Vision of the Department
To educate students with conceptual knowledge and technical skills in the field of Information Technology with moral and ethical values to achieve excellence in academic, industry and research centric environments.

Mission of the Department
1. To inculcate in students a firm foundation in theory and practice of IT skills coupled with the thought process for disruptive innovation and research methodologies, to keep pace with emerging technologies.
2. To provide a conducive environment for all academic, administrative and interdisciplinary research activities using state-of-the-art technologies.
3. To stimulate the growth of graduates and doctorates, who will enter the workforce as productive IT engineers, researchers and entrepreneurs with necessary soft skills, and continue higher professional education with competence in the global market.
4. To enable seamless collaboration with the IT industry and Government for consultancy and sponsored research.
5. To cater to cross-cultural, multinational and demographic diversity of students.
6. To educate the students on the social, ethical, and moral values needed to make significant contributions to society.

Program Educational Objectives (PEOS) for B.Tech (T)

PEO1. Demonstrate core competence in basic engineering and mathematics to design, formulate, analyze, and solve hardware/software engineering problems.

PEO2. Have insight in fundamental areas of Information Technology and related engineering with an inclination towards self-learning to address real-world problems using digital and cognitive technologies.

PEO3. Collaborate with industry, academic and research institutions for product and research related development.

PEO4. Imbibe high professionalism, effective communication skills and team spirit to work on multidisciplinary projects, in diverse professional environments.

PEO5. Practice IT solutions following technical standards with ethical values.
PROGRAM OUTCOMES FOR B.TECH (IT):

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **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.

3. **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.

4. **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.

5. **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.

6. **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.

7. **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.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **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.

11. **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.

12. **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.
Program Specific Outcomes (PSO) defined for the B.Tech (IT) program are as follows:

**PSO1:** Ability to apply programming principles and practices for the design of software solutions in an internet-enabled world of business and social activities.

**PSO2:** Ability to identify the resources to build and manage the IT infrastructure using the current technologies in order to solve real world problems with an understanding of the tradeoffs involved in the design choices.

**PSO3:** Ability to plan, design and execute projects for the development of intelligent systems with a focus on the future.
MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES:

A broad relation between the programme objective and the outcomes is given in the following table.

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|        | Environmental Science and Engineering |     |     |     |     |     |     | ✓   | ✓   |
|        | Digital Principles and Design |     |     |     |     | ✓   | ✓   |     |     |
|        | Database Systems |     |     |     |     |     | ✓   | ✓   |     |
|        | Object Oriented Programming and Advanced Data Structures |     |     |     |     |     |     | ✓   | ✓   |
|        | Digital Communication |     |     |     |     |     |     | ✓   |     |
|        | Digital and Database Systems Laboratory |     |     |     |     |     |     | ✓   | ✓   |
|        | Object Oriented Programming and Advanced Data Structures Laboratory |     |     |     |     |     |     | ✓   | ✓   |

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# ANNA UNIVERSITY, CHENNAI
## UNIVERSITY DEPARTMENTS
### B.TECH. INFORMATION TECHNOLOGY
#### REGULATIONS – 2015
##### CHOICE BASED CREDIT SYSTEM
#### CURRICULA AND SYLLABI FOR I TO VIII SEMESTERS

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This course aims at developing the language skills necessary for the first year students of Engineering and Technology.

OBJECTIVES:
- To develop the four language skills – Listening, Speaking, Reading and Writing.
- To improve the students’ communicative competence in English.
- To teach students the various aspects of English language usage.

CONTENTS:

UNIT I  GREETING AND INTRODUCING ONESELF  12
Listening - Types of listening – Listening to short talks, conversations;  Speaking – Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family/ friend;  Reading – Skimming a passage– Scanning for specific information;  Writing - Guided writing - Free writing on any given topic (My favourite place/ Hobbies/ School life, writing about one’s leisure time activities, hometown, etc.);  Grammar – Tenses (present and present continuous) - Question types - Regular and irregular verbs;  Vocabulary – Synonyms and Antonyms.

UNIT II  GIVING INSTRUCTIONS AND DIRECTIONS  12
Listening – Listening and responding to instructions;  Speaking – Telephone etiquette - Giving oral instructions/ Describing a process – Asking and answering questions;  Reading – Reading and finding key information in a given text - Critical reading -  Writing –Process description( non-technical) -  Grammar – Tense (simple past & past continuous) - Use of imperatives – Subject – verb agreement – Active and passive voice;  Vocabulary – Compound words – Word formation – Word expansion ( root words).

UNIT III  READING AND UNDERSTANDING VISUAL MATERIAL  12
Listening- Listening to lectures/ talks and completing a task;  Speaking –Role play/ Simulation – Group interaction;  Reading – Reading and interpreting visual material;  Writing- Jumbled sentences – Discourse markers and Cohesive devices – Essay writing (cause & effect/ narrative);  Grammar – Tenses (perfect), Conditional clauses –Modal verbs;  Vocabulary – Cause and effect words; Phrasal verbs in context.

UNIT IV  CRITICAL READING AND WRITING  12
Listening- Watching videos/ documentaries and responding to questions based on them;  Speaking–Informal and formal conversation;  Reading –Critical reading (prediction & inference);  Writing–Essay writing (compare & contrast/ analytical) – Interpretation of visual materials;  Grammar – Tenses (future time reference);  Vocabulary – One word substitutes (with meanings) – Use of abbreviations & acronyms – Idioms in sentences.

UNIT V  LETTER WRITING AND SENDING E-MAILS  12
Listening- Listening to programmes/broadcast/ telecast/ podcast;  Speaking – Giving impromptu talks, Making presentations on given topics- Discussion on the presentation;  Reading – Extensive reading;  Writing- Poster making – Letter writing (Formal and E-mail) ;  Grammar – Direct and Indirect speech – Combining sentences using connectives;  Vocabulary – Collocation;

TEACHING METHODS:
Interactive sessions for the speaking module.
Use of audio – visual aids for the various listening activities.
Contextual Grammar Teaching.
EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL: 60 PERIODS

LEARNING OUTCOMES:
- Students will improve their reading and writing skills
- Students will become fluent and proficient in communicative English
- Students will be able to improve their interpersonal communication

TEXTBOOK:

REFERENCES:

MA7151 MATHEMATICS – I
(Common to all branches of B.E. / B.Tech. Programmes in I Semester)

OBJECTIVES:
- The goal of this course is for students to gain proficiency in calculus computations. In calculus, we use three main tools for analyzing and describing the behavior of functions: limits, derivatives, and integrals. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I DIFFERENTIAL CALCULUS
Representation of functions - New functions from old functions - Limit of a function - Limits at infinity - Continuity - Derivatives - Differentiation rules - Polar coordinate system - Differentiation in polar coordinates - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES

[Signature]
DIRECTOR
Centre for Academic Courses
Anna University, Chennai-600 025
UNIT III INTEGRAL CALCULUS 12
Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

UNIT V DIFFERENTIAL EQUATIONS 12
Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES:
- Understanding of the ideas of limits and continuity and an ability to calculate with them and apply them.
- Improved facility in algebraic manipulation.
- Fluency in differentiation.
- Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
- Understanding the ideas of differential equations and facility in solving simple standard examples.

TEXTBOOKS:

REFERENCES:
PH7151 ENGINEERING PHYSICS (Common to all branches of B.E / B.Tech programmes) 3 0 0 3

OBJECTIVE:
- To introduce the concept and different ways to determine moduli of elasticity and applications.
- To instill the concept of sound, reverberation, noise cancellation, and ultrasonic generation, detection and applications
- To inculcate an idea of thermal properties of materials, heat flow through materials and quantum physics
- To promote the basic understanding of interferometers, principles and applications of lasers, optical fibers and sensors
- To establish a sound grasp of knowledge on the basics, significance and growth of single crystals

UNIT I PROPERTIES OF MATTER 9

UNIT II ACOUSTICS AND ULTRASONICS 9

UNIT III THERMAL AND MODERN PHYSICS 9

UNIT IV APPLIED OPTICS 9

UNIT V CRYSTAL PHYSICS 9
Single crystalline, polycrystalline and amorphous materials – Single crystals: unit cell, crystal systems, Bravais lattices, ditections and planes in a crystal, Miller indices - interplanar distance for a cubic crystal - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - structure and significance of NaCl, CsCl, ZnS and graphite - crystal imperfections: point defects, line defects – Burger vectors, dislocations and stacking faults – Growth of single crystals: Bridgman and Czochralski methods.

TOTAL: 45 PERIODS
OUTCOME:
- The students will understand different moduli of elasticity, their determination and applications.
- The students will gain knowledge on the properties of sound, noise cancellation, and production, detection and applications of ultrasonics.
- The students will acquire sound knowledge on thermal expansion and thermal conductivity of materials. Further they will gain an idea of quantum physics.
- The students will gain knowledge on interferometers, lasers and fiber optics.
- The students will secure knowledge on the basics of crystal structures and their significance. Further they gain basic ideas of growing single crystals.

TEXTBOOKS:

REFERENCES:

CY7151 ENGINEERING CHEMISTRY

OBJECTIVE
To develop an understanding about fundamentals of polymer chemistry.
Brief elucidation on surface chemistry and catalysis.
To develop sound knowledge photochemistry and spectroscopy.
To impart basic knowledge on chemical thermodynamics.
To understand the basic concepts of nano chemistry.

UNIT I POLYMER CHEMISTRY
Introduction: Functionality-degree of polymerization. Classification of polymers-natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension.

UNIT II SURFACE CHEMISTRY AND CATALYSIS

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY
UNIT IV CHEMICAL THERMODYNAMICS
Second law: Entropy-entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Free energy and work function: Helmholtzand Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius Clapeyron equation; Maxwell relations-Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation- variation of chemical potential with temperature and pressure.

UNIT V NANOCHEMISTRY

OUTCOMES:
- Will be familiar with polymer chemistry, surface chemistry and catalysis.
- Will know the photochemistry, spectroscopy and chemical thermodynamics.
- Will know the fundamentals of nano chemistry.

TEXTBOOKS:

REFERENCES:
UNIT III  ARRAYS AND STRINGS

UNIT IV  POINTERS
Macros - Storage classes –Basic concepts of Pointers– Pointer arithmetic - Example Problems - Basic file operations

UNIT V  FUNCTIONS AND USER DEFINED DATA TYPES

TOTAL : 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
• Write C program for simple applications
• Formulate algorithm for simple problems
• Analyze different data types and arrays
• Perform simple search and sort.
• Use programming language to solve problems.

TEXTBOOKS:

REFERENCES:

BS7161  BASIC SCIENCES LABORATORY  L T P C
(Common to all branches of B.E. / B.Tech Programmes)  0 0 4 2

OBJECTIVE:
• To inculcate experimental skills to test basic understanding of physics of materials including properties of matter, thermal and optical properties.
• To induce the students to familiarize with experimental determination of velocity of ultrasonic waves, band gap determination and viscosity of liquids.

PHYSICS LABORATORY: (Any Seven Experiments)
1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of young’s modulus
3. Uniform bending – Determination of young’s modulus
4. Lee’s disc Determination of thermal conductivity of a bad conductor
5. Potentiometer- Determination of thermo e.m.f of a thermocouple
6. Laser- Determination of the wave length of the laser using grating
7. Air wedge - Determination of thickness of a thin sheet/wire
8. a) Optical fibre - Determination of Numerical Aperture and acceptance angle
     b) Compact disc- Determination of width of the groove using laser.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Post office box - Determination of Band gap of a semiconductor.
13. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow

TOTAL: 30 PERIODS

OUTCOME:
Upon completion of the course, the students will be able
- To determine various moduli of elasticity and also various thermal and optical properties of materials.
- To determine the velocity of ultrasonic waves, band gap determination and viscosity of liquids.

