical language.

PREREQUISITE:
Basics of Object Oriented Programming

COURSE OBJECTIVES

1	To learn GO Programming Language
2	To Study Object Oriented Programming
3	To Study Functional Programming

COURSE OUTCOMES

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

CO1: To Understand the basics in GO programming language in terms of constructs, control statements, string functions	Understand & Apply
CO2: To Understand the use of GO Programming fundamentals.	Understand & Apply
CO3: Learn to apply GO programming for Communicating Sequential Process	Understand & Apply
CO4: Able to appreciate and apply the GO programming from a statistical perspective	Understand & Apply
CO5: To learn GO programming Variables	Understand & Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO3
CO1	S	S	M	M	L	S	S	M	S	L	S	S	-	-	-
CO2	M	S	M	M	M	S	S	M	S	M	M	M	-	-	-
CO3	S	S	S	S	M	S	S	S	S	M	S	S	-	-	-
CO4	S	S	S	M	M	S	S	S	S	L	S	S	-	-	-
CO5	S	S	M	M	L	S	M	M	S	L	M	S	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introducing to Go Programming – Command-Line Arguments – Finding Duplicate Lines – Animated GIFs – Fetching a URL – Fetching URLs Concurrently – A Web Server – Loose Ends – Names – Declarations – Variables – Integers – Floating-Point Numbers - Complex Numbers – Booleans – Strings.

FUNCTIONS

Function Declarations - Arrays – Slices – Maps – Structs – JSON – Text and HTML Templates – Recursion – Multiple Return Values – Function Values – Anonymous Functions – Variadic Functions – Deferred Function Calls – Methods and Declarations - Encapsultion

INTERFACES, GOROUTINES & CHANNELS

Interfaces Types, Contracts, Satification – Interface Values – Assertions Types – Discriminating Errors with Type Assertions – Querying Behaviours with Interface Type Assertions – Types of Switches – Goroutines – Goroutines Channel – Looping in Parallel - Multiplexing.

CONCURRENCY WITH SHARED VARIABLES, PACKAGES , THE GO TOOL

Race Conditions – Mutual Exclusion – Read/Write Mutexes, Memory Synchronization – Lazy Initialization – The Race Detector – Grountines and Threads – Import Paths – The Package Declaration – Blank Reports – Packages and Naming – The Go Tools.

REFLECTION, LOW-LEVEL PROGRAMMING

Introduction – A recursive value printer – Setting Variables – Accessing Struct Field Tags – Displaying the Methods of a Type – A Word of Caution.

TEXT BOOKS:

1. The Go Programming Language, Alan A.A. Donovan, Brian W. Kernighan , Addison – Welsey Professional Computing Series, 2015.
2. The Go Programming Language, David Chisnall , 2012.

REFERENCES:

1. Cocoa Programming Developer's,Pearson Education, 2009.
2. Introducing GO, Caleb Doxey, O'Reilly Media, 2016

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email Id
1	Dr.R.Jaichandran	Professor	CSE/AVIT	rjaichandran@avit.ac.in
2	Dr.R.Bharanidharan	Assitant Professor	CSE/VMKVEC	bharanidharan@vmkvec.edu.in

	R PROGRAMMING	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE:
R is a scripting language for statistical data manipulation and analysis. It was inspired by and is most compatible with the statistical language.

PREREQUISITE:
Basics of Object Oriented Programming

COURSE OBJECTIVES

1	To learn R Programming
2	To Study Object Oriented Programming
3	To Study Functional Programming

COURSE OUTCOMES

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

CO1: To Understand the basics in R programming in terms of constructs, control statements, string functions	Understand & Apply
CO2: To Understand the use of R for Big Data analytics	Understand & Apply
CO3: Learn to apply R programming for Text processing	Understand & Apply
CO4: Able to appreciate and apply the R programming from a statistical perspective	Understand & Apply
CO5: To learn Big Data	Understand & Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Introducing to R – R Data Structures – Help functions in R – Vectors – Scalars – Declarations – recycling – Common Vector operations – Using all and any – Vectorized operations – NA and NULL values – Filtering – Vectorised if-then else – Vector Equality – Vector Element names

MATRICES, ARRAYS AND LISTS

Creating matrices – Matrix operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector/Matrix Distinction – Avoiding Dimension Reduction – Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists

DATA FRAMES

Creating Data Frames – Matrix-like operations in frames – Merging Data Frames – Applying functions to Data frames – Factors and Tables – factors and levels – Common functions used with factors – Working with tables - Other factors and table related functions - Control statements – Arithmetic and Boolean operators and values – Default values for arguments - Returning Boolean values – functions are objects – Environment and Scope issues – Writing Upstairs - Recursion – Replacement functions – Tools for composing function code – Math and Simulations in R

OOP

S3 Classes – S4 Classes – Managing your objects – Input/Output – accessing keyboard and monitor – reading and writing files – accessing the internet – String Manipulation – Graphics – Creating Graphs – Customizing Graphs – Saving graphs to files – Creating three-dimensional plots

INTERFACING

Interfacing R to other languages – Parallel R – Basic Statistics – Linear Model – Generalized Linear models – Non-linear models – Time Series and Auto-correlation – Clustering

TEXT BOOKS:

1. The Art of R Programming: A Tour of Statistical Software Design, Norman Matloff, No Starch Press, 2011
2. R for Everyone: Advanced Analytics and Graphics, Jared P. Lander, Addison-Wesley Data & Analytics Series, 2013.

REFERENCES:

1. Beginning R – The Statistical Programming Language, Mark Gardener, Wiley, 2013.
2. Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R, Robert Knell, Amazon Digital South Asia Services Inc, 2013

1.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Email Id
1	Dr.R.Jaichandran	Professor	CSE	rjaichandran@avit.ac.in
2	A.Kasthuri	Assitant Professor	CSE	kasthuri@vmkvec.edu.in

	RICH INTERNET APPLICATION	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

Uses of web sites and portals have become common for knowledge sharing and business. The course focuses on the fundamentals of CGI, SCRIPTING LANGUAGES, Web Applications.

PREREQUISITE: Java Programming

COURSE OBJECTIVES

1.	To learn CGI Concepts & CGI Programming
2.	To Study DHTML, XML,AJAX
3.	To Study On-Line web application & Internet Concepts

COURSE OUTCOMES

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

CO1: To understand the basic concept of HTML and Scripting Language	Understand
CO2: To learn the HTML, Common Gateway Interface.	Apply
CO3: To learn the Java Script and AJAX	Apply
CO4: To learn the Server side programming	Apply
CO5: To learn the database connectivity.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Internet Principles – Basic Web Concepts – Client/Server model – retrieving data from Internet – HTML and Scripting Languages – Standard Generalized Mark –up languages – Next Generation – Internet –Protocols and Applications

COMMON GATEWAY INTERFACE PROGRAMMING

HTML forms – CGI Concepts – HTML tags Emulation – Server – Browser Communication – E-mail generation – CGI client Side applets – CGI server applets – authorization and security. Introduction to PERL

SCRIPTING LANGUAGES

Java Script Programming-Dynamic HTML-Cascading style sheets-Object model and Event model- Filters and Transitions-Active X Controls-Multimedia-Client side script.- Traditional web application vs AJAX application – creating full scale AJAX application - Forms – Scripting Object

SERVER SIDE PROGRAMMING

Dynamic Web content – cascading style sheets – DHTML – XML – Server side includes – communication – Active and Java Server Pages - Ruby enabled applications

ONLINE

Simple applications – on-line databases – monitoring user events – plug-ins –database connectivity – Internet Information Systems – MICROSOFT IIS - EDI application in business – Internet Commerce – Customization of Internet Commerce

TEXT BOOK

1. Jason Hunter, William Crawford, "Java Servlet Programming", O' Reilly Publications, 1999.
2. Ravi Kalakota and Andrew B Whinston, "Frontiers of Electronic Commerce", Addison Wesley, 1996
3. Eric Ladd, Jim O' Donnel, "Using HTML 4, XML and Java", Prentice Hall of India – QUE,1999
4. Paul JDeitel and Harvey M Deitel, "AJAX, Rich Internet appliactions and web development", Prentice Hall, 2008.

REFERENCES

1. Jeffy Dwight, Michael Erwin and Robert Niles, "Using CGI", Prentice Hall of India QUE, 2010
2. Scot Johnson, Keith Ballinger, Davis Chapman, "Using Active server Pages", Prentice Hall of India, 1999
3. Ted coombs, Jason coombs , Brewer, " Active X source book", John wiley, 1999
4. Evangelos Petroutsos , " Mastering Visual Basic 6", BPB Publications, 1998

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1.	Dr.R.Jaichandran	Assistant Professor G-II	CSE	rjaichandran@avit.ac.in
2.	Mr. B. Sundharamurthy	Assistant Professor	CSE	sundharamurthy@vmkvec..edu.in

	GAME THEORY	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to understand the basics of Game Theory

PREREQUISITE: ENGINEERING MATHEMATICS(17MABS01)

COURSE OBJECTIVES

1	To introduce the student to the notion of a game, its solutions concepts, and other basic notions and
2	To study tools of game theory, and the main applications for which they are appropriate, including electronic trading markets
3	To formalize the notion of strategic thinking and rational choice by using the tools of game theory, and to provide insights into using game theory in modeling applications
4	To draw the connections between game theory, computer science, and economics, especially emphasizing the computational issues
5	To introduce contemporary topics in the intersection of game theory, computer science, and economics

COURSE OUTCOMES

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

CO1: Explain the concept of basic notion of a game, its solutions concepts, and other issues	Understand
CO2: Develop a strategic game theory with perfect information	Apply
CO3: Analyze a formal notion of strategic thinking and rational choice by using tools of game theory	Analyze
CO4: Indentify the non-cooperative game theory form.	Apply
CO5: Analyze the connections between game theory, computer science, and economics, especially emphasizing the computational issues	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Making rational choices: basics of Games – strategy - preferences – payoffs – Mathematical basics - Game theory – Rational Choice - Basic solution concepts-noncooperative versus cooperative games - Basic computational issues - finding equilibria and learning in games- Typical application areas for game theory (e.g. Google's sponsored search, eBay auctions, electricity trading markets).

GAMES WITH PERFECT INFORMATION

Games with Perfect Information - Strategic games - prisoner's dilemma, matching pennies Nash equilibria-theory and illustrations - Cournot's and Bertrand's models of oligopoly- auctions mixed strategy equilibrium-zero-sum games- Extensive Games with Perfect Information repeated games (prisoner's dilemma)- subgame perfect Nash equilibrium; computational issues.

GAMES WITH IMPERFECT INFORMATION

Games with Imperfect Information - Bayesian Games – Motivational Examples – General Definitions – Information aspects – Illustrations - Extensive Games with Imperfect -Information - Strategies- Nash Equilibrium – Beliefs and sequential equilibrium – Illustrations - Repeated Games – The Prisoner's Dilemma – Bargaining.

NON-COOPERATIVE GAME THEORY

Non-cooperative Game Theory - Self-interested agents- Games in normal form - Analyzing games: from optimality to equilibrium - Computing Solution Concepts of Normal-Form Games – Computing Nash equilibria of two-player, zero-sum games -Computing Nash equilibria of twoplayer, general-sum games - Identifying dominated strategies.

MECHANISM DESIGN

Aggregating Preferences-Social Choice – Formal Model- Voting - Existence of social functions - Ranking systems - Protocols for Strategic Agents: Mechanism Design - Mechanism design with unrestricted preferences- Efficient mechanisms - Vickrey and VCG mechanisms (shortest paths) - Combinatorial auctions - profit maximization Computational applications of mechanism design - applications in Computer Science - Google's sponsored search - eBay auctions.

TEXT BOOKS

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth Edition, Sun Microsystems Press, 2008.

REFERENCES

1. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005.
2. David Marshall, Wade A. Reynolds, “Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center”, Auerbach Publications, 2006.
3. Kumar Reddy, Victor Moreno, “Network virtualization”, Cisco Press, July, 2006.
4. Chris Wolf, Erick M. Halter, “Virtualization: From the Desktop to the Enterprise”, APress 2005.
5. Kenneth Hess , Amy Newman, “Practical Virtualization Solutions: Virtualization from the Trenches”, Prentice Hall, 2010.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	V.Subapriya	Assistant Professor	CSE	subapriyacse@avit.ac.in
2	Ms A.Kasthuri	Assistant Professor	CSE	kasthuri@vmkvec.edu.in

	INFORMATION RETRIEVAL TECHNIQUES	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

This syllabus is intended for the Engineering students and enable them to understand the basics of Information Retrieval with pertinence to modeling, query operations and indexing.

PREREQUISITE: 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: Able to Understand searching ,ranking and digital libraries	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION

Motivation – Basic Concepts – Practical Issues - Retrieval Process – Architecture - Boolean Retrieval – Retrieval Evaluation – Open Source IR Systems–History of Web Search – Web Characteristics–The impact of the web on IR —IR Versus Web Search–Components of a Search engine.

MODELING

Taxonomy and Characterization of IR Models – Boolean Model – Vector Model - Term Weighting – Scoring and Ranking –Language Models – Set Theoretic Models - Probabilistic Models – Algebraic Models – Structured Text Retrieval Models – Models for Browsing.

INDEXING

Static and Dynamic Inverted Indices – Index Construction and Index Compression. Searching - Sequential Searching and Pattern Matching. Query Operations -Query Languages – Query Processing - Relevance Feedback and Query Expansion - Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency.

CLASSIFICATION AND CLUSTERING

Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering –Matrix decompositions and latent semantic indexing – Fusion and Meta learning.

SEARCHING AND RANKING

Searching the Web –Structure of the Web –IR and web search – Static and Dynamic Ranking - Web Crawling and Indexing – Link Analysis - XML Retrieval Multimedia IR: Models and Languages – Indexing and Searching Parallel and Distributed IR – Digital Libraries.

TEXT BOOKS

1. Ricardo Baeza – Yates, BerthierRibeiro – Neto, Modern Information Retrieval: The concepts and Technology behind Search (ACM Press Books), Second Edition

2.Textbook Retrieval Systems In Information Management by GG Chowdhury

REFERENCES

1. Christopher D. Manning, PrabhakarRaghavan, HinrichSchutze, Introduction to Information Retrieval, Cambridge University Press, First South Asian Edition

2. Stefan Buttcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval Implementing and Evaluating Search Engines, The MIT Press, Cambridge.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr. S. Muthuselvan	Assistant Professor	CSE	muthuselvan@avit.ac.in
2	T.Geetha	Assistant Professor	CSE	geetha@vmkvec.edu.in

	SOFTWARE QUALITY MANAGEMENT	Category	L	T	P	Credit
		PE	3	0	0	3

PREAMBLE

Software Testing and Quality Assurance is predominant for the smartness of the Software system. Software testing is a critical element of software quality assurance and represents the ultimate review of specification, design and coding. The real challenge to deliver successful software product relies on sound testing strategies and tools.

PREREQUISITE: Software Engineering

COURSE OBJECTIVES

1	The students will be able to differentiate between quality control, quality management and quality assurance
2	The students will be able to discuss the different components of SQA system
3	The students will be able to discuss different software quality factors models
4	The students will be able to understand the rational for the SE code of ethics and discuss them

COURSE OUTCOMES

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

CO1: An ability to understand the quality management in software	Understand
CO2: To analyze the different types of models for quality assurance	Analyze
CO3: To demonstrate software quality infrastructures.	Apply
CO4: To measure various business process reengineering.	Apply
CO5: To know how to prevent the defects.	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3
CO1	S	M	-	M	M	-	-	-	-	-	-	S	-	S	S
CO2	S	S	S	M	M	-	-	M	-	-	-	S	-	M	S
CO3	S	M	S	M	M	-	-	-	-	-	-	S	-	M	S
CO4	S	M	S	-	L	-	-	L	-	-	-	S	-	M	S
CO5	S	M	S	-	M	-	-	L	-	-	-	S	-	M	S

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO SOFTWARE QUALITY & ARCHITECTURE

Need for Software quality – Quality challenges – Software quality assurance (SQA) – Definition and objectives – Software quality factors- McCall‟s quality model – SQA system and architecture – Software Project life cycle Components – Pre project quality components – Development and quality plans

SQA COMPONENTS AND PROJECT LIFE CYCLE

Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – CASE tools for software quality – Software maintenance quality – Project Management

SOFTWARE QUALITY INFRASTRUCTURE

Procedures and work instructions – Templates – Checklists – 3S developmenting – Staff training and certification Corrective and preventive actions – Configuration management – Software change control – Configuration management audit -Documentation control – Storage and retrieval.