(CHEMISTRY LABORATORY) (Minimum of 8 experiments to be conducted)
1. Estimation of HCl using Na₂CO₃ as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler’s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline/thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
12. Pseudo first order kinetics-ester hydrolysis.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 30 PERIODS

TEXTBOOKS:
GE7161 COMPUTER PRACTICES LABORATORY  L T P C  0 0 4 2

OBJECTIVES:
- To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
- To articulate where computer programs fit in the provision of computer-based solutions to real world problems.
- To learn to use user defined data structures.

LIST OF EXPERIMENTS
1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function
10. Program using structures and unions.

TOTAL: 60 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Write and compile programs using C programs.
- Write program with the concept of Structured Programming
- Identify suitable data structure for solving a problem
- Demonstrate the use of conditional statement.

HS7251 TECHNICAL ENGLISH

OBJECTIVES:
- To enable students acquire proficiency in technical communication.
- To enhance their reading and writing skills in a technical context.
- To teach various language learning strategies needed in a professional environment.

CONTENTS
UNIT I ANALYTICAL READING 12
Listening- Listening to informal and formal conversations; Speaking – Conversation Skills(opening, turn taking, closing )-explaining how something works-describing technical functions and applications; Reading –Analytical reading, Deductive and inductive reasoning; Writing- vision statement–structuring paragraphs.

UNIT II SUMMARISING 12
Listening- Listening to lectures/ talks on Science & Technology; Speaking –Summarizing/ Oral Reporting, Reading – Reading Scientific and Technical articles; Writing- Extended definition –Lab Reports – Summary writing.

UNIT III DESCRIBING VISUAL MATERIAL 12
Listening- Listening to a panel discussion; Speaking – Speaking at formal situations; Reading – Reading journal articles - Speed reading; Writing-data commentary-describing visual material-writing problem-process- solution-the structure of problem-solution texts- writing critiques
UNIT IV  WRITING/ E-MAILING THE JOB APPLICATION  
Listening- Listening to/ Viewing model interviews; Speaking – Speaking at different types of interviews – Role play practice (mock interview); Reading – Reading job advertisements and profile of the company concerned; Writing- job application – cover letter – Résumé preparation.

UNIT V  REPORT WRITING
Listening- Viewing a model group discussion; Speaking – Participating in a discussion – Presentation; Reading – Case study – analyse – evaluate – arrive at a solution; Writing– Recommendations– Types of reports (feasibility report)– designing and reporting surveys – Report format– writing discursive essays.

TEACHING METHODS:
Practice writing
Conduct model and mock interview and group discussion.
Use of audio – visual aids to facilitate understanding of various forms of technical communication.
Interactive sessions.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%  
TOTAL: 60 PERIODS

LEARNING OUTCOMES
• Students will learn the structure and organization of various forms of technical communication.
• Students will be able to listen and respond to technical content.
• Students will be able to use different forms of communication in their respective fields.

TEXTBOOK:

REFERENCES:
MA7251  MATHEMATICS - II
(Common to all branches of B.E. / B.Tech. Programmes in II Semester)

OBJECTIVES:
- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of the electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I  MATRICES  12

UNIT II  VECTOR CALCULUS  12
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III  ANALYTIC FUNCTION  12
Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions \( w = z + c, \frac{1}{z}, z^2 \) - Bilinear transformation.

UNIT IV  COMPLEX INTEGRATION  12

UNIT V  LAPLACE TRANSFORMS  12

TOTAL: 60 PERIODS

OUTCOMES:
Upon successful completion of the course, students should be able to:
- Evaluate real and complex integrals using the Cauchy integral formula and the residue Theorem
- Appreciate how complex methods can be used to prove some important theoretical results.
- Evaluate line, surface and volume integrals in simple coordinate systems
- Calculate grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting these quantities
- Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.
PH7255 PHYSICS FOR ELECTRONICS AND INFORMATION SCIENCE
(Common to ECE & IT Branches)

OBJECTIVE:
- To understand the electrical properties of materials including free electron theory and applications of quantum mechanics
- To instill knowledge on physics of semiconductors, determination of charge carriers and device applications
- To promote the knowledge of magnetization of matter, classification of magnetic materials and their applications
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications
- To inculcate an idea of significance of nano structures, quantum confinement and ensuing nano device applications.

UNIT I ELECTRICAL PROPERTIES OF MATERIALS

UNIT II SEMICONDUCTORS AND TRANSPORT PHYSICS

UNIT III MAGNETIC PROPERTIES OF MATERIALS

Attested
DIRECTOR
Centre for Academic Courses
Anna University, Chennai-600 025
UNIT IV  OPTICAL PROPERTIES OF MATERIALS  9
Classification of optical materials – Absorption emission and scattering of light in metals, insulators & Semiconductors - LED’s – Organic LED’s – Plasma light emitting devices – LCD’s – Laser diodes – Optical data storage techniques (including DVD, Blue-ray disc, Holographic data storage).

UNIT V  NANO DEVICES  9

OUTCOME:
At the end of the course, the students will
• come to have firm knowledge on the electrical properties of materials and applications
• acquire adequate understanding of semiconductor physics and functioning of semiconductor devices
• gain knowledge on magnetization of matter, classification of magnetic materials and their theoretical understanding, and device applications
• understand the optical properties of materials and working principles of various optical devices
• appreciate the importance of nanotechnology, physics of nanodevices, low-dimensional structures and their applications

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

IT 7202  DATA STRUCTURES  L T P C  3 0 0 3

OBJECTIVES:
• To introduce the basics of C programming language
• To introduce the concepts of ADTs and linear data structures
• To introduce the concepts of Sorting and Searching techniques
• To familiarize the concepts of Hashing and Sets
UNIT I  C PROGRAMMING
Arrays - Functions - Pointers - Structures - Union - Enumerated Data Types - File Handling - Preprocessor Directives

UNIT II  LINEAR DATA STRUCTURES – LIST, STACK AND QUEUE
Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – cursor-based linked lists – doubly-linked lists – circular linked list- applications of lists – Polynomial Manipulation – Stack ADT – Implementation of Stack- Applications- Queue ADT – Queue Implementation - Double ended Queues

UNIT III  NON-LINEAR DATA STRUCTURES - TREES

UNIT IV  SORTING AND SEARCHING TECHNIQUES
Sorting algorithms: Insertion sort - Shell sort - Quick sort - Heap sort - Merge sort - External Sort– Searching: Linear search - Binary search

UNIT V  HASHINGAND DISJOINT SETS
Hashing: Hash Functions – Separate Chaining – Open Addressing: Linear Probing- Quadratic Probing- Double Hashing- Rehashing – Extendible Hashing - Disjoint Sets – Basic data structure- Smart Union Algorithms - Path Compression

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:

• Implement data structures using C language.
• Solve the problem using linear and non linear data structures.
• Analyze and implement hashing techniques that solves in linear time.

TEXT BOOK:

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<td>3. Ability to describe and implement hierarchical data structure using c language</td>
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<td>4. Distinguish and solve the real time problem by applying linear and non linear data structure concepts</td>
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<td>5. Interpret and design a suitable sorting techniques to optimize and solve the real time problems</td>
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6. Formulate and explain the hashing techniques to solve the storage related problems

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GE7152 ENGINEERING GRAPHICS

OBJECTIVES:

• To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HANDSKETCHING


UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES

Orthographic projection- principles-Principal planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes- Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES

Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY)

Introduction to drafting packages and demonstration of their use.

L = 45 + T = 30, TOTAL: 75 PERIODS

OUTCOMES:
On Completion of the course the student will be able to
- Perform free hand sketching of basic geometrical shapes and multiple views of objects.
- Draw orthographic projections of lines, planes and solids
- Obtain development of surfaces.
- Prepare isometric and perspective views of simple solids.

TEXT BOOK:

REFERENCES:

Publication of Bureau of Indian Standards:

Special points applicable to University Examinations on Engineering Graphics:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

IT7201 INFORMATION TECHNOLOGY ESSENTIALS

OBJECTIVES:
- To introduce the concept of Internet, Networks and its working principles.
- To know scripting languages.
- To understand various applications related to Information Technology.

UNIT I WEB ESSENTIALS
Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server
UNIT II         SCRIPTING ESSENTIALS  9
Need for Scripting languages - Types of scripting languages - Client side scripting - Server side scripting - PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and MySQL - PHP and HTML - Cookies - Simple PHP scripts

UNIT III        NETWORKING ESSENTIALS  9
Fundamental computer network concepts - Types of computer networks - - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching - Network components

UNIT IV MOBILE COMMUNICATION ESSENTIALS  9

UNIT V APPLICATION ESSENTIALS  9
Creation of simple interactive applications - Simple database applications - Multimedia applications - Design and development of information systems – Personal Information System – Information retrieval system – Social networking applications

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Design and deploy web-sites
- Design and deploy simple web-applications
- Create simple database applications
- Develop information system
- Describe the basics of networking and mobile communications

TEXT BOOKS:

REFERENCES:
3. it-ebooks.org

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<td>Design and deploy websites</td>
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<td>Design and deploy simple web-applications</td>
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<td>Create simple database applications</td>
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<td>Develop information systems</td>
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<td>Describe the basics of networking and mobile communications</td>
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<td>Design and develop systems using software engineering methodologies</td>
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OBJECTIVES:
- To write simple scripts for the creation of web sites
- To create various information technology enabled applications

1. Creation of interactive web sites - Design using HTML and authoring tools
2. Creation of simple PHP scripts - Dynamism in web sites
3. Handling multimedia content in web sites
4. Database applications using PHP and MySQL
5. Study of computer networking components
6. Creation information retrieval system using web, PHP and MySQL

OUTCOMES: On Completion of the course, the students should be able to:
- Design interactive websites using basic HTML tags, different styles, links and with all basic control elements.
- Create client side and server side programs using scripts using PHP.
- Design dynamic web sites and handle multimedia components
- Create applications with PHP connected to database.
- Create Personal Information System
- Implement the technologies behind computer networks and mobile communication.

Part B - DATA STRUCTURES LABORATORY

OBJECTIVES:
- To introduce the concepts of structured Programming language and writing ADT’s.
- To introduce the concepts of primitive Data Structures.
- To introduce the concepts of Hashing and Sorting.

LIST OF EXERCISE:
1. Practice of C Programming
2. Implementation of Linked List
3. Implementation of Stack using Arrays and Linked List.
4. Implementation of Queue using Arrays and Linked List.
5. Implementation of Stack and Queue applications.
8. Implementation of Sorting and Searching techniques.

OUTCOMES: On Completion of the course, the students should be able to:
- Implement any data structures using ADT’s.
- Solve the given problem using appropriate data structures

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<td>Design interactive websites using basic html tags, different styles, links and with all basic control elements.</td>
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<td>Create client side and server side</td>
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</table>
programs using php scripts
Design dynamic web sites using multimedia components
Implement the technologies related to computer networks and mobile communication.
Implement Data Structures using ADT’s
Solving problems using appropriate data structures

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<tr>
<th>Program</th>
<th>Lecture (L)</th>
<th>Teaching (T)</th>
<th>Practical (P)</th>
<th>Coursework (C)</th>
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<tbody>
<tr>
<td>To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Civil, Mechanical, Electrical and Electronics Engineering.</td>
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GROUP – A (CIVIL & ELECTRICAL) 15

1. CIVIL ENGINEERING PRACTICES

PLUMBING
Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
- Laying pipe connection to the suction side of a pump.
- Laying pipe connection to the delivery side of a pump.
- Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK
- Sawing, planning and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.