SOFTWARE QUALITY MANAGEMENT & METRICS

Project process control – Computerized tools – Software quality metrics – Objectives of quality measurement – Process metrics – Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model.

STANDARDS, CERTIFICATIONS & ASSESSMENTS

Quality manangement standards – ISO 9001 and ISO 9000-3 – capability Maturity Models – CMM and CMMI assessment methodologies – Bootstrap methodology – SPICE Project – SQA project process standards – IEEE st 1012 & 1028 – Organization of Quality Assurance – Department management responsibilities – Project management responsibilities – SQA units and other actors in SQA systems.

TEXT BOOKS

1. DanielGalin, “Software Quality Assurance”, Pearson Publication, 2009.

REFERENCES

1.Alan C. Gillies, “Software Quality: Theory and Management”, International Thomson Computer Press, 1997.

2. Mordechai Ben-Menachem “Software Quality: Producing Practical Consistent Software”, International Thompson Computer Press, 1997.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	K. Karthik	Assistant Professor	CSE	karthik@avit.ac.in
2	B.Sundaramurthy	Associate Professor	CSE	Sundaramurthy@vmkvec.edu.in

	ENGINEERING MANAGEMENT AND ETHICS	Category	L	T	P	Credit
		OEI	3	0	0	3

PREAMBLE:

Engineering management provides technological problem-solving ability of engineering and the organizational to oversee the operational performance of complex engineering enterprises to Engineers. Engineers require honesty, impartiality, fairness, and equity, and dedication to the protection of the public health, safety, and welfare. Ethics emphasises the importance of moral issues, rights and duties of the employees through basic ethics confronting individuals and organizations engaged. It also emphasise values that are morally desirable in engineering practice and research. It allows them to understand various occupational crimes and learn the moral leadership.

PREREQUISITE: Not Required

COURSE OBJECTIVES:

1. To Understand the principles of planning at various levels of the organisation.
2. To analyse and practice the concepts of organizing, staffing to higher productivity.
3. To apply the concepts related to directing and controlling.
4. To understand and apply the case studies to practice code of ethics in organisation.
5. To apply the ethical principles in working environment.

COURSE OUTCOMES:

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

CO1: Understand the importance of planning principles in organization	Understand
CO2: Apply the various strategies of organising and staffing process.	Apply
CO3: Analyse various leadership skills and control techniques for shaping the organization.	Analyse
CO4: Understand and apply best ethical practices in organisation	Analyse
CO5: Analyse and Apply relevant ethical practices in engineering.	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	L	S	M	M	L	S	S	S	S	S	S	M
CO2	M	L	L	-	M	M	M	L	M	S	M	M	M	M	M
CO3	M	M	L	-	M	M	M	L	L	S	S	M	M	M	M
CO4	L	M	-	M	-	M	S	S	S	S	-	M	M	-	L

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

S- Strong; M-Medium; L-Low

SYLLABUS:

PLANNING

Management – Nature & Scope – Functions of Management – Levels of Management – Role of Managers - Nature and purpose of planning - Planning process - Types of plans – Objectives Managing by objective (MBO) - Decision Making - Types of decision - Decision Making Process - Decision Making under different conditions.

ORGANIZING & STAFFING

Nature and purpose of organizing - Organization structure - Formal and informal Organization - Line and Staff authority - Depart mentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training Methods - Performance Appraisal.

DIRECTING & CONTROLLING

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Communication - Barriers to effective Communication – Controlling – Controlling Techniques - Organization Culture - Elements and types of culture – Managing cultural diversity.

INTRODUCTION TO ETHICS

Moral dilemmas -Uses of Ethical Theories- Engineering As Social Experimentation- Engineer's Responsibility For Safety-Codes of Ethics-Challenger Case Study.

ETHICS IN ENGINEERING

Employed Engineers Rights and Duties- Collective Bargaining - Occupational Crime - Global Issues- Multinational Corporation- Technology transfer - Engineers as managers - Consulting Engineers - Expert Witness-Moral Leadership.

TEXT BOOKS:

1. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.
2. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.
3. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York (2005).

REFERENCES:

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, (1999).
2. Harold Koontz, Heinz Weihrich and Mark V Cannice, 'Management - A global & Entrepreneurial Perspective', Tata Mcgraw Hill, 12th edition, 2007.
3. Andrew J. Dubrin, 'Essentials of Management', Thomson South-western, 7th edition, 2007.
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, (2004)
5. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003).

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	mail id
1	M. Manickam	Associate Professor	Management Studies	manickam@vmkvec.edu.in
2	T. Thangaraja	Assistant Professor	Management Studies	thangaraja@avit.ac.in

	FINANCE AND ACCOUNTING FOR ENGINEERS	Category	L	T	P	Credit
		OEI	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 analysis and interpretation - Types of Analysis - Objectives - Tools of Analysis - Ratio Analysis: Objectives, Uses and Limitations - Classification of Ratios: Liquidity, Profitability, Financial and Turnover Ratios - Funds Flow Analysis and Cash Flow Analysis: Sources and Uses of Funds, Preparation of Funds Flow statement, Uses and Limitations: Pay Back Period – Accounting Rate of Return – NPV – IRR - Profitability Index.

Marginal Costing: Marginal Cost - Breakeven Analysis - Cost Volume Profit Relationship - Applications of Standard and marginal Costing Techniques.

Working Capital Management: – Types of Working Capital – Operating Cycle – Determinants of Working Capital - Receivables Management – Inventory Management – Need for holding inventories – Objectives – Inventory Management Techniques: EOQ & Reorder point – ABC Analysis - Cash Management – Motives for holding cash.

Text Book

1. Kesavan, C. Elenchezhian, and T. Sunder Selwyan, "Engineering Economics and Financial Accounting", Firewall Media, 2005.
2. Kasi Reddy .M and Saraswathi .S, "Managerial Economics and Financial Accounting", PHI Learning Pvt., Ltd. 2007.

Reference Book

1. Periyasamy .P, "A Textbook of Financial, Cost and Management Accounting", Himalaya Publishing House, 2010.
2. Palanivelu V.R., "Accounting for Managers", Lakshmi Publications, 2005.
1. Mark S Bettner, Susan Haka, Jan Williams, Joseph V Carcello, "Financial and Management Accounting", Mc-Graw-Hill Education, 2017

COURSE DESIGNERS:

S.No	Name of the Faculty	Designation	Department	Mail ID
1.	M.Manickam	Associate Professor	Management Studies	manickam@vmkec.edu.in
2.	Dr. Rajeshkumar	Assistant Professor	Management Studies	rajesh.mba@avit.ac.in

	INNOVATION, PRODUCT DEVELOPMENT AND COMMERCIALIZATION	Category	L	T	P	Credit
		OEI	3	0	0	3

PREAMBLE

commercialization of innovation and new products in fast-paced, high-tech markets and matching technological innovation to market opportunities.

PREREQUISITE - Not Required

COURSE OBJECTIVES

1	To make students understand multiple-perspective approach in organization to capture knowledge and creativity to develop successful products and services for Volatile, Uncertain, Complex and Ambiguous (VUCA) world.
2	Inculcate a disruptive thought process to generate ideas for concurrent and futuristic problems of society in general and markets in particular which focus on commercialization
3	Improved understanding of organizational best practices to transform exciting technology into successful products and services
4	Critically assess and evaluate innovation policies and practices in organizations especially from a cultural and leadership point of view
5	Explain why innovation isessential to organizational strategy – especially in a global environment

COURSE OUTCOMES

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

CO1: Understand the role of innovation in gaining and maintaining competitive advantage	Understand
CO2: Integrate the innovation basis and its role in decision making especially under uncertainty	Apply
CO3: Analyze business challenges involving innovation management	Apply
CO4: Having problem solving ability – solving social issues and business problems	Apply
CO5: Comprehend the different sources of innovation	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**P012**
CO1	M	-	-	-	-	M	S	S	-	M	-	-
CO2	S	S	S	M	M	M	-	-	-	-	-	-
CO3	S	S	S	M	M	M	-	-	-	-	-	-
CO4	S	S	S	M	M	M	-	-	-	-	-	-
CO5	S	S	S	M	M	M	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

SYLLABUS:

Introduction to Innovation Management - Innovation – What it is? Why it Matters? - Innovation as a Core Business Process – system thinking for innovation – Framework for System Thinking - system thinking tools

Creating New Products and Services - Product and Service Innovation – Exploiting Open Innovation and Collaboration –The Concept of Design Thinking and Its Role within NPD and Innovation – framework for design thinking

Creating New Products and Services - Product and Service Innovation – Exploiting Open Innovation and

Collaboration –The Concept of Design Thinking and Its Role within NPD and Innovation – framework for design thinking

Capturing Innovation Outcome - New Venture – Benefits of Innovation, and Learning from Innovation – Building Innovative Organization and Developing Innovation Strategy - Globalization for Innovations, Innovating for Emerging Economies and Role of National Governments in Innovation

New Product Brand Development and Pricing Strategies - Importance of Brand decisions and Brand identity development; Pricing of a new product, Pre-test Marketing

The Product offer Selecting Market opportunity and Designing new market offers-Concept Generation and Evaluation, Developing and Testing Physical offers - Pre-launch, during launch and Post launch preparations;

Text Book:

1. Joe Tidd, John Bessant (2013), Managing Innovation: Integrating Technological, Market and Organizational Change, 5th edition, Wiley.

Reference Books:

1. Schilling, M (2013), Strategic management of technological innovation, 4th edition, McGraw Hill Irwin.
2. Allan Afuah (2003), Innovation Management: Strategies, Implementation and Profits, 2nd edition, Oxford University Press.
3. Michael G. Luchs, Scott Swan, Abbie Griffin (2015), Design Thinking: New Product Development Essentials from the PDMA, Wiley-Blackwell.
4. John Boardman, Brian Sauser (2013), Systemic Thinking: Building Maps for Worlds of Systems, 1st edition, Wiley.
5. Rich Jolly (2015), Systems Thinking for Business: Capitalize on Structures Hidden in Plain Sight, Systems Solutions Press

COURSE DESIGNERS:

S.No	Name of the faculty	Designation	Department	E-Mail Id
1	Dr.B.Rajnarayanan	Professor	Management Studies	rajnarayanan@vmkvec.edu.in
2	Dr. Rajeshkumar	Associate Professor	Management Studies	rajesh.mba@avit.ac.in

	SOCIAL ENTREPRENEURSHIP	Category	L	T	P	Credit
		OEI	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

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

S.No	Name of the faculty	Designation	Department	E-Mail Id
1	Dr.B.Rajnarayanan	Assistant Professor	Management Studies	rajnarayanan@vmkec.edu.in

	NEW VENTURE PLANNING AND MANAGEMENT	Category	L	T	P	Credit
		OEI	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

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

	SOFTWARE PROJECT MANAGEMENT	Category	L	T	P	Credit
		OE-SD	3	0	0	3

PREAMBLE

This course will enable the students to have an understanding on the need for Software Project Management. It highlights different techniques for software cost estimation and activity planning. Software Project Management provides the platform for students to gain knowledge on procedures, skills, tools and techniques for applying in real world scenarios.

PREREQUISITE

- Software Engineering

COURSE OBJECTIVES

1.	To understand the Software Project Planning and Evaluation techniques.
2.	To plan and manage projects at each stage of the software development life cycle (SDLC)
3.	To learn about the activity planning and risk management principles.
4.	To manage software projects and control software deliverables.
5.	To develop skills to manage the various phases involved in project management and people management.
6.	To deliver successful software projects that support organization‘s strategic goals.

COURSE OUTCOMES

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

CO1: Understand Project Management principles while developing software.	Understand
CO2: Gain extensive knowledge about the basic project management concepts, framework and the process models.	Analyze
CO3: Obtain adequate knowledge about software process models and software effort estimation techniques.	Apply
CO4: Estimate the risks involved in various project activities.	Apply
CO5: Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.	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	S	S	M	M							S		M	S
CO3	S	M	S	M	M							S		M	S
CO4	S	M	S		L							S		M	S
CO5	S	M	S		M							S		M	S

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I PROJECT EVALUATION AND PROJECT PLANNING

Importance of Software Project Management – Activities – Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

UNIT II PROJECT LIFE CYCLE AND EFFORT ESTIMATION

Software process and Process Models – Choice of Process models – Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points – COCOMO II – a Parametric Productivity Model.

UNIT III ACTIVITY PLANNING AND RISK MANAGEMENT

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.

UNIT IV PROJECT MANAGEMENT AND CONTROL

Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.

UNIT V STAFFING IN SOFTWARE PROJECTS

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

TEXT BOOK:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Sixth Edition, Tata McGraw Hill, New Delhi, 2018.

REFERENCES:

1. Robert K. Wysocki -Effective Software Project Management – Wiley Publication, 2011.
2. Walker Royce: - Software Project Management- Addison-Wesley, 1998.
3. Gopalaswamy Ramesh, - Managing Global Software Projects – McGraw Hill Education (India), Fourteenth Reprint 2013.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Mr. B. Sundaramurthy	Associate Professor	CSE	sundramurthy@vmkvec.edu.in
2.	K.Karthik	Associate Professor	CSE	karthik@avit.ac.in

	DATA SCIENCE IN PYTHON	Category	L	T	P	Credit
		OE-SD	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

- Basic Python Knowledge

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

SYLLABUS

UNIT I INTRODUCTION TO PYTHON

Structure of Python Program-Underlying mechanism of Module Execution-Branching and Looping-Problem Solving Using Branches and Loops-Functions - Lists and Mutability- Problem Solving Using Lists and Functions

UNIT II SEQUENCE DATATYPES AND OBJECT-ORIENTED PROGRAMMING

Sequences, Mapping and Sets- Dictionaries- -Classes: Classes and Instances-Inheritance- Exceptional Handling- Introduction to Regular Expressions using “re” module.

UNIT III USING NUMPY

Basics of NumPy-Computation on NumPy-Aggregations-Computation on Arrays- Comparisons, Masks and Boolean Arrays-Fancy Indexing-Sorting Arrays-Structured Data: NumPy’s Structured Array.

UNIT IV DATA MANIPULATION WITH PANDAS –I

Introduction to Pandas Objects-Data indexing and Selection-Operating on Data in Pandas- Handling Missing Data-Hierarchical Indexing - Combining Data Sets - Aggregation and Grouping-Pivot Tables-Vectorized String Operations - Working with Time Series-High Performance Pandas- and query()

UNIT V VISUALIZATION AND MATPLOTLIB

Basic functions of matplotlib-Simple Line Plot, Scatter Plot-Density and Contour Plots- Histograms, Binnings and Density-Customizing Plot Legends, Colour Bars-Three- Dimensional Plotting in Matplotlib

TEXT BOOK:

1. Jake VanderPlas ,Python Data Science Handbook - Essential Tools for Working with Data, O’Reily Media,Inc, 2016
2. Zhang.Y ,An Introduction to Python and Computer Programming, Springer Publications,2016

REFERENCES:

1. Joel Grus ,Data Science from Scratch First Principles with Python, O’Reilly Media,2016.
2. T.R.Padmanabhan, Programming with Python,Springer Publications,2016
3. "CS41 - The Python Programming Language", *Stanfordpython.com*, 2019. [Online]. Available: https://stanfordpython.com/#overview. [Accessed: 20- Jun- 2019].
4. "Python for Data Science", *Cognitive Class*, 2019. [Online]. Available: https://cognitiveclass.ai/courses/python-for-data-science/. [Accessed: 20- Jun- 2019].

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	A.Kasthuri	Assistant Professor	CSE	kasthuri@vmkvec.edu.in
2	Dr.R.Jaichandran	Associate Professor(G-II)	CSE	rjaichandran@avit.ac.in

	DIGITAL MARKETING	Category	L	T	P	Credit
		OE-SD	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

- Basic knowledge of internet, social media.

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: Introduction to the basics of 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

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 and Targeting - Twitter Marketing: - Introduction to Twitter Marketing, how twitter Marketing is different than other forms of digital marketing, framing content strategy, Twitter Advertising Campaigns - Instagram and Snapchat: - Digital Marketing Strategies through Instagram and Snapchat - Mobile Marketing: - Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics.