STUDY
- Study of joints in door panels and wooden furniture
- Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICES 15
- Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
- Stair case light wiring
- Tube – light wiring
- Preparation of wiring diagrams for a given situation.
- Study of Iron-Box, Fan Regulator and Emergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS) 15

3. MECHANICAL ENGINEERING PRACTICES
GE7251  ENVIRONMENTAL SCIENCE AND ENGINEERING  L T P C  3 0 0 3

OBJECTIVES:

- To the study of nature and the facts about environment.
- To find and implement scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth’s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I  ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY  14
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
Field study of common plants, insects, birds.
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II  ENVIRONMENTAL POLLUTION  8
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil
waste management: causes, effects and control measures of municipal solid wastes – role of an
individual in prevention of pollution – pollution case studies – disaster management: floods, 
earthquake, cyclone and landslides.
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III  NATURAL RESOURCES
Forest resources: Use and over-exploitation, deforestation, case studies - timber extraction, mining, 
dams and their effects on forests and tribal people – Water resources: Use and over- utilization of 
surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – 
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral 
resources, case studies – Food resources: World food problems, changes caused by agriculture 
and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, 
Sources – Energy resources: Growing energy needs, renewable and non renewable energy 
sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land 
degradation, man induced landslides, soil erosion and desertification – role of an individual in 
conservation of natural resources – Equitable use of resources for sustainable lifestyles.
Field study of local area to document environmental assets – river / forest / grassland / hill / 
mountain.

UNIT IV  SOCIAL ISSUES AND THE ENVIRONMENT
From unsustainable to sustainable development – urban problems related to energy – water 
conservation, rain water harvesting, watershed management – resettlement and rehabilitation of 
people; its problems and concerns, case studies – role of non-governmental organization-
environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, 
ozone layer depletion, nuclear accidents and holocaust, case studies, – wasteland reclamation – 
consumerism and waste products – environment production act– Air (Prevention and Control of 
Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest 
conservation act – enforcement machinery involved in environmental legislation- central and state 
pollution control boards- Public awareness.

UNIT V  HUMAN POPULATION AND THE ENVIRONMENT
Population growth, variation among nations – population explosion – family welfare programme –
environment and human health – human rights – value education – HIV / AIDS – women and 
child welfare – role of information technology in environment and human health – Case studies.

OUTCOMES:
Environmental Pollution or problems cannot be solved by mere laws. Public participation is an 
important aspect which serves the environmental Protection. One will obtain knowledge on the 
following after completing the course.
  • Public awareness of environment at infant stage.
  • Ignorance and incomplete knowledge has lead to misconceptions.
  • Development and improvement in standard of living has lead to serious environmental 
disasters.

TEXT BOOKS:

REFERENCES:
1. R.K. Trivedi, ‘Handbook of Environmental Laws, Rules, Guidelines, Compliances 
3. Dharmendra S. Sengar, ‘Environmental law’, Prentice hall of India PVT LTD, New Delhi, 
   2007.
OBJECTIVES:
- To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- To learn about the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To know the fundamental concepts of transaction processing - concurrency control techniques and recovery procedure.
- To have an introductory knowledge about the Storage and Query processing Techniques

UNIT I RELATIONAL DATABASES
Purpose of Database System — Views of data – Data Models – Database System Architecture –
Introduction to relational databases - Relational Model - Keys -- Relational Algebra – Relational
Calculus - SQL fundamentals - Advanced SQL features - Triggers- Embedded SQL- Dynamic
SQL - Database connectivity

UNIT II DATABASE DESIGN
Entity-Relationship Model – E-R Diagrams - Functional Dependencies – Non-loss Decomposition –
Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation –
Boyce/Codd Normal Form - Multi-valued Dependencies and Fourth Normal Form – Join
Dependencies and Fifth Normal Form

UNIT III TRANSACTION MANAGEMENT
Recovery – Two Phase Commit -- Save Points – Concurrency – Need for Concurrency – Locking
Protocols – Two Phase Locking – Deadlock – Recovery Isolation Levels

UNIT IV IMPLEMENTATION TECHNIQUES
Overview of Physical Storage Media – RAID – File Organization – Organization of Records in Files –
Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static
Hashing – Dynamic Hashing – Query Processing Overview – Catalog Information for Cost
Estimation - Query Optimization

UNIT V ADVANCED TOPICS
Introduction to Distributed databases - Cloud Databases - Data warehouse and Mining - Mobile
Databases - XML Databases - Multimedia Databases.

TOTAL : 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- To design database using E-R modeling and apply normalization techniques over it.
- To manage the transactions that happens in a database.
- To analyze the recent advancements in databases.
- To design and implement database for real world applications.

TEXT BOOKS:

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<tr>
<td>Demonstrate an understanding of relational data model and formulate queries using relational algebra, sql and relational calculus.</td>
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<td>Recognize and use contemporary logical design methods and tools for databases.</td>
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<td>Articulate the purpose of concurrency control and transaction management in databases.</td>
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<td>Learn and implement the principles and concepts of storage structures and access methods.</td>
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<td>Analyze the recent advancements in databases.</td>
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<td>Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing and implementing a DBMS.</td>
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IT7302 DIGITAL COMMUNICATION L T P C 3 0 0 3

OBJECTIVES:
- To provide knowledge on various amplitude, frequency and pulse modulation and demodulation systems.
- To provide some analysis of noise performance of various receivers.
- To study some basic information theory.

UNIT I INTRODUCTION TO DATA COMMUNICATION & STOCHASTIC PROCESSES
UNIT II         REPRESENTATION OF SIGNALS AND SYSTEMS
Signals and Systems - Fourier Series representation of signals - Sampling process - Discrete
Fourier transform - Z-transform - Convolution and Correlation.

UNIT III         MODULATION
Continuous Wave Modulation: Amplitude and Frequency modulation - Frequency Division
Multiplexing - Noise in continuous wave modulation - Pulse Modulation: Pulse amplitude
modulation - Pulse Code Modulation - Time Division Multiplexing – Pseudo-Noise Sequences – A
notion of Spread Spectrum – Direct Sequence Spread Spectrum – Frequency-Hop Spread
Spectrum.

UNIT IV         TRANSMISSION AND RECEPTION
Baseband Transmission: Line coding - NRZ, RZ, Manchester Coding - Baseband M-ary PAM
transmission - Pass band Transmission: Frequency Shift Keying - Phase Shift Keying- Reception:
Correlation Filters - Matched filter - Error rate due to noise - Inter Symbol Interference

UNIT V         INFORMATION THEORY AND ERROR CONTROL CODING
Uncertainty, Information and Entropy - Source Coding theorem - Mutual information - Channel
capacity - Channel coding theorem - Information capacity theorem - Rate-distortion theory and
Data compression - Linear block codes - Cyclic codes - Convolutional Codes.

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
• Know the various modulation and demodulation techniques.
• Know the representation of signals, will be able to analyze the transmission & reception
processes and information coding techniques.

TEXT BOOK:

REFERENCES:
2. Wayne Tomasi, “Electronic communication systems", fundamentals through advanced, 5/e,

Course Outcomes (COs) / Program Outcomes (POs) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | PSO1 | PSO2 | PSO3
---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---
Know about basics of communication, various types of random process and its application in communication. | 3 | 2 | - | 2 | - | - | - | - | - | - | - | - | 2 | 3
Know about the types of signals and systems and its application in communication systems. | 3 | 2 | 3 | 3 | - | - | - | - | - | - | - | - | 2 | 3
Know the various analog modulation and demodulation techniques. | 3 | - | - | 2 | - | - | - | - | - | - | - | - | 2 | 3
Know about the pulse and digital modulation and demodulation techniques. | 3 | - | - | 2 | - | - | - | - | - | - | - | - | 2 | 3
Know the representation of signals, will be able to analyze the transmission and reception process. | 3 | 2 | - | 3 | - | - | - | - | - | - | - | - | 2 | 3
Know about the basics of information theory, source coding and channel coding techniques. | 3 | 2 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | 2 | 3
OBJECTIVES:
- To introduce Object Oriented Programming language concepts and to implement Data Structures.
- To learn about Non linear Data Structures.
- To familiarize Graphs and its algorithms.

UNIT I  OBJECT ORIENTED PROGRAMMING FUNDAMENTALS  9
Data Abstraction - Encapsulation - Class - Object - Constructors - Static members – Constant members – Member functions – Pointers – References - Role of this pointer - String Handling – Copy Constructor - Polymorphism – Function overloading – Operators overloading – Dynamic memory allocation - Inheritance.

UNIT II  OBJECT ORIENTED PROGRAMMING - ADVANCED FEATURES  9
Generic Programming - Templates – Class template - Function template– Virtual functions - Abstract class - Exception handling - Standard libraries - STL – Containers – Algorithms - Iterators

UNIT III  ADVANCED NON-LINEAR DATA STRUCTURES  9

UNIT IV  ELEMENTARY GRAPH ALGORITHMS  9

UNIT V  GRAPH ALGORITHMS  9

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Solve the given problem using object oriented programming concepts.
- Implement advanced data structures through ADT’s using OOP.
- Apply graph data structures for a real world problem.

TEXT BOOKS:

REFERENCES
**Outcomes (POs)**

| To understand the problem specifications and define as per requirements | 3 | 3 | 2 | 1 | - | - | 1 | 1 | 1 | 1 | 1 | - | 2 | - | 2 | 2 |
| To design the real time problems using oops concepts | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | - | 2 | 2 | 2 | 2 |
| Solve the given problems using oop concepts | 3 | 3 | 3 | 2 | 2 | - | 1 | 1 | 2 | 1 | - | 1 | 2 | 2 | 2 |
| To understand and apply the advanced data structures for solving real time applications | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | - | 2 | 2 | 2 | 2 |
| Implement advanced data structures through adt's using oops | 3 | 3 | 3 | 2 | 2 | - | 1 | 1 | 2 | 2 | - | 2 | 2 | 2 | 2 |
| Apply graph data structures for a real world problem | 3 | 3 | 3 | 2 | 1 | - | 1 | 1 | 2 | 2 | - | 2 | 2 | 2 | 2 |

**IT7351**  
**DIGITAL PRINCIPLES AND DESIGN**  
**L T P C**  
3 0 0 3

**OBJECTIVES:**
- Learn how to design digital circuits, by simplifying the Boolean functions.
- Learn to design combinational and sequential circuits.
- To study about asynchronous sequential logic.
- Give an idea about designs using PLDs.
- To write code in hardware definition languages for designing larger digital systems.

**UNIT I**  
**BOOLEAN ALGEBRA AND LOGIC GATES**  
9

**UNIT II**  
**COMBINATIONAL LOGIC**  
9

**UNIT III**  
**SYNCHRONOUS SEQUENTIAL LOGIC**  
9

**UNIT IV**  
**ASYNCHRONOUS SEQUENTIAL LOGIC**  
9

**UNIT V**  
**MEMORY AND PROGRAMMABLE LOGIC**  
9

**TOTAL: 45 PERIODS**

**OUTCOMES:**
On Completion of the course, the students should be able to:
- Design and analyze digital circuits.
- Simplify complex Boolean functions.
- Implement design using MSI chips and PLDs.
- Build digital systems involving combinational and sequential logic.
TEXT BOOK:

REFERENCES:

Course Outcomes (COs) / Program Outcomes (POs)

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<thead>
<tr>
<th>Design and analyze combinational digital circuits.</th>
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<tr>
<td>Simplify complex boolean functions.</td>
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<td>Implement circuits using MSI chips and PLDs</td>
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<td>Build digital systems involving combinational and sequential logic</td>
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<tr>
<td>Design and analyze asynchronous sequential logic Circuits</td>
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<td>Use hardware definition language to design and simulate digital systems</td>
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MA7355 PROBABILITY AND QUEUEING THEORY

OBJECTIVES:
- To provide the required fundamental concepts in probability and queueing models and apply these techniques in networks, image processing etc.
- Acquire skills in analyzing queueing models.

UNIT I RANDOM VARIABLES
Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions - Functions of a random variable.

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III RANDOM PROCESSES

UNIT IV QUEUEING THEORY
Markovian queues – Birth and Death processes – Single and multiple server queueing models – Little’s formula - Queues with finite waiting rooms – Finite source models.
UNIT V
NON-MARKOVIAN QUEUES AND QUEUEING NETWORKS

M/G/1 queue – Pollaczek Khinchin formula - M/D/1 and M/E_k/1 as special cases – Series queues – Open and closed Jackson networks.