UNIT IV SEO, WEB ANALYTICS

Introduction and need for SEO - How to use internet & search engines - search engine and its working pattern - On-page and off-page optimization - SEO Tactics - Planning A New Website - Market Your Optimized Website - Analytics and Measurement. - Introduction to Digital Analytics - Building Blocks - Fundamentals of Digital Analytics - Business Perspective - Data Analysis Fundamentals - Analysis Perspective: Providing Insights - Enabling Capabilities - Managing Analytics - Audience - Acquisition - Behavior - Conversions Onboarding - Retention and Expansion - Advocacy - Privacy and Ethics - Wrapping Up

UNIT V ADVANCED SOCIAL MEDIA

Understanding Paid Earned and Owned Social Media - Social Sharing - Blogging for Business - Finding and Communicating with Influencers - Online Reputation Management - Social Media Measurement - Social Media Analytics - Pinterest Marketing - Digital Marketing Capstone.

TEXT BOOK:

1. Ryan, D. (2014). Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan Page Limited.

REFERENCES:

1. Jan Zimmerman, Deborah Ng - Social Media Marketing All-in-One For Dummies - 4th Edition – John Wiley & Sons Inc.
2. The Beginner's Guide to Digital Marketing (2015). Digital Marketer. Pulizzi,J.(2014) Epic Content Marketing, Mcgraw Hill Education.
3. Dave Chaffey & Fiona Ellis , Digital Marketing: Strategy, Implementation & Practice – 6 th Edition, Pearson.
4. Eric Enge , Art of SEO (3rd edition) - O'Reilly.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	S. Muthuselvan	Assistant Professor	CSE	muthuselvan@avit.ac.in
2	A.Kasthuri	Assistant Professor	CSE	kasthuri@vmkvec.edu.in

	3D PRINTING	Category	L	T	P	Credit
		OE-EA	3	0	0	3

Preamble

The course is designed to impart knowledge and skills related to 3D printing technologies, selection of material and equipment and develop a product using this technique in Industry 4.0 environment.

Prerequisite – NIL

Course Objective

1	To discuss the basic concepts and procedure followed in 3D printing methods
2	To construct a CAD model for a required product
3	To identify the use of different material and support structures
4	To experiment with different 3d printing process
5	To identify the defects.

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

CO1.	Demonstrate the various 3D Printing methods	Understand
CO2.	Develop CAD Models ,Import and Export CAD data and generate .STL file.	Apply
CO3.	Select a specific material for the given application.	Apply
CO4.	Select a 3D printing process for an application.	Apply
CO5.	Able to identify the Product defects after post processing	Apply

Mapping with Programme Outcomes and Programme Specific Outcomes

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

S- Strong; M-Medium; L-Low

SYLLABUS

3D PRINTING & CAD FOR ADDITIVE MANUFACTURING (7 Hrs.)
Introduction, Process, Classification, Advantages, Additive V/s Conventional Manufacturing processes, Applications. CAD Data formats, Data translation, Data loss, STL format.
ADDITIVE MANUFACTURING TECHNIQUES (12Hrs.)
Stereo- Lithography, LOM, FDM, SLS, SLM, Binder Jet technology. Process, Process parameter, Process Selection for various applications. Additive Manufacturing Application Domains: Aerospace, Electronics, HealthCare, Defence, Automotive, Construction, Food Processing, Machine Tools
MATERIALS (8 Hrs.)
Polymers, Metals, Non-Metals, Ceramics. Various forms of raw material- Liquid, Solid, Wire, Powder; Powder Preparation and their desired properties, Polymers and their properties. Support Materials
ADDITIVE MANUFACTURING EQUIPMENT (10 Hrs.)
Process Equipment- Design and process parameters, Governing Bonding Mechanism Common faults and troubleshooting, Process Design
POST PROCESSING & PRODUCT QUALITY (8 Hrs.)
Post Processing Requirement and Techniques , Product Quality Inspection and testing , Defects and their causes

Text Books

1	Lan Gibson, David W. Rosen and Brent Stucker, "Additive Manufacturing Technologies:Rapid Prototyping to Direct Digital Manufacturing", Springer, 2010.
2	Khanna Editorial, "3D Printing and Design", Khanna Publishing House, Delhi.

Reference Books

1	CK Chua, Kah Fai Leong, "3D Printing and Rapid Prototyping- Principles and Applications", World Scientific, 2017.
2	Andreas Gebhardt, "Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooling, Rapid Manufacturing", Hanser Publisher, 2011.
3	J.D. Majumdar and I. Manna, "Laser-Assisted Fabrication of Materials", Springer Series in Material Science, 2013.

Course Designers

S.No	**Faculty Name**	**Designation**	**Department/Name of the**	**Email id**
1	L.Prabhu	Associate Professor	Mech / AVIT	prabhu@avit.ac.in

Alternative NPTEL/SWAYAM Course

S. No.	**NPTEL Course Name**	**Instructor**	**Host Institute**
1	Rapid Manufacturing	Dr. Amandeep Singh, Prof. J. Ramkumar	IIT Kanpur

	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

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
2				

	BIOMOLECULES - STRUCTURE, FUNCTION IN HEALTH AND DISEASE	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

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
2	Ms.S.Sowmiya	Assistant Professor	Pharmaceutical Engineering	sowmiya.vmkvec@vmrf.edu.in

	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

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.

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

	MUNICIPALSOLID ANDWASTEMANA GEMENT	Category	L	T	P	Credit
		OE-EA	3	0	0	3

Preamble

Structureisanarrangementandorganizationofinterrelatedelementsinamaterialobjectorsystem,ortheobject orsystemsoorganized.Materialstructuresincludemandeobjectssuchasbuildingsandmachinesandnaturalobjectssu chasbiologicalorganisms,minerals and chemicals.

Prerequisite: Nil

Course Objectives

1.	The on-site/off-site process in gof 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.To know about the types of waste & Sources	Analyze
Co2.To Study the on site Storage & Processing	Apply
Co3.To study about the collection & transfer the waste	Apply
Co4.To Study the process of offsite processing	Apply
CO5.To know 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

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).

S.No.	NameoftheFaculty	Designation	Department	MailID
1	Mrs.P.Subathra	AssistantProfessor	Civil/AVIT	subathra@avit.ac.in

	DISASTER MANAGEMENT	Category	L	T	P	Credit
		OE-EA	3	0	0	3

Preamble

Thiscoursedealswiththevariousdisastersandtoexposethestudentsaboutthemeasures,itseffectagainstbuiltstructures ,andHazardAssessmentprocedureinIndia.Thiscoursealsodealswiththemethodsofmitigatingvarioushazardssuchthatth eirimpact on communitiesisreduced.

Prerequisite

NIL

CourseOutcomes

1	ToUnderstandbasicconceptsinDisasterManagement
2	ToUnderstandDefinitionsandTerminologiesusedinDisasterManagement
3	ToUnderstandtheChallengesposedbyDisasters
4	TounderstandImpactsofDisasters

COURSEOUTCOMES

Onthesuccessfulcompletionofthecourse,studentswillbeableto

CO1.Understandthevarioustypesofdisastervizhydrological,CoastalandMarine Disasters,AtmosphericDisasters,Geological,MassMovementandLandDisasters, Windand WaterDrivenDisasters.	Understand
CO2.Identifythepotentialdeficienciesofexistingbuildingsforearthquakedisasterand suggestsuitableremedialmeasures.	Understand
CO3.Derivetheguidelinesfortheprecautionarymeasuresandrehabilitationmeasuresfore arthquake disaster.	Apply
CO4.Derivetheprotectionmeasuresagainstfloods,cyclone,landslides	Apply
CO5.Understandtheeffectsofdisastersonbuiltstructuresinindia	Understand

MAPPINGWITHPROGRAMMEOUTCOMESANDPROGRAMMESPECIFICOUTCOMES

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

S-Strong;M-Medium;L-Low

SYLLABUS

INTRODUCTION:

Conceptofdisaster;Differentapproaches; Concept of Risk; Levels of disasters; Disaster phenomena and events (Global, national and regional); Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etcDos and Don'ts during various types of Disasters.

RISKASSESSMENTANDVULNERABILITYANALYSIS:

Responsetime,frequencyandforewarninglevelsofdifferenthazards;Characteristicsanddamage potential of naturalhazards;hazard assessment;Dimensionsofvulnerabilityfactors; vulnerability assessment; Vulnerability and disaster risk; Vulnerabilities to flood and earthquake hazards

DISASTER MANAGEMENT MECHANISM:

Concepts of risk management and crisis management ; Disastermanagementcycle;ResponseandRecovery;Development,Prevention,MitigationandPreparedness;Planningf or relief, Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster

DISASTER RESPONSE:

Mass media and disaster management; Disaster Response Plan; Communication, Participation,and Activation of Emergency Preparedness Plan; Logistics Management; Psychological Response; Trauma and StressManagement;RumourandPanicManagement;MinimumStandardsofRelief;ManagingRelief;Funding.