OUTCOMES:
- Students will be able characterize probability models using probability mass (density) functions & cumulative distribution functions.
- Students will be able to understand the terminology & nomenclature appropriate queueing theory.
- Students will demonstrate the knowledge and understand the various queueing models.
- Students will be able to formulate concrete problems using queueing theoretical approaches.

TEXT BOOKS:

REFERENCES:

IT7311 DIGITAL AND DATABASE SYSTEMS LABORATORY
L T P C
0 0 4 2

OBJECTIVES:
- To learn how to develop combinational and sequential circuits.
- To use Hardware description language for simulation of digital circuits.
- To write code in HDL - VHDL or Verilog.

LIST OF EXPERIMENTS FOR DIGITAL LAB:
1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters.
3. Design and implementation of combinational circuits using MSI devices
   - 4 – bit binary adder / subtractor
   - Parity generator / checker
   - Application using multiplexers and decoders
4. Design and implementation of sequential circuits:
   - Shift –registers
   - Synchronous and asynchronous counters
5. Coding combinational / sequential circuits using HDL and a simple digital system (Mini Project).

OUTCOMES:
On Completion of the course, the students should be able to:
• Build digital circuits using basic gates and MSI devices
• Simulate and analyze digital circuits.
• Debug implementation issues for Boolean functions.

OBJECTIVES:
• To learn and implement DDL, DML, DCL and TCL commands in query language
• To practice SQL Queries, PL/SQL programming concepts and Triggers
• To design and develop a database application

LIST OF EXPERIMENTS FOR DATABASE LAB:
1. Data Definition, Manipulation of Tables and Views
2. Database Querying – Simple queries, Nested queries, Join Queries, Views
3. Triggers
4. High level language extensions - PL/SQL Basics
5. Procedures and Functions
6. Front End Tools/Programming Languages
7. Database Connectivity with Front End Tools
8. Database Design and Implementation (Case Study)

TOTAL: 60 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
• To design databases using E-R modeling and apply normalization techniques.
• To implement DDL, DML and DCL commands in SQL.
• To implement database in open source software environment.
• To design and implement database for real world applications.

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<tr>
<td>Design digital circuits using basic gates and msi devices</td>
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<td>Simulate and analyze digital circuits</td>
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<td>Implement and debug digital circuits</td>
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<td>Implement ddl, dml and dcl commands</td>
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<tr>
<td>Design and implement database in open source software environment for real world applications</td>
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IT7312 OBJECT ORIENTED PROGRAMMING AND ADVANCED
DATA STRUCTURES LABORATORY

OBJECTIVES:
• To understand the concepts of Object Oriented Programming
• To use standard template library in the implementation of standard data structures
• To learn advanced data structures using Object Oriented Programming language
• To expose graph structures and traversals using OOP concepts.
• To understand various graph algorithms using OOP concepts.

LIST OF EXPERIMENTS:
1. Practicing C++ programs with Classes, Objects, Constructors and Destructors.
2. Function overloading and Operator overloading.
3. Inheritance.
4. Polymorphism – Virtual functions.
5. Templates and STL
6. Exception handling.
8. Implementation of Splay Tree.
9. Implementation of a Heap tree
10. Implementation of Graphs - Topological Sort
11. Graph Traversals Algorithms - Breadth-First Search – Depth-First Search

OUTCOMES:
On Completion of the course, the students should be able to:
• Implement the given problem using object oriented programming concepts.
• Implement advanced data structures through ADT's using OOP.
• Analyze and apply the graph data structures for a real world problem.

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<th>PSO1</th>
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<td>Implement the concepts of object oriented programming.</td>
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<td>Solve and implement the given problem using object oriented programming concepts.</td>
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<td>Implement basic and advanced data structures through ADT's using OOP.</td>
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<td>Analyze and apply the graph data structures for a real world problem.</td>
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<td>Design and develop real time applications by applying suitable data structures and associated operations.</td>
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<td>Design and develop efficient algorithms with data representations on his own based on the requirements.</td>
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TOTAL: 60 PERIODS
48

CS7351  SOFTWARE ENGINEERING  L  T  P  C  3 0 0 3

OBJECTIVES:

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

UNIT I  SOFTWARE PROCESS MODELS  9

UNIT II  REQUIREMENT ENGINEERING  9

UNIT III  ANALYSIS MODELLING  9

UNIT IV  DESIGN AND TESTING  9

UNIT V  QUALITY AND MAINTENANCE  9

TOTAL: 45PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- To differentiate the perspective of various software process models
- To elicit the requirements for real-time problems
- To compile a SRS pertaining to industry standards
- To create a behavioral model from the set of requirements
- To develop a user-interface design for the given system
- To outline various software metrics and their context in measuring software programs
- To estimate the software cost
TEXTBOOKS:

REFERENCES:

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<td>Distinguish the perspective of various Software process models</td>
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<td>Analyze the requirements for real-time problems</td>
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<td>To create software requirements specification pertaining to industry standards</td>
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<td>To create a behavioral model from the set of requirements</td>
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<td>To design and develop a user-interface for the given system</td>
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<td>To optimize the software cost estimation</td>
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CS7451 COMPUTER ARCHITECTURE

OBJECTIVES:
- To identify the functional units in a digital computer system
- To distinguish between the various ISA styles
- To trace the execution sequence of an instruction through the processor
- To compare different approaches used for implementing a functional unit
- To understand the fundamentals of memory and I/O systems and their interaction with the processor
- To evaluate different computer systems based on performance metrics

UNIT I FUNDAMENTALS OF A COMPUTER SYSTEM

UNIT II ARITHMETIC FOR COMPUTERS

49
UNIT III  BASIC PROCESSING UNIT  12

UNIT IV  MEMORY AND I/O  12

UNIT V  ILP AND PARALLEL PROCESSING  12

OUTCOMES:
Upon completion of the course, the students will be able to
- Identify the functional units of a computer system and their operation
- Point out the various metrics of performance
- Critically analyze the different types of ISA styles
- Explain the data path and control path implementation of a processor
- Discuss the implementations of various functional units
- Point out the characteristics of the memory and I/O systems and discuss their design

TEXTBOOK:

REFERENCES:
OBJECTIVES:
- To learn the concepts of operating systems.
- To learn about the various issues in operating systems.
- To familiarize with the important mechanisms in operating systems.
- To appreciate the emerging trends in operating systems.

UNIT I OPERATING SYSTEMS OVERVIEW

UNIT II PROCESS MANAGEMENT

UNIT III STORAGE MANAGEMENT

UNIT IV I/O SYSTEMS

UNIT V CASE STUDY

<table>
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<tr>
<th>Activities</th>
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<tr>
<td>Point out the various metrics of performance</td>
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<tr>
<td>Critically analyze the different types of ISA</td>
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<td>Explain the data path and control path</td>
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<tr>
<td>Discuss the implementations of various functional units</td>
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<tr>
<td>Explore the characteristics of the memory and I/O systems and discuss their design</td>
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CS7452 OPERATING SYSTEMS L T P C 3 0 0 3
OUTCOMES:
On Completion of the course, the students should be able to:
- Articulate the main concepts, key ideas, strengths and limitations of operating systems
- Explain the core issues of operating systems
- Know the usage and strengths of various algorithms of operating systems

TEXT BOOK:

REFERENCES:

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<tr>
<td>Articulate the main concepts, key ideas, strengths and limitations of operating systems</td>
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<td>Explain the core issues of operating systems</td>
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<td>Know the usage and strengths of various algorithms of operating systems</td>
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<td>Understand the efficient utilization of system resources by the management techniques adopted by the operating system.</td>
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<td>Explore the behavior of the operating systems with its associated software and hardware.</td>
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<td>Understand the practical implementations of Operating Systems.</td>
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IT7401 ALGORITHMICS

OBJECTIVES:
- To learn about the process of problem solving and writing algorithms
- To analyze the algorithms for time/space complexity
- To use algorithm design paradigms for various algorithmic design
- To learn the applications of algorithmic design.
UNIT I  FUNDAMENTALS

UNIT II  DESIGNTECHNIQUES

UNIT III  ANALYSIS AND SEARCH TECHNIQUES
Probabilistic Analysis and Randomized Algorithms - The Hiring Problem - Randomized Algorithms - Amortized Analysis - Branch and Bound - Integer Linear Programming - Job Scheduling - Backtracking - All Simple Paths in a Graph

UNIT IV  APPLICATIONS

UNIT V  NP-COMPLETENESS

OUTCOMES:
On Completion of the course, the students should be able to:
• Design and implement any problem using design techniques
• Critically analyze the complexity of the given algorithm.
• Solve the problem in polynomial time or prove that to be a NP-Complete problem.

TEXT BOOK:

REFERENCES:

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<tbody>
<tr>
<td>Articulate the process of problem solving and writing algorithms</td>
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<td>Understand different algorithmic design strategies</td>
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<td>Design and implement any problem using design techniques</td>
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53
Critically analyze the complexity of the given algorithm
Solve the problem in polynomial time or prove that to be np-complete problem
Obtaining knowledge of advanced topics of algorithms such as approximation algorithms, linear programming, and randomized algorithms

IT7402 WEB TECHNOLOGY

OBJECTIVES:
- To know the object oriented programming basics using Java
- To train the students to acquire knowledge in Object Oriented application development
- To acquire knowledge in concurrent programming in Java
- To gain skill to develop simple web applications using Java based technologies
- To know the basics of python programming

UNIT I JAVA BASICS
Introduction to Java - Test-driving a java application - Input / Output and operators - Classes, Objects, Methods and strings - control statements - Methods: A deeper look - Arrays and Array Lists - classed and objects: A deeper look - Inheritance - polymorphism and Interfaces

UNIT II JAVA GUI, FILE STREAM AND CONCURRENCY
Exception handling - swing GUI components - Graphics and Java 2d - Strings, characters and Regular Expressions - File streams and object serialization - Generic collections - Lamdas and Streams - Generic classes and methods - advanced Swing GUI components - concurrency - thread states and life cycles - thread synchronization

UNIT III HTML AND JAVA SCRIPT

UNIT IV JAVA SERVER SIDE PROGRAMMING

UNIT V PYTHON PROGRAMMING BASED WEB DEVELOPMENT
Strings - Operators - Decisions- Functions - Classes and Objects - Files and Directories - Modules - Text processing - Accessing Databases - Simple web application using python

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Have knowledge on the concepts of Java based implementation of Object Oriented system
- Write thread based parallel programs using Java
- Develop simple web applications using Java based technologies
- Write simple programs using Python language
TEXT BOOKS:
3. James Payne, Beginning Python - Using Python 2.6 and 3.1, Wiley India Pvt. Ltd., 2010

REFERENCES:
1. Marty Hall and Larry Brown, "Core Servlets And Javaserver Pages", Second Edition
4. http://www.w3schools.com/
5. http://nptel.ac.in/courses/106105084/

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<td>Create, validate, parse and transform xml documents</td>
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MA7451 DISCRETE MATHEMATICS L T P C

OBJECTIVES:
- Have knowledge of the concepts needed to test the logic of a program.
- Have an understanding in identifying structures on many levels.
- Be aware of a class of functions which transform a finite set into another finite set which relates to input output functions in computer science.
- Be aware of the counting principles.
- Be exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups.

UNIT I LOGIC AND PROOFS 12

UNIT II COMBINATORICS 12
Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations -Solving linear
recurrence relations using generating functions – Inclusion - Exclusion - Principle and its applications.

UNIT III GRAPHS
Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

UNIT IV ALGEBRAIC STRUCTURES

UNIT V LATTICES AND BOOLEAN ALGEBRA

TOTAL: 60 PERIODS

OUTCOMES:
On completion of the module the student should be able to:
- Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
- Understand the basics of discrete probability and number theory, and be able to apply the methods from these subjects in problem solving.
- Use effectively algebraic techniques to analyse basic discrete structures and algorithms.
- Understand asymptotic notation, its significance, and be able to use it to analyse asymptotic performance for some basic algorithmic examples.
- Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.

TEXTBOOKS:

REFERENCES:

IT7411 OPERATING SYSTEMS LABORATORY

OBJECTIVES:
- To learn about the basic commands of operating systems.
- To learn various process management schemes in operating systems.
- To practice with the important memory management mechanisms in operating systems.
- To implement the file handling techniques in operating systems

LIST OF EXERCISES:
1. Basic unix commands such as ls, cd, mkdir, rmdir, cp, rm, mv, more, lpr, man, grep, sed, etc.,
2. Shell script
3. Process control System calls - demonstration of fork, execute and wait
4. Thread management
5. Thread synchronization
6. Deadlock avoidance using semaphores
7. Interprocess communication using pipes
8. Interprocess communication using FIFOs
9. Interprocess communication using signals
10. Implementation of CPU scheduling policy in Linux
11. Implement a memory management policy in Linux
12. Implement a file system in Linux
13. Linux kernel configuration

TOTAL : 60 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Learn the concepts to identify, create and maintain the basic command in operating systems
- Express strengths and limitations of various managements schemes in operating systems
- Explain the core issues of operating systems
- Implement algorithms of operating systems

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<td>Familiarize strengths and limitations of various managements schemes in operating systems</td>
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<td>Implement algorithms of operating systems</td>
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IT7412 WEB TECHNOLOGY LABORATORY

OBJECTIVES:
- To learn about web technologies related concepts
- To develop Java and HTML based web applications
- To implement parsers and XML related concepts
EXERCISES:
1. Creating simple applications using JAVA by exploring all the object oriented programming concepts such as inheritance, polymorphism, interfaces and packages.
2. Creating GUI based application using JAVA Swings
3. Developing concurrent and generic programming using Threads
4. Creation of simple websites using HTML 5 Tags
5. Creation of web forms and validating it through javascripts
6. Creation of XML file and validating with DTD and XML schema
7. Working with DOM and SAX parsers
8. Creation of AJAX based application
9. Developing JSON application
10. Creation of dynamic HTML based web applications
11. Creation of servlet based web application with JDBC
12. Developing JSP application
13. Creating simple applications using python
14. Simple database and web application using python

TOTAL: 60 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Create simple web applications
- Implement server side and client side programming develop web applications with various web technology concepts.

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<tr>
<td>Create simple web applications</td>
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<td>Write programs on streaming, multithreading and generic collections in java</td>
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<td>Develop web based applications using jdbc</td>
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<td>Implement server side programming using servlet and jsp</td>
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<td>Develop simple web application using python</td>
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IT7501 COMPILER ENGINEERING

OBJECTIVES:
- To learn the concepts in the design of compilers
- To learn about the runtime store organization.
- To know the data structures used to implement symbol tables.
- To be familiar with garbage collection.
UNIT I LEXICAL ANALYSIS

UNIT II SYNTAX ANALYSIS
Introduction-Context Free Grammar-Top Down Parsing-Recursive Descend Parsing-Predictive Parsing-Non-Recursive Predictive Parsing-Error Recovery- Bottom Up Parsing- LR Parsers-Construction of SLR(1) Parsing Table, Canonical LR(1) Parsing Table and LALR(1) Parsing Table - Parser Generators.

UNIT III INTERMEDIATE CODE GENERATION

UNIT IV RUNTIME ENVIRONMENT
Storage Organization - Stack Allocation - Access To Non-Local Data - Heap Management - Symbol Tables - Introduction to Garbage Collection - Trace-Based Collection.

UNIT V CODE GENERATION

TOTAL : 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Use compiler construction tools.
- Design and implement a prototype compiler

TEXT BOOK:

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<td>Understand the concept of lexical analysis and construction of deterministic and non deterministic automata</td>
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<td>Understand the concept of parsing and construction of parser</td>
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</table>
Study of programming language design, target machine design and run time environment of compilers.

Study about the compiler construction tools.

Obtaining knowledge to construct a prototype compiler for a subset of a programming language.

OBJECTIVES:

- Identify the component required to build different types of networks
- To learn about the division of network functionalities into layers.
- Identify solution for each functionality at each layer
- Choose the required functionality at each layer for given application

UNIT I  FUNDAMENTALS

UNIT II  TRANSPORT LAYER

UNIT III  NETWORK LAYER AND UNICAST ROUTING

UNIT IV  NETWORK RELATED PROTOCOLS

UNIT V  DATA LINK LAYER AND LAN
Link layer services - Framing – Error Detection and Correction - Flow control - Media access control - Ethernet - CSMA/CD - Token Ring - FDDI - Link Virtualization - Data Center Networking Wireless LANs - CSMA/CA –BLUETOOTH

OUTCOMES:
On Completion of the course, the students should be able to:

- Differentiate between the various fundamental computer network concepts
- Analyze issues in design and deployment of a computer network
- Solve computational problems in networks
- Design and implement a networking application incorporating the different layering protocols

TEXT BOOKS:

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<td>Analyze issues in design and deployment of a computer network</td>
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<td>Design and implement a networking application incorporating the different layering protocols</td>
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<td>Acquiring knowledge about various network routing protocols</td>
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<td>Understanding of different link layer concepts in wired and wireless technologies.</td>
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**IT7503 EMBEDDED SYSTEMS**

**OBJECTIVES:**
- To learn the internal architecture of an embedded processor including timers and interrupts
- To quantize the core specifications of an embedded processor
- To introduce interfacing I/O devices to the processor
- To learn programming an embedded processor
- To run and debug programs in an IDE

**UNIT I 8-BIT EMBEDDED PROCESSOR**

**UNIT II EMBEDDED C PROGRAMMING**
Programming embedded systems in C – Implementing Timers, Interrupts and Serial communication in embedded C- Multi-state systems

**UNIT III LOW-POWER EMBEDDED PROCESSORS**
ARM7 TDMI processing core - instruction sets and programming – Intel ATOM/Quark Processor – Architecture – Programming- Advanced Low Power Processors - Introduction to IoT
UNIT IV  RTOS
Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Performance issues - Need for RTOS - Introduction to µC/OS II

UNIT V  EMBEDDED SYSTEM DEVELOPMENT
Embedded software development tools – Emulators and debuggers. Challenges of Embedded Systems – Embedded system design process - Design issues – Design methodologies – Case studies – Complete design of example embedded systems.

OUTCOMES:
On Completion of the course, the students should be able to:
- Design a simple embedded application
- Compare various embedded processors
- Design and deploy timers and interrupts
- Design an embedded processor based system for a real-time application

TEXT BOOKS:

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<td>Compare various embedded processors</td>
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<td>Design and deploy timers and interrupts</td>
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<td>Ability to understand, adapt and use advanced processor</td>
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<td>Ability to write assembly and embedded c programs</td>
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IT7551  UNIX INTERNALS  3 0 0 3

OBJECTIVES:
- To learn about the design of the UNIX operating system.
- To become familiar with the various data structures used.
To learn the various low-level algorithms used in UNIX.

UNIT I OVERVIEW

UNIT II FILE SUBSYSTEM
Internal Representation of Files: Inodes – Structure of a Regular File – Directories – Conversion of a Path Name to an Inode – Super Block – Inode Assignment to a New File – Allocation of Disk Blocks.

UNIT III SYSTEM CALLS FOR THE FILE SYSTEM

UNIT IV PROCESSES

UNIT V MEMORY MANAGEMENT AND I/O

OUTCOMES:
On Completion of the course, the students should be able to:
- To design and implement the subsystems of an operating system.
- To explain the data structures of an open source operating system.
- To modify and implement the data structures and algorithms of an open source operating system.

TEXT BOOK:

REFERENCES:
To explain the data structures of an open source operating system.

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<th>Course Outcomes (COs) / Program Outcomes (POs)</th>
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<tr>
<td>To explain the data structures of an open source operating system.</td>
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To modify and implement the data structures and algorithms of an open source operating system.

| To modify and implement the data structures and algorithms of an open source operating system. | 3 | 3 | 3 | 2 | 2 | - | - | - | 2 | - | - | 3 | 3 | 3 | 1 |

To have a knowledge about the memory management in unix operating system.

| To have a knowledge about the memory management in unix operating system. | 3 | 1 | 2 | - | 1 | - | - | - | 2 | - | - | 2 | 2 | 3 | - |

To know the internal representation of files in unix operating system.

| To know the internal representation of files in unix operating system. | 3 | 1 | 2 | - | 1 | - | - | - | 2 | - | - | 2 | 2 | 3 | - |

To identify process creation, manipulation, waiting and termination of processes.

| To identify process creation, manipulation, waiting and termination of processes. | 3 | 3 | 3 | 1 | 2 | - | - | - | 2 | - | - | 3 | 3 | 3 | 1 |

IT7511 COMPUTER NETWORKS LABORATORY

OBJECTIVES:
To learn about the low-level network programming concepts using APIs and Simulation tools.

LIST OF EXERCISES:
1. Write a network application program
2. Use tools to visualize packet flow
3. Configure Router/Switch to set up network (network administration)
4. Simple Chat Program using TCP Sockets
5. Simulation of HTTP Protocol using TCP Sockets
6. Simulation of Sliding Window Protocol using TCP Sockets
7. Simulation of DNS using UDP Sockets
8. Simulation of Ping using Raw Sockets
9. Learn to use commands like TCP Dump, Netstat, Trace Route
10. Study of TCP/UDP performance using simulation tool
11. Performance comparison of MAC protocols using simulation tool
12. Performance comparison of Routing protocols using simulation tool

TOTAL: 60 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- To implement a network layer software and analyze functionalities of computer networks
network configuration
management.

To develop a simulation program
for connection establishment
using various types of sockets

To learn and use the various
commands in network
programming.

To Analyze and compare the
performance of various routing
protocols.

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OBJECTIVES:

- To learn tools relevant to Embedded Systems
- To explore Embedded C Programs for different embedded processor
- To write and interpret simple assembly programs that use various features of the processor.

LIST OF EXERCISES:

1. 8051 Assembly Language Experiments(Kit and Simulator) based on:
   - Data transfer programs
   - Arithmetic and logical programs
   - Conversions and sorting
   - Timers and Interrupts
   - Serial Communication
   - I/O interfacing: Traffic Generator, DAC, ADC, Stepper Motor

2. Basic and Interfacing Programs Using Embedded C

3. Real time system programs (Embedded C)

4. KEIL software example programs

2. ARM/Atom based Application Development:
   i. Programs to practice data processing instructions.
   ii. Interfacing programs
   iii. Program that uses combination of C and ARM/Atom assembly code.

3. Embedded Application Development on Platforms like Bluemix:

TOTAL : 60 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

- Develop Applications based on Embedded Systems
- Write an Embedded C Program, Debug and interpret the Results
- Write and implement simple assembly programs that use various features of the processor.
- Able to do an experiment that senses an analog signal, process and control [e.g., Keypad, Display].

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<td>Write and implement simple assembly programs that use various features of the processor</td>
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senses an analog signal, process and control [e.g., Keypad, display]

Design and implement an embedded processor based system for a real-time application

Design and deploy an IoT using Arduino/ARM Equivalent boards

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<td>Implement the computational model that addresses the societal problems</td>
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<td>Deploy the developed computation model</td>
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<td>Appreciate the collaborative problem solving skill set of the team</td>
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<td>Understand the importance of IT in society</td>
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IT7513  
SOCIALLY RELEVANT PROJECT

Students are expected to take up problems that would directly benefit the society and design and implement an IT based solution for the problem, based on the courses undertaken up to that semester. The evaluation of the project would be based on the formulation of the problem, and the technical merit of the solution.

OUTCOMES:
On Completion of the course, the students should be able to:
- Be a benefit to the society by solving a socially pertinent problem, design and implement it with an IT based solution for the problem.