DISASTER MANAGEMENT IN INDIA:

Strategies for disaster management planning; Steps for formulating a disasterriskreductionplan;DisastermanagementActandPolicyinIndia;Organisationalstructurefordisastermanagemen tinIndia;Preparation of state and district disaster management plans, , Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake- holders

TEXTBOOKS:

1. Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423 2.
2. Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10:1259007367, ISBN-13: 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES:

1. AbarquezI.&MurshedZ.CommunityBasedDisasterRiskManagement:FieldPractitioner'sHandbook,AD PC,Bangkok,2004.
2. Goudie,A.GeomorphologicalTechniques,UnwinHyman,London1990.
3. Goswami,S.C.RemoteSensingApplicationinNorthEastIndia,PurbanchalPrakesh,Guwahati,1997.
4. ManualonNaturalDisasterManagementinIndia,NCDM,NewDelhi,2001.
5. DisasterManagementinIndia,MinistryofHomeAffairs,GovernmentofIndia,NewDelhi,2011.
6. NationalPolicyonDisasterManagement,NDMA,NewDelhi,2009.
7. DisasterManagementAct.(2005),MinistryofHomeAffairs,GovernmentofIndia,NewDelhi,2005.

CourseDesigners

S.No.	NameoftheFaculty	Designation	Department	MailID
1	Ms.S.IsparaXavier	AssistantProfessor	Civil/AVIT	isparaxavier.civil@avit.ac.in

	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: Conduct 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

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:

1. Energy and the Environment, Ristinen, Robert A. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A., 2nd Edition, John Wiley, 2006,
2. Energy and the Challenge of Sustainability, World Energy assessment, UNDP, N York, 2000.

REFERENCE BOOKS:

1. Ocean Energy: Tide and Tidal Power by R. H. Charlier and Charles W. Finkl, Springer 2010
2. 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

	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

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

1. G.K.Dubey, Fundamentals of Electrical Drives', Narosa Publication,2002.
2. FrankD.petruzellaprogrammable logic controlsthird edition TATA mc graw-hill edition 2010.
3. M.S.Berde, Electric Motor Drives Khanna publishers.2008

REFERENCES

1. Pradheepkumarsrivastava, Programmable logic controllers with applications', BPB publications.2004.
2. John W.Webb, Ronald A.Reis, Programmable logic controllers-Principles and Applications', Fifth Edition, Prentice Hall of India.
3. Michel P.Lukas, Distributed Control system', van Nostrand Reinhold Co, 1986
4. R.SrinivasanSpecial electrical Machines lakshmi publication.2012
5. Process Control Instrumentation Technology, Johnson Curties, Prentice hall of India, 8th edition
6. 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
2	Dr.R.Devarajan	Professor	EEE/VMKVEC	devarajan@vmkvec.edu.in

	FOOD AND NUTRITION TECHNOLOGY	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

The course aims to enable the students to understand the physicochemical, nutritional, microbiological and sensory aspects, To familiarize the students about the processing and preservation techniques. To emphasize the importance of food safety, food quality, food plant¬ sanitation, food laws and regulations, food engineering and packaging in food industry.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	Understand the tradition food processing techniques and the basics concept of food biochemistry
2	Demonstrate the product development technique, quality and contaminant check
3	To articulate their technical knowledge for industrial purpose
4	Describe national food laws and standards
5	Laws and qualities of standard for food products

COURSE OUTCOMES

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

CO1: Recall the processing techniques practiced in olden days and the biological process	Remember
CO2. Illustrate the methods for animal product development, quality control and also screen the contaminant	Understand
CO3.Transfer the techniques in scaling up for industrial needs	Apply
CO4. Interpret and Troubleshoot instruments to maintain accuracy	Apply
CO5. Develop standards for food additives	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

INTRODUCTION TO FOOD BIOTECHNOLOGY

Introduction, History and scope of food Biotechnology, development and prospects of biotechnology in animal products, ancient and traditional food processing techniques; Biochemical and metabolic pathways of biological systems used in food production.

METHODS IN FOOD BIOTECHNOLOGY: Role of biotechnology in productivity of livestock, Modern biotechnological methods and processes in animal product development, chemical and physical factors required for growing microbial cultures in nutritive substrate; Meat species identification, Quality control, Screening products for contaminants

BIOTECHNOLOGY METHODS IN FOOD PROCESSING:

Use of biotechnology in the production of food additives, use of biotechnological tools for the processing and preservation and foods of animal origin, use of biotechnology improved enzymes in food processing industry, Basic principles of the industrial use of bio-reactions for production of biomass-upstream and

downstream processing application of microorganisms as starter cultures in meat industry, microbial production of food ingredients; Biosensors and novel tools and their application in food science.

FOOD SAFETY & SECURITY:

Consumer concerns about risks and values, biotechnology & food safety, Ethical issues concerning GM foods; testing for GMOs; current guidelines for the production, release and movement of GMOs; Future and applications of food biotechnology in India.

TEXT BOOKS:

1. Potter, Norman. M. Food Science, 5th Ed. Springer US
2. Manay, S.; Shadakshara Swamy, M., (2004). Foods: Facts and Principles, 4 th Ed. New Age Publishers.
3. B. Srilakshmi., (2002) Food Science, New Age Publishers..

REFERENCES:

1. Meyer, (2004). Food Chemistry. New Age
2. Deman JM. (1990) Principles of Food Chemistry. 2 nd Ed. Van Nostrand Reinhold, NY
3. Ramaswamy H and Marcott M. Food Processing Principles and Applications. CRC Press

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

	GREEN BUILDING AND SUSTAINABLE ENVIRONMENT	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

. Before starting with this course, one must get a clear knowledge on the basics of green building, learning the plan details of HVAC for a building, energy efficient modeling

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To define, develop and & Plan the details of Implementation.
2.	To summarize the fundamentals of electric power systems and building electric wiring.
3.	To demonstrate about the Bioclimatic design and concepts.
4.	To construct the water conservation & water management systems.
5.	To assess the key components of remodelling project.

COURSE OUTCOMES

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

CO1. Define the basics of green building	Remember
CO2. Discuss the advantages and benefitsof green building practices	Understand
CO3. Illustrate low energy architecture features in residential and commercial buildings	Apply
CO4. Develop proper water conservation systems to make up a healthy building	Apply
CO5. Validate the green sustainable materials and practices	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	L	-	-	-	-	-	-	-	-	-	-	-	-	-	
CO2	M	M	-	-	-	-	-	-	-	-	-	-	-	-	
CO3	M	M	-		L	-	-	-	-	-	-	L	L	-	
CO4	M	M	-	-	S	-	L	-	-	-	-	-	-	M	
CO5	M	M	L	L	S	S	-	L	-	-	-	-	-	L	

S- Strong; M-Medium; L-Low

SYLLABUS

GREEN BUILDING BASICS AND PRACTICES:

Site Design / Development & Plan Implementation, Resource Efficiency, Energy Efficiency, Water Efficiency, Indoor Environmental Quality and Homeowner Education, Operation, Maintenance & Practices. Assessment of building design and construction, emission of CO2, SO2, and NO2 of building materials, elements, and construction process.

ENERGY MANAGEMENT SYSTEM OF BUILDINGS

The objective of the course is to provide students the necessary tools to control, monitor and optimize the building's facilities, mechanical and electrical equipment for comfort, safety, and efficiency. It starts with the fundamentals of electric power systems and building electric wiring and then works through building automation systems (BAS) principles. The course allows students to acquaint applying BAS to commercial HVAC equipment, lighting systems, fire systems and security/observation systems.

LOW ENERGY ARCHITECTURE, PASSIVE BUILDING DESIGN

Solar geometry, climate/regional limitations, natural lighting, passive design and sustainability initiatives, insulating and energy storing material. Bioclimatic design and concepts. Case studies will be used extensively as a vehicle to discuss the success/failure of ideas and their physical applications.