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IT7601  
INFORMATION SECURITY

OBJECTIVES:
- To introduce the concepts and models of security in computing
- To design and implement symmetric and asymmetric cryptosystems
- To explain the security standards followed at the network level and at the application level
- To estimate the level of security risk faced by an organization and the counter measures to handle the risk
- To learn secured software development

UNIT I  
SECURITY - AN OVERVIEW
UNIT II ADVANCED CRYPTOGRAPHY

UNIT III SECURITY STANDARDS

UNIT IV SECURITY PRACTICES

UNIT V SECURE DEVELOPMENT

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Apply the basic security algorithms and policies required by computing system.
- Predict the vulnerabilities across any computing system and hence be able to design a security solution for any computing system.

TEXT BOOKS:

REFERENCES:

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<td>Apply the basic security and cryptographic algorithms and policies required by computing system</td>
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<td>Predict the vulnerabilities across any computing system and hence</td>
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be able to design a security solution for any computing system.

Ability to design and implement symmetric and asymmetric cryptosystems

Explain the security standards followed at the network level and at the application level

Estimate the level of security risk faced by an organization and the counter measures to handle the risk

Acquire familiarity with the state of the art security standards and practices for CO6

*Exposed to the security standards and security practices followed in it industries and in turn able to develop secure software.

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OBJECTIVES:
- To know the importance of Java based Enterprise level application development
- To train the students to acquire knowledge in various frameworks
- To gain skill to develop enterprise applications using Java based technologies

UNIT I SERVER SIDE PROGRAMMING

UNIT II ENTERPRISE JAVA BEANS

UNIT III HIBERNATE FRAMEWORK
UNIT IV  JAVA WEB SERVICES  
Overview of SOA - Overview of Java Web Services (JWS) - Role of WSDL, SOAP, and Java/XML Mapping in SOA - JAX-WS 2.2 and JAXB 2.2 Specification - WSEE, WS-Metadata, SAAJ, JAXR specifications

UNIT V  STRUT AND SPRING FRAMEWORKS  
Struts - Struts 2 Architecture - Actions in Struts 2 - Spring Framework Architecture - Spring’s web MVC framework - Spring with Hibernate - Struts 2 with Spring - Securing Java EE Applications - JAAS - AJAX

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Develop complex real world web applications
- Differentiate the importance of various application development frameworks

TEXT BOOKS:
2. https://docs.oracle.com/javaee/7/JEETT.pdf

REFERENCES:

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<tr>
<td>Interpret java ee, its features, containers and develop applications using its features.</td>
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<td>Discover and differentiate the importance of various application development frameworks to implement mvc framework.</td>
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<td>Develop enterprise level web applications using java based technologies.</td>
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<td>Understand the basics of security mechanisms and its usage in application server, enterprise beans and providing security in web applications.</td>
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<td>Design and implement web services that accommodates to specific requirements.</td>
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<td>Develop complex real world web applications</td>
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69
OBJECTIVES:
- To know about the intricacies of wireless communication
- To study about the popular cellular networking technologies
- To learn about widely used wireless LAN technologies
- To explore the various protocols that support mobility at network layer and transport layer
- To learn the principles of mobile application development

UNIT I  WIRELESS COMMUNICATION  9
Frequencies and Regulations - Signals - Antennas - Propagation Ranges and Effects - Multipath
Propagation - Effects of Mobility - Multiplexing - Modulation and Shift Keying - Spread Spectrum
- Frequency Hopping and Direct Sequence - Evolution of Wireless Telephony.

UNIT II  TELECOMMUNICATION NETWORKS  9
Cellular System - Cellular Network Structure and Operation - Principles - Tessellation, Frequency
Reuse, Hand off - GSM - System Architecture, Elements, Interfaces, Frame Structure, Protocol
Stack, Types of Handover – CDMA - UMTS and IMT-2000 - Architecture, User Equipment, RNS,
UTRAN, Node B, RNC functions - W-CDMA - HSPA+, HSUPA, HSDPA+

UNIT III  WIRELESS LAN  9
Need and Advantages - Applications - IEEE 802.11 WLAN - Architecture, Protocol stack - Physical
layer - MAC Layer - CSMA/CA, Virtual Carrier Sense, Fragmentation and Reassembly, Inter
Frame Spacing - Security - WEP - 802.1x Authentication - Synchronization - Power management
- ETSI HIPERLAN - Characteristics, Services, Protocols - Physical Layer - Channel Access
Control - Bluetooth - PHY and MAC layers

UNIT IV  MOBILE NETWORK AND TRANSPORT LAYER  9
Mobile IP - IPv6 Mobility Features - Mobility header, Mobility options - Ad hoc networks - AODV
and DSDV Protocols - Limitations of traditional TCP - Indirect TCP - Snoop TCP - Mobile TCP
- Different Approaches in Transmission and Retransmission - Explicit Link Failure Notification
- Wireless Transport Layer Security (WTLS)

UNIT V  MOBILE APPLICATION DEVELOPMENT  9
Three Tier Architecture - Presentation Tier - Application Tier and Data Tier – Google Android
Platform – Eclipse Simulator – Android Application Architecture – Apple iPhone Platform – UI Tool
Kit Interfaces – Event Handling – Event based Programming – Storing and Retrieval of data

OUTCOMES:
On Completion of the course, the students should be able to:
- To articulate the concept of wireless communication
- To have knowledge on the architecture of GSM and LTE protocol
- To choose the appropriate WLAN technology for a given scenario
- To deploy various protocols that support mobility at network layer and transport layer
- To design and implement mobile applications

TEXT BOOKS:

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<td>To articulate the concept of wireless communication</td>
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<td>To choose the appropriate wlan technology for a given scenario</td>
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<td>To design and implement mobile applications</td>
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<td>To explore the architecture of various mobile os platforms</td>
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IT7604 PARALLEL AND DISTRIBUTED SYSTEMS L T P C 3 0 0 3

OBJECTIVES:
- To provide knowledge on principles underlying the design of distributed and parallel systems
- To lay the foundations of Distributed and Parallel Systems.
- To introduce the idea of Distributed and Parallel Architecture.
- To introduce the idea of Distributed operating system and related issues.

UNIT I INTRODUCTION TO DISTRIBUTED AND PARALLEL SYSTEMS 8

UNIT II COMMUNICATION IN DISTRIBUTED AND PARALLEL ENVIRONMENT 9

UNIT III DISTRIBUTED OPERATING SYSTEMS 10

UNIT IV DISTRIBUTED RESOURCE MANAGEMENT 10

UNIT V FAULT TOLERANCE AND CONSENSUS 8

TOTAL: 45 PERIODS
OUTCOMES:
On Completion of the course, the students should be able to:
- Articulate the principles and standard practices underlying the design of distributed and parallel systems.
- Explain the core issues of distributed and parallel systems.
- Appreciate the difficulties in implementing basic communication in parallel and distributed systems.
- Have knowledge on the substantial difficulty in designing parallel and distributed algorithms in comparison to centralized algorithms.
- Appreciate the issues in distributed operating system, resource management and fault tolerance

TEXT BOOKS:

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<td>Articulate the principles and standard practices underlying the design of distributed and parallel system</td>
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<td>Explain the core issues of distributed and parallel systems</td>
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<td>Appreciate the difficulties in implementing basic communication in parallel and distributed systems.</td>
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<td>Have knowledge on the substantial difficulty in designing parallel and distributed algorithm in comparison to centralized algorithm</td>
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<td>Appreciate the issues in distributed operating system, resource management and fault tolerance</td>
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<td>Appreciate the application of distributed system in data transmission and access</td>
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OBJECTIVES:
The goal of this course is to encourage the students to identify innovative projects that help in exploring variables that promote creativity and innovation. Each student is expected to choose a real life or socially relevant problem. At the end of the project, students should be familiar with the state of art in their respective fields. They would be able to apply the concepts learnt to relevant research problems or practical applications.

OUTCOMES:
On Completion of the course, the students should be able to:
Know concepts, models, frameworks, and tools that engineering graduates’ need in a world where creativity and innovation is fast becoming a pre-condition for competitive advantage.

TOTAL: 60 PERIODS

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<tr>
<td>Design a computational model for creative and innovative problems</td>
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<td>Implement the computational model that addresses the innovative solutions</td>
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<td>Test the computational model in real time settings</td>
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<td>Deploy the developed computation model</td>
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<td>Appreciate the collaborative problem solving skill set of the team</td>
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<td>Appreciate the need of creativity and innovation for competitive advantage</td>
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OBJECTIVES:
- The Information Security Laboratories to present several hands-on exercises to help reinforce the students knowledge and understanding of the various Information security aspects.
- The lab exercises are based on implementation of cryptographic algorithms and with usage of various security attacks/defenses related tools and utilities.

LIST OF EXERCISES:
The following exercises are based on the cryptographic algorithms. They can be implemented using C, C++, Java, etc.
1. Write a program to perform encryption and decryption using the following algorithms
   a. Caesar cipher
   b. Substitution cipher
   c. Hill Cipher
2. Write a program that contains functions, which accept a key and input text to be encrypted/decrypted. This program should use the key to encrypt/decrypt the input by using the triple DES algorithm. Make use of Cryptography package.
3. Write a program to implement the Rijndael algorithm logic.
4. Write the RC4 logic in any language.
5. Using cryptography, encrypt the text "Hello world" using Blowfish. Create your own key using key tool.
6. Write a program to implement RSA algorithm.
7. Implement the Diffie-Hellman Key Exchange mechanism using HTML and Script. Consider the end user as one of the parties (Alice) and the Script application as the other party (Bob).
8. Calculate the message digest of a text using the SHA-1/MD5 algorithm in any language.
9. Create a digital certificate of your own by using the key tool.
10. Write a program to encrypt user’s passwords before they are stored in a database table, and to retrieve the whenever they are to be brought back for verification.
11. Key generation (public and private key pair) can be performed using Java. Write a program which can do this.
12. Write a program which performs a digital signature on a given text.

TOTAL: 60 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Have knowledge on the fundamentals of secret and public cryptography.
- Familiar with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc)

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<tr>
<td>Attain knowledge of the fundamentals of secret and public key cryptography</td>
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<td>Implement specific encryption/decryption algorithms</td>
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<td>Implement secret key exchange strategies</td>
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<td>Develop basic mobile applications in android environment</td>
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<td>Create simple animations in android</td>
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<td>Explore the performance analysis in mobile simulators</td>
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IT7613 INTEGRATED PROGRAMMING LABORATORY

OBJECTIVES:
- To learn about the concepts of developing simple web applications
- To practice the concepts of enterprise level Java frameworks
- To familiarize the students with the development of advanced Java applications

EXERCISES
1. Creating servlet based application with session and cookies
2. Developing JSP applications with JDBC and session management
3. Experimenting with basic EJB applications.
4. Developing EJB application with session and entity beans
5. Creation of web services using JAVA
6. Creation of RESTful web services and SOAP based web services
7. Developing SOA based solutions using web service composition
8. Hibernate based application development
9. Application development using spring
10. Application development using strut framework
11. Creation of Database applications using Hibernate
12. Creation of java based secure application

TOTAL : 60 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Develop enterprise level java applications
- Implement enterprise java concepts such as JSP, Servlet, EJB
- Create the applications using the concepts of hibernate, spring, struts

Course Outcomes (COs) / Program Outcomes (POs)

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<th>Identify and understand the state of art in their respective fields and become familiar with the concepts</th>
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<td>Apply the concepts learnt to relevant research problems or practical applications and classify the concepts.</td>
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<td>Understand and formulate the real-time concepts and models, develop enterprise level java applications</td>
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<td>Design and develop enterprise level java applications and become familiar with frameworks and tools</td>
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<td>Design and create enterprise java concepts using jsp, servlet, ejb</td>
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<tr>
<td>Create the applications using the concepts of hibernate, spring, struts</td>
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IT7701 COMPUTER GRAPHICS AND MULTIMEDIA

OBJECTIVES:
- To know the mathematical basis of computer graphics
- To train the students to acquire knowledge in Graphic generation and Animation creation
- To acquire knowledge about multimedia compression techniques
- To gain skill to develop multimedia systems

UNIT I INTRODUCTION TO COMPUTER GRAPHICS
Graphics display devices- Graphics input primitives and devices - OpenGL basic graphic primitives-Line drawing algorithms DDA and Bresenham - World windows and viewports- Clipping algorithms for lines, Regular polygons, circles and arcs- The parametric form for a curve- Review of vectors- Representations of key geometric objects- Lines and Planes

Attested

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Centre for Academic Courses
Anna University, Chennai-600 025

75
UNIT II MODELING AND TRANSFORMATIONS OF OBJECTS 9
Introduction to transformations-Two dimensional transformations-3D affine transformations-
Drawing 3D scenes interactively- Introduction to solid modeling with polygonal meshes-Mesh
approximations to smooth objects-Particle systems and physically based systems-Three-
dimensional viewing -Perspective projections of 3D objects - Introduction to shading models-Flat
shading and smooth shading- Adding texture to faces.