WATER MANAGEMENT, BUILDING METHODS & MATERIALS

Water conservation, water management systems, water efficient landscaping, green roofing, rainwater harvesting, sanitary fixtures and plumbing systems, wastewater treatment and reuse, and process water strategies. AAC (Aerated Autoclave Concrete), ICF (Insulated Concrete Forms), new Advanced Framing & Insulation Techniques, SIPs (Structural Insulated Panels), Straw Bale and Pumice-crete Rammed Earth, Timber Frame, Straw Clay, and Earth ship buildings.

ENERGY EFFICIENT REMODELLING

Key components of remodelling projects-windows, walls, roofs, heating and ventilation, insulation, tighten up the building envelope, Advances in building technology and materials, incorporate active and passive solar into the home or commercial building, Mistakes to avoid, various improvements cost

TEXT BOOKS:

1. Kibert, C. J. "Sustainable Construction: Green Building Design and Delivery," Second Edition, New York:
    1. John Wiley & Sons, Inc., 2008.
    2. Thermal analysis and design of passive solar buildings by A. K. Athienitis and Mat Santamouris.
    3. Passive building desing by N.K. Bansal, G. Hauser, and G. Minke.

REFERENCES:

1. McDonough, W. and Braungart, M. "Cradle to Cradle: Remaking the Way We Make Things," New York: Farrar, Straus and Giroux, 2002

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Dr.S.P.Sangeetha	Professor	Civil	sangeetha@avit.ac.in
2	Ms.R.Subashini	Assistant Professor	Biotechnology	subashini@vmkvec.edu.in

	BIO-FUEL	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.

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

	PRINCIPLES OF MEDICAL INSTRUMENTATION	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

To enable the students to develop knowledge of principles, design and applications of the Biomedical Instruments.

PREREQUISITE – NIL

COURSE OBJECTIVES

1	To know about bioelectric signals, electrodes and its types.
2	To know the various Biopotential recording methods.
3	To study about patient monitoring concept and various Physiological measurements methods.
4	To study the principle of operation blood flow meter, blood cells counter.
5	To study about bio chemical measurements and details the concept of biotelemetry and patient safety.

COURSE OUTCOMES

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

CO1. Explain the different Bio signal or biopotential.	Understand
CO2. Discuss the working principles of diagnostic and therapeutic equipments.	Understand
CO3. Examine the various instruments like as ECG, EMG, EEG, X-ray machine.	Apply
CO4. Illustrate medical instruments based on principles and application used in hospital.	Analyze
CO5. Analyze and calibrate fundamental biomedical instrumentation used in hospital.	Analyze

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S- Strong; M-Medium; L-Low

SYLLABUS

BIOELECTRIC SIGNALS AND ELECTRODES

Basic medical instrumentation system, Origin of Bioelectric Potential, Recording electrodes – Electrode Tissue interface, Electrolyte – skin interface, Polarization, Skin contact impedance, motion artifacts. Electrodes – Silver – silver chloride electrodes, electrodes for ECG, electrodes for EEG, electrodes for EMG, Electrical conductivity of electrode jellies and creams, Microelectrodes.

BIO AMPLIFIER AND BIOMEDICAL RECORDERS

Bioamplifier, Need for Bioamplifier, Differential amplifier, Instrumentation amplifier, Chopper amplifier,

Isolation Amplifier, ECG, EEG, EMG, PCG, EOG, ERG lead system and recording methods, typical waveform.

PATIENT MONITORING SYSTEM AND NON ELECTRICAL PARAMETERS MEASUREMENTS

System concepts of patient monitoring system, Bedside patient monitoring system, central monitors, Blood pressure measurement, Measurement of temperature, Respiration rate measurement, cardiac output measurement, Measurement of pulse rate, Plethysmography technique.

BLOOD FLOW METERS, BLOOD CELL COUNTERS

Electromagnetic blood flow meter, ultrasonic blood flow meter, Laser Doppler blood flow meter, Types of blood cells, Methods of cell counting, coulter counters, automatic recognition and differential counting.

BIO- CHEMICAL MEASUREMENTS AND BIOTELEMETRY AND PATIENT SAFETY

Ph, Pc02, p02, Phco3 and electrophoresis, colorimeter, spectrophotometer, flame photometer, auto-analyser. Biotelemetry-wireless telemetry, single channel telemetry, multichannel telemetry, multi patient telemetry.

TEXT BOOKS:

1. Khandpur R.S, **"Hand-book of Biomedical Instrumentation"**, Tata McGraw Hill, 2nd Edition, 2003.
2. Leslie Cromwell, Fred Weibell J, Erich Pfeiffer. A, **"Biomedical Instrumentation and Measurements"**, Prentice-Hall India, 2nd Edition, 1997.

REFERENCES:

1. John G. Webster, **"Medical Instrumentation application and design"**, John Wiley, 3rd Edition, 1997.
2. Carr, Joseph J, Brown, John.M, **"Introduction to Biomedical equipment technology"**, John Wiley and sons, New York, 4th Edition, 1997.

COURSE DESIGNERS

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr. N.Babu	Professor	BME	babu@vmkvec.edu.in
2	Mr.V.Prabhakaran	Assistant Professor (Gr-II)	BME	prabhakaran.bme@avit.ac.in
3	Mrs. S.Vaishnodevi	Assistant Professor	BME	vaishnodevi@vmkvec.edu.in
4	Ms. Lakshmi Shree	Assistant Professor	BME	lakshmishree.bme@avit.ac.in

	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.

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

S.No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.L.K.Hema	Professor & Head	BME	hemalk@avit.ac.in
2	Dr.N.Babu	Professor	BME	babu@vmkvec.edu.in
3	Mr.V.Prabhakaran	Assistant Professor (Gr-II)	BME	Prabhakaran.bme@avit.ac.in
4	Mrs.S.Vaishnodevi	Assistant Professor	BME	vaishnodevi@vmkvec.edu.in

	BODY AREA NETWORKS AND MOBILE HEALTHCARE	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

To enable the students to gain knowledge in various aspects of BAN related to health and the techniques to apply these in proper health care delivery.

PRERQUISITE – NIL

COURSE OBJECTIVES

1	To Learn about body area network.
2	To study the different BAN hardware related to it.
3	To Provide knowledge in the applications of Body Area Networks.
4	To study the concept of telemedicine.
5	To Provide knowledge in the applications of Telemedicine.

COURSE OUTCOMES

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

CO1. Explain about concept of Body Area Network.	Understand
CO2. Describe about fundamentals of telemedicine.	Understand
CO3. Illustrate the applications of telemedicine & BAN in health care.	Apply
CO4. Analyze the Hardware for BAN in physiological system.	Analyze
CO5. Compare BAN and telemedicine.	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	--	--	--	--	--	--	--	--	--	--	M	M	M	M
CO2	M	--	--	--	--	L	--	--	--	--	--	M	M	M	M
CO3	S	M	L	L	L	M	--	--	--	L	--	M	M	S	M
CO4	S	M	L	L	M	M	--	--	--	M	--	M	S	S	S
CO5	S	S	L	L	M	S	--	S	M	M	M	M	S	S	S

S- Strong; M-Medium; L-Low

SYLLABUS

WIRELESS HEALTH SYSTEMS

Definition, BAN and Healthcare, Technical Challenges – Sensor design, biocompatibility, Energy Supply, optimal node placement, number of nodes, System security and reliability, BSN Architecture – Introduction, Wireless Communication techniques.

HARDWARE FOR BAN

Processor – Low Power MCUs, Mobile Computing MCUs, Integrated processor with radio transceiver, Memory, Antenna – PCB antenna, Wire antenna, Ceramic antenna, External antenna, Sensor Interface, Power sources – Batteries and fuel cells for sensor nodes.

APPLICATIONS OF BAN

Monitoring patients with chronic disease, Hospital patients, Elderly patients, Cardiac arrhymias monitoring, Multi patient monitoring systems, Multichannel Neural recording, Gait analysis, Sports Medicine, Electronic pill.

FUNDAMENTALS OF TELEMEDICINE

History of telemedicine, definition of telemedicine, tele-health, tele-care, scope, Telemedicine Systems, benefits & limitations of telemedicine.

APPLICATIONS OF TELEMEDICINE

Teleradiology, telepathology, telecardiology, teleoncology, teledermatology, telesurgery, eHealth and Cyber Medicine.