UNIT III VISUAL REALISM 9
Manipulating pixmaps-Manipulating symbolically defined regions-Aliasing and anti aliasing
techniques-Describing curves using polynomials-Bezier curves-The B-Spline basis functions-
Modeling curved surfaces- Color theory- Overview of the ray tracing process-Intersecting rays
with other primitives-Adding shadows for greater realism-Reflections and transparency- Boolean
operations on objects-Ray casting.

UNIT IV INTRODUCTION TO MULTIMEDIA 9
Multimedia and hypermedia-world wide web-overview of multimedia software tools - Multimedia
authoring-Editing and authoring tools-VRML - Graphics/Image data types-popular file formats-
Fundamental Concepts in Video- Types of Video Signals-Analog Video-Digital Video- Basics of
Digital Audio- Digitization of sound-MIDI-Quantization and transmission of audio-Surround sound-
Dolby-DTS.

UNIT V COMPRESSION TECHNIQUES 9
Run-length coding -Lossless image compression- Transform coding-Wavelet-based coding -JPEG
standard- JPEG2000 Standard- JPEG-LS standard-Bi-level image compression standards- MPEG
Video Coding1-MPEG-1 and - MPEG Video Coding II-MPEG-4,7 and Beyond- Basic Audio
Compression Techniques- MPEG Audio Compression.

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Articulate the concepts and techniques used in three-dimensional graphics
- Design and model graphical structures
- Design and implement algorithms and techniques applied to multimedia objects

TEXTBOOKS:

REFERENCES:
Understand the importance of compression techniques for multimedia objects
Develop multimedia enabled application

OBJECTIVES:
- To introduce big data and its importance towards analytics
- To familiarize the students with fundamentals of data analysis
- To expose the students to different of big data frameworks
- To learn about the stream mining concepts

UNIT I  INTRODUCTION TO DATA ANALYTICS  9

UNIT II  DATA ANALYSIS - FUNDAMENTALS  9

UNIT III  ANALYTICAL FRAMEWORKS - I  9

UNIT IV  ANALYTICAL FRAMEWORKS – II  9
Overview of Application development in Languages for Hadoop – PigLatin, Hive, jaql, Sqoop, Apache drill, Cloudera Impala – Introduction to NoSQL databases - HBase, MongoDB – CouchDB – Introduction to R Language for statistical computing and visualization – R Installation and integration with Hadoop.

UNIT V  MINING DATA STREAMS  9

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Identify the differences between reporting and analytics
- Demonstrate fundamental mathematics behind analytics
- Install Hadoop and write Map Reduce Programs
- Critically analyze different big data frameworks for programming, storage and statistical analysis
- Apply mining techniques for stream data
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<td>To know the fundamental concepts of big data and analysis</td>
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<td>To learn various techniques for mining data streams</td>
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<td>To learn event modelling for different applications</td>
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<td>Work with big data platform and its analysis techniques</td>
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<td>Design efficient algorithms for mining the data from large volumes</td>
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<td>Model a framework for human activity recognition</td>
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IT7703 KNOWLEDGE ENGINEERING AND INTELLIGENT SYSTEMS  L T P C  3 0 0 3

OBJECTIVES:
- The background of intelligent agents and search mechanisms
- The various knowledge representation techniques
- The reasoning methods of proposition, predicate and higher order logics
- The learning techniques in artificial agents

UNIT I KNOWLEDGE REPRESENTATION IN INTELLIGENT AGENTS  9

UNIT II SEARCH STRATEGIES  9
UNIT III REASONING WITH PROPOSITION AND PREDICATE LOGIC
Proposition Logic - Syntax - Semantics - Horn Clauses - Resolution - First Order Logic - Syntax - Conversion from English Statements to First order logic formula - Semantics - Reasoning methods - Forward chaining - Backward chaining - Resolution - Application: AI Planning

UNIT IV REASONING WITH HIGHER ORDER LOGICS
Modal Logic - Syntax - Semantics - Kripke structures - Temporal Logic - Syntax and Semantics - Reasoning mechanisms using Temporal Logic - Epistemic Logic - Syntax and Semantics - Multiagent reasoning using Epistemic Logic- Case based reasoning

UNIT V LEARNING
Statistical methods - Bayesian techniques- Supervised learning- Unsupervised learning- Regression methods - Learning under uncertainty - Probability methods - Text processing

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Use the knowledge representation and reasoning techniques for the design of intelligent systems
- Apply the reasoning methods of various logics to computer science domains.
- Create intelligent systems using learning mechanisms.

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<tr>
<td>1. Understand the mechanism of agents, environments, knowledge representation and reasoning techniques</td>
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<td>2. Analyse the different types of search mechanisms</td>
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<td>3. Apply the reasoning techniques of lower order logics</td>
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<td>4. Understand the reasoning process of higher order logics</td>
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<td>5. Apply the learning techniques to real world problems</td>
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<td>6. To explore the recent trends in Intelligent systems</td>
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OBJECTIVES:
- To study about the design, implementation and evaluation of effective and usable graphical computer interfaces.
- To describe and apply core theories, models and methodologies from the field of HCI.
- To learn various case studies in HCI.

UNIT I  FOUNDATIONS FOR INTERACTION DESIGN  9

UNIT II  MODELS AND THEORIES  9

UNIT III  DESIGN PROCESS  9

UNIT IV  IMPLEMENTATION AND EVALUATION TECHNIQUES  9

UNIT V  CASE STUDIES  9
Goals of HCI case studies: Exploration - Explanation - Description - Demonstration, Types of case study: Intrinsic or instrumental - Single case multiple cases - Embedded or holistic, Groupware: Groupware systems - Computer mediated communication - Meeting and decision support system - Shared applications and artifacts - Frameworks for groupware - Implementing synchronous groupware, Ubiquitous computing and augmented realities: Ubiquitous computing applications research - Virtual and augmented reality - Information and data visualization - HCI for smart environment – Virtual reality – HCI for scientific applications, medical applications – HCI for assistive technology

OUTCOMES:
On Completion of the course, the students should be able to:
- Interpret the contributions of human factors and technical constraints on human-computer interaction.
- Evaluate the role of current HCI theories in the design of software.
- Apply HCI techniques and methods to the design of software.
- Categorize and carefully differentiate various aspects of multimedia interfaces
- Design and develop issues related to HCI for real application.

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<td>Interpret the Contributions of Human Factors and Technical Constraints on Human-Computer Interaction</td>
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<td>Evaluate the role of current HCI Theories in the Design of Software</td>
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<td>Apply HCI Techniques and Methods to the Design of Software</td>
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<td>Evaluate the Human Computer Interfaces Developed for Various Applications</td>
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<td>Design and Develop HCI for Real Applications</td>
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<td>Design and Develop Innovative and Societal Valued Interfaces for Real Life Applications</td>
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IT7711  GRAPHICS AND MULTIMEDIA LABORATORY  L T P C  0 0 4 2

OBJECTIVES:
- To introduce the necessary background, the basic algorithms, and the applications of computer graphics.
- To examine the various graphics applications of modeling, design and visualization.
- To develop an innovative multimedia projects.

Implement the exercises from 1 to 4 using C/OpenGL / Java
1. Implementation of Algorithms for drawing 2D Primitives with attributes
   a. Line (DDA, Bresenham) - all slopes
   b. Circle (Midpoint), Ellipse.
2. 2D Geometric Transformations -
   a. Translation
   b. Rotation
   c. Scaling
   d. Reflection
   e. Shear
3. Window- Viewport transformation
4. Composite 2D Transformations
5. Line Clipping - Liang Barsky, Cohen Sutherland

Implement the exercises from 6 to 8 using OpenGL
6. 3D Transformations - Translation, Rotation, Scaling
7. 3D Projections - Parallel, Perspective

81
8. Creating 3D Scenes

Implement the exercise 9 and 10 using any programming language

9. To implement text compression algorithms
10. To implement image compression algorithms

Implement the exercises from 11 to 12 using respective open source tools

11. Image Editing and Manipulation - Basic Operations on image using any image editing software, Creating gif animated images, Image optimization
12. 3D Animation - To create Interactive animation using any open source 3D Modelling tool

OUTCOMES:
On Completion of the course, the students should be able to:

- Be able to construct interactive computer graphics programs using OpenGL.
- Have a thorough understanding of working of 2D and 3D computer graphics.
- Able to create animation in both 2D and 3D.
- Have the ability to build a multimedia application.

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<tr>
<td>Construct Interactive Computer Graphics Programs</td>
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<td>Have a Thorough Understanding of 2D and 3D Computer Graphics</td>
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<td>Create Animation in Both 2D and 3D</td>
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<td>Have ability to Build a Multimedia Application</td>
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<td>Apply Creative Ideas in the Development of Multimedia Applications</td>
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<td>Construct 3D Scenes in a Realistic Manner</td>
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IT7712 MINI PROJECT

Three member team is identified to carry out mini project, the goal of mini project is to choose the final year project, Perform Literature Survey, refer IEEE papers, IEEE/ACM papers, study the implementation issues, familiarize with the tools needed for implementation, study necessary simulation software (if any) and implement the initial phase of the project. Three reviews needs to be conducted project report has to be submitted by the team. Final review will be conducted by external member.

TOTAL : 60 PERIODS
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<td>As a team, identify a real-world problem that can be solved using IT tools and techniques</td>
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<td>Analyse existing artefacts and solutions and design novel effective approaches</td>
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<td>To explore, select, and deploy the appropriate tools for effective implementation of the design</td>
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<td>To prepare the documentation for the design and implementation, write reports and make presentations justifying the choices made.</td>
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<td>To develop the required collaboration and communication skills to work in a professional team and multi-disciplinary context.</td>
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<td>To quickly develop Proof-of-Concept of solutions to problems</td>
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**CS7072 GRAPH THEORY**

**OBJECTIVES:**
- To comprehend graphs as modeling and analysis tool
- To introduce various data structures with graph theory
- To learn fundamentals behind principle of counting and combinatorial.