TEXT BOOK:

1. Annalisa Bonfiglio, Danilo De Rossi, **"Wearable Monitoring Systems"**, Springer, 2011.
2. Norris A C, **"Essentials of Telemedicine and Telecare",** John Wiley, New York, 2002.

REFERENCES:

1. Zhang, Yuan-Ting, **"Wearable Medical Sensors and Systems"**, Springer, 2013.
2. H K Huang, **"PACS and Imaging Informatics: Basic Principles and Applications"**, Wiley, New Jersey, 2010.
3. Guang-Zhong Yang (Ed.), **"Body Sensor Networks"**, Springer, 2006.
4. Mehmet R. Yuce,Jamil Y.Khan, **"Wireless Body Area Networks Technology, Implementation, and applications"**, Pan Stanford Publishing Pvt. Ltd, Singapore, 2012.
5. Khandpur R S, **"Handbook of Biomedical Instrumentation"**, Tata McGraw Hill, New Delhi, 2003.

COURSE DESIGNERS

S. No.	Name of the Faculty	Designation	Department	Mail ID
1	Dr.D.Vinodkumar	Professor & Head	BME	vinodkumar@vmkvec.edu.in
2	Dr.L.K.Hema	Professor & Head	BME	hemalk@avit.ac.in
3	Mr.S.Kannan	Assistant Professor	BME	kannan@vmkvec.edu.in
4	Ms.R.Sandhiya	Assistant Professor	BME	Sandhiya.bme@avit.ac.in

	INTRODUCTION TO INDUSTRY 4.0 AND INDUSTRIAL 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: Basic knowledge of computer and internet

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

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 and Industry 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
1	Dr. L.K.Hema	Prof.&Head/ECE	ECE	hodece@avit.ac.in
2	Dr.T.Muthumanickam	Professor	ECE	hodece@vmkvec.edu.in

	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 – BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

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

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

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Department	Mail ID
1	Mr.Rajat Kumar Dwibedi	Assistant Professor	ECE	rajatkumar.ece@avit.ac.in
2	Dr. L.K.Hema	Prof. & Head/ ECE	ECE	hodece@avit.ac.in
3	Mr.G.Murali	Assistant Professor	ECE	muralig@vmkvec.edu.in

	ROBOTICS AND AUTOMATION	Category	L	T	P	Credit
		OE-EA	3	0	0	3

PREAMBLE

Robotics is the applied science of motion control for multi-axis manipulators and is a large subset of the field of "Mechatronics" (Mechanical, Electronic and Software engineering for product or systems development, particularly for motion control applications). Robotics, sensors, actuators and controller technologies are continuously improving and evolving synergistically. In the 20th century, engineers have mastered almost all forms of motion control and have proven that robots and machines can perform almost any job that is considered too heavy, too tiring, too boring or too dangerous and harmful for human beings. This course supports the students to design and develop multi-DOF manipulator and wheeled mobile robot.

PREREQUISITE: NIL

COURSE OBJECTIVES

1.	To Understand the actuators used in robotic manipulators and indicate their advantages and limitations.
2.	To apply the forward kinematic model of multi-degree of freedom to develop a robot arm and wheeled robot
3.	To apply a static force and dynamic model of two degrees of freedom to develop robot arm
4.	To apply a step-by-step procedure for the generation a cubic polynomial trajectory for a joint with specified kinematic constraints
5.	To apply and develop a program for point-to-point applications

COURSE OUTCOMES

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

CO1 Describe the working of the subsystems of robotic manipulator and wheeled mobile robot**.**	Understand
CO2. Develop the forward kinematic model of multi-degree of freedom (DOF) manipulator and inverse kinematic model of two and three degrees of freedom planar robot arm and wheeled robot	Apply
CO3. Develop the static force and dynamic model of two degrees of freedom planar robot arm	Apply
CO4. Generate a trajectory in joint space using polynomial and trigonometric functions with given kinematic constraints of multi-degree of freedom (DOF) manipulator	Apply
CO5 Develop a offline robot program for point-to-point applications such as pick and place, palletizing, sorting and inspection of work-parts	Apply

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	L	-	-	-	-	-	-	-	-	-	L	-	S	M	-
CO2	S	L	M	-	-	-	-	-	-	-	M	-	S	M	-
CO3	S	L	M	-	-	-	-	-	-	-	M	-	S	M	-
CO4	S	L	M	-	-	-	-	-	-	-	M	-	S	M	-
CO5	S	L	M	-	-	-	-	-	-	-	M	-	S	M	-

S- Strong; M-Medium; L-Low

SYLLABUS

Introduction to Robotics. Mechanical structure: Robot Configuration - Robot Anatomy, Sub-systems/ Elements of Industrial Robot - Performance characteristics of industrial Robots. Mobile robot locomotion: Introduction, key issues for locomotion, wheeled locomotion-wheel design, geometry, stability and controllability. Applications - Progressive advancement in Robots – Point to point and continuous motion applications - Mobile manipulators and its applications.

Kinematic model - Forward Kinematics for two DOF manipulator – Algebraic method, Mechanical structure and notations, Coordinate frames, Description of objects in space, Transformation of vectors, Fundamental rotation matrices (principal axes and fixed angle rotation) Description of links and joints, Denavit- Hartenberg (DH) notation, Forward Kinematics for multi-Degrees of Freedom (DOF) manipulator. Inverse kinematics of 2R, 3R manipulator - Manipulator workspace. Mobile Robot kinematics: kinematic model and constraints, Mobile robot workspace-motion control.

Static model: Differential relationship - Velocity analysis – Jacobian matrix – Determination of forces and equivalent torques for joints of two link planar robot arm. Dynamic model: Euler –Lagrangian formulation - Forward and inverse dynamic model for two DOF planar manipulator. Applications of Fuzzy Logic and Neural network in Robot Control, Neural controllers, Implementation of Fuzzy controllers

Trajectory planning: Definitions and planning tasks, Joint space techniques – Motion profiles – Cubic polynomial, Linear Segmented Parabolic Blends and cycloidal motion - Cartesian space techniques. Navigation: Graph search and potential field path planning - navigation architecture - offline and online planning.

AI And Other Research Trends In Robotics- Application of Machine learning - AI, Expert systems; Tele-robotics and Virtual Reality, Micro & Nanorobots, Unmanned vehicles, Cognitive robotics, Evolutionary robotics, Humanoids.

TEXTBOOKS

1. S.K.Saha, “Introduction to Robotics”, Second Edition, McGraw Hill Education (India) Private Limited, 2014.
2. Roland Siegwart and Illah R.Nourbakhsh, “Introduction to Autonomous Mobile Robots”, Prentice Hall of India (P) Ltd., 2005.

REFERENCE BOOKS

1. B. Siciliano, L. Sciavicco, L. Villani, G. Oriolo, “Robotics: Modelling, Planning and Control”, First Edition, Springer-Verlag London,2009
2. K.S. Fu, R.C Gonzalez and C.S. Lee, “Robotics- Control, Sensing, Vision and Intelligence”, Tata McGraw-Hill Editions, 2008.
3. John J.Craig, “Introduction to Robotics, Mechanics and Control”, Third Edition, Pearson Education, 2005.
4. Mark W.Spong, M.Vidyasagar, “Robot Dynamics and Control”, Wiley India, 2009.
5. George A. Bekey, “Autonomous Robots – From Biological Inspiration to Implementation and Control”, MIT Press, 2005.
6. Howie Choset, Kevin M. Lynch, Seth Hutchinson, George A. Kantor, Wolfram Burgard, Lydia E. Kavraki and Sebastian Thrun, “Principles of Robot Motion – Theory, Algorithms and Implementation”, MIT Press, 2005.
7. Mikell P. Groover, Mitchell Weiss, Roger N.Nagel and Nicholas G. Odrey, “Industrial Robotics – Technology, Programming and Applications” Tata McGraw-Hill, 2008.
8. Yoram Koren, “Robotics for Engineers”, McGraw-Hill Book Co., 1992.
9. P.A. Janakiraman, “Robotics and Image Processing”, Tata McGraw-Hill, 1995.

COURSE DESIGNERS

S.No	Name of the Faculty	Designation	Name of the College	Mail ID
1.	Dr.T.Muthumanickam	Professor	ECE	muthumanickam@vmkvec.edu.in
2.	Dr.L.K.Hema	Professor	ECE	hemalk@avit.ac.in

	PROJECT WORK	Category	L	T	P	Credit
		PI	**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.

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

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.