**UNIT I  INTRODUCTION**

**UNIT II  TREES, CONNECTIVITY & PLANARITY**

**UNIT III  MATRICES, COLOURING AND DIRECTED GRAPH**
UNIT IV PERMUTATIONS & COMBINATIONS

UNIT V GENERATING FUNCTIONS

OUTCOMES:
Upon completion of the course, the students will be able to:
- Write programs involving basic graph algorithms
- Write programs for graph coloring
- Differentiate the potential use of directed and undirected graphs
- Outline the concepts of permutations and combinations

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<tr>
<td>Demonstrate understanding of the fundamental theorems of graph theory.</td>
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<td>Identify and differentiate the potential use of special graphs and describe the basic properties of each kind.</td>
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<td>Design and develop programs involving basic graph algorithms.</td>
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<td>Introduce graphs as a powerful modeling tool that can be used to solve practical problems in various fields.</td>
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<td>Outline and apply the concepts of permutations and combinations and generating functions in applications.</td>
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<td>Apply the abstract concepts of graph theory in modeling and</td>
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</table>
OBJECTIVES:
- To give students knowledge of soft computing theories fundamentals,
- To learn the fundamentals of non-traditional technologies and approaches to solving hard real-world problems.
- To learn and apply artificial neural networks, fuzzy sets and fuzzy logic, and genetic algorithms in problem solving and use of heuristics based on human experience
- To introduce the ideas of fuzzy sets, fuzzy logic, to become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations

UNIT I NEURAL NETWORKS - I

UNIT II NEURAL NETWORKS - II

UNIT III FUZZY LOGIC - I

UNIT IV FUZZY LOGIC – II

UNIT V GENETIC ALGORITHM

TOTAL :45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to:
- Awake the importance of tolerance of imprecision and uncertainty for design of robust and low-cost intelligent machines.
- Acquire knowledge of soft computing theories fundamentals and so they will be able to design program systems using approaches of these theories for solving various real-world problems.
- Try and integrate the knowledge of neural networks, fuzzy logic, genetic algorithms, probabilistic reasoning, rough sets, chaos, hybrid approaches (combinations of neural networks, fuzzy logic and genetic algorithms).
TEXTBOOKS:

REFERENCES:
1. Siman Haykin, “Neural Networks”, Prentice Hall of India, 1999

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<tr>
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<tr>
<td>Identify and describe soft computing techniques and their role in building intelligent machines.</td>
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<td>Apply neural networks to pattern classification and regression problems using soft computing approach</td>
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<td>Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems</td>
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<td>Apply genetic algorithms to optimization problems</td>
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<td>Integrate the knowledge of neural networks, fuzzy logic, genetic algorithms, probabilistic reasoning, rough sets, chaos, hybrid approaches</td>
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<td>Awake the importance of tolerance of imprecision and uncertainty for design of robust and low-cost intelligent machines</td>
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OBJECTIVES:
- To get an idea on designing analog and digital filters
- To acquire knowledge related to Fourier transform and its applications.
- To learn the design of infinite and finite impulse response filters for filtering undesired signals.
- To understand signal processing concepts in systems having more than one sampling frequency.

UNIT I  SIGNALS AND SYSTEMS  9

UNIT II  FREQUENCY TRANSFORMATIONS  9

UNIT III  IIR FILTER DESIGN  9

UNIT IV  FIR FILTER DESIGN  9

UNIT V  APPLICATIONS  9

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to:
- Perform frequency transforms for signals
- Design IIR and FIR filters
- Write programs using analog and digital filters and to compare the respective output
- Identify finite word length errors in digital filters

TEXTBOOKS:

REFERENCES:
GE7071  DISASTER MANAGEMENT  L T P C

OBJECTIVES:
- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR).
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

UNIT I  INTRODUCTION TO DISASTERS  9
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II  APPROACHES TO DISASTER RISK REDUCTION (DRR)  9
Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III  INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT  9
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV  DISASTER RISK MANAGEMENT IN INDIA  9
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V  DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS  9
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:
On completion of the course, the students should be able to:

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management

TEXTBOOKS:


REFERENCES:

1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005

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<td>1. Understanding foundations of hazards, disasters and associated natural/social phenomena</td>
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<td>2. Familiarity with disaster management theory (cycle, phases)</td>
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<td>3. Knowledge about existing global frameworks and existing agreements</td>
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<td>4. Methods of community involvement as an essential part of successful DRR</td>
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<td>5. Humanitarian Assistance before and after disaster</td>
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<td>6. Technological innovations in Disaster Risk Reduction: Advantages and problems</td>
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89
OBJECTIVES:

- To understand the global trends and development methodologies of various types of products and services
- To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification
- To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I  FUNDAMENTALS OF PRODUCT DEVELOPMENT  9

UNIT II  REQUIREMENTS AND SYSTEM DESIGN  9

UNIT III  DESIGN AND TESTING  9

UNIT IV  SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT  9

UNIT V  BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY  9

OUTCOMES:
Upon completion of the course, the students will be able to:
• Define, formulate and analyze a problem
• Solve specific problems independently or as part of a team
• Gain knowledge of the Innovation & Product Development process in the Business Context
• Work independently as well as in teams
• Manage a project from start to finish

TEXTBOOKS:
1. Book specially prepared by NASSCOM as per the MoU.

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<td>Define, formulate and analyze a problem</td>
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<td>Solve specific problems independently or as part of a team</td>
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<td>Gain knowledge of the Innovation Process in the Business Context</td>
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<td>Product Development process in the Business Context</td>
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<td>Work independently as well as in teams</td>
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<td>Manage a project from start to finish</td>
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GE7074  HUMAN RIGHTS  L T P C
OBJECTIVE: To sensitize the Engineering students to various aspects of Human Rights.

UNIT I
UNIT II

UNIT III
Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V

TOTAL : 45 PERIODS

OUTCOME:
- Engineering students will acquire the basic knowledge of human rights.

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<td>An understanding of the principles and institutions of international human rights law, including their origins, assumptions contents, limits and potential</td>
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<td>Understanding the importance of the human rights Act 1998</td>
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<td>The role of human rights in contemporary issues relating to terrorism, religion, ethnicity, gender and development</td>
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<td>Analyse a country’s situation or an international situation in terms of human rights and formulate human rights-based initiatives and policies</td>
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AIM
To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES
- To understand the need for quality, its evolution, basic concepts, contribution of quality gurus, TQM framework, Barriers and Benefits of TQM.
- To understand the TQM Principles.
- To learn and apply the various tools and techniques of TQM.
- To understand and apply QMS and EMS in any organization.

UNIT I INTRODUCTION
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality - Definition of TQM - Basic concepts of TQM - Gurus of TQM (Brief introduction) - TQM Framework - Barriers to TQM - Benefits of TQM.

UNIT II TQM PRINCIPLES
Leadership - The Deming Philosophy, Quality council, Quality statements and Strategic planning - Customer Satisfaction - Customer Perception of Quality, Feedback, Customer complaints, Service Quality, Kano Model and Customer retention - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition & Reward and Performance Appraisal - Continuous process improvement - Juran Trilogy, PDSA cycle, 5s and Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating and Relationship development.

UNIT III TQM TOOLS & TECHNIQUES I

UNIT IV TQM TOOLS & TECHNIQUES II
Quality circles - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures - Cost of Quality - BPR.

UNIT V QUALITY MANAGEMENT SYSTEM

TOTAL: 45 PERIODS

OUTCOMES:
- Ability to apply TQM concepts in a selected enterprise.
- Ability to apply TQM principles in a selected enterprise.
- Ability to apply the various tools and techniques of TQM.
- Ability to apply QMS and EMS in any organization.

TEXT BOOK:
REFERENCES:

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<td>To know the TQM Principles.</td>
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<td>Applying QMS and EMS in any organization</td>
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<td>Knowledge of ISO’s with Benchmark Data’s</td>
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<td>Awareness of Latest Quality Control Standards</td>
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IT7001 ADVANCED DATABASE TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES:
- To learn the advanced concepts of databases.
- To familiarize the concepts of spatial and xml databases for better representation.
- To learn various enhanced data models.
- To learn and understand the concepts of No SQL databases for large scale data management.

UNIT I PARALLEL AND DISTRIBUTED DATABASES
Database System Architectures: Centralized and Client-Server Architectures - Parallel databases: I/O Parallelism - Inter and Intra query parallelism - Inter and Intra operation parallelism - Distributed database concepts - Distributed data storage - Distributed transactions - Commit protocols - Concurrency control - Distributed Query Processing - Heterogeneous Distributed databases - Cloud based Databases.

UNIT II SPATIAL DATABASES & XML DATABASES

UNIT III INFORMATION RETRIEVAL AND WEB SEARCH
Information Retrieval concepts- Retrieval Models - Types of Queries in IR systems- Text Preprocessing- Inverted Indexing- Evaluation measures of search relevance- Web search and analysis - Web databases
UNIT IV  ENHANCED DATA MODELS
Active database concepts and Triggers - Temporal Database concepts - Object Oriented Databases - Multimedia Database concepts - Introduction to Deductive databases - Mobile Databases - Data Warehousing - Data Mining

UNIT V  NoSQL DATABASES
Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – column family stores - relationships – graph databases – schema-less databases – materialized views -Cassandra - MongoDB

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- To create data models and representations for a database application.
- To evaluate the usage and effectiveness of various databases.
- To develop IR systems and Web search engines.
- To demonstrate the NoSQL databases using recent big data tools.

TEXT BOOKS:

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<td>Analyze the recent advancements in databases.</td>
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<td>Evaluate the usage and effectiveness of various databases.</td>
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<td>Understand and work with the architecture of parallel and distributed databases.</td>
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<td>Develop IR (expand) systems, xml and web databases.</td>
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<td>Implement intelligent and multimedia databases.</td>
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<td>Explore the representation, storage mechanism, query strategy and transaction management of various databases.</td>
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OBJECTIVES:
- To explain QoS requirements and compare different approaches to QoS.
- To appreciate need for high speed networks
- To identify reliability issues and provide solutions

UNIT I  INTERNETWORKING  9

UNIT II  QUALITY OF SERVICE  9
QoS taxonomy - Resource allocation - Scheduling - Queuing disciplines - Delay Analysis - Integrated services - Differentiated services - RSVP.

UNIT III  MPLS AND VPN  9

UNIT IV  OPTICAL NETWORKS  9
Photonic Packet switching - WDM network design - Introduction to optical networks - optical layer - SONET/SDH - Optical packet switching - Client layers - Signaling protocols and network operation

UNIT V  SOFTWARE DEFINED NETWORKING  9
Introduction to SDN - Network Function Virtualization - Data Plane - Control Plane - SDN software stack - Data center Traffic Management

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Gain an understanding of advanced networks concept.
- Describe the principles behind the enhancement in networking
- Know the recent development in networks

TEXT BOOKS:

REFERENCES:
Apply the techniques used for QoS in networks 3 3 2 2 3 - - 2 - - 3 2 3 3
Validate the concepts of MPLS 3 3 2 1 3 - - 2 - - 3 2 3 3
Analyze the design of SONET and WDM 3 3 3 2 3 - - 2 - - 3 2 3 3
Setup and demonstrate the working of an SDN controller 3 3 3 2 3 - - 2 2 - 3 3 3 3

IT7003  AGENT BASED INTELLIGENT SYSTEMS L T P C 3 0 0 3

OBJECTIVES:
- The structure of agents
- The learning mechanisms of agents
- The communication and cooperation within agents
- The design of agents

UNIT I  INTRODUCTION 9
Agents as a paradigm for software engineering - Agents as a tool for understanding human societies - Intelligent Agent: Agents and Objects - Agents and Expert Systems - Agents as Intentional Systems - Abstract Architectures for Intelligent Agents - How to Tell an Agent What to Do

UNIT II  LEARNING IN AGENTS 9

UNIT III  COMMUNICATION AND COOPERATION IN AGENTS 9
Software tools for ontology - OWL - XML - KIF - Speech acts - Cooperative Distributed Problem Solving - Task Sharing and Result Sharing - Result Sharing - Combining Task and Result Sharing - Handling Inconsistency - Coordination - Multi agent Planning and Synchronization

UNIT IV  DEVELOPING INTELLIGENT AGENT SYSTEMS 9
Situated Agents: Actions and Percepts - Proactive and Reactive Agents: Goals and Events - Challenging Agent Environments: Plans and Beliefs - Social Agents - Agent Execution Cycle - Deciding on the Agent Types - Grouping functionalities - Review Agent Coupling - Acquaintance Diagrams - Develop Agent Descriptors

UNIT V  APPLICATIONS 9

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Implement a computational agent with various searching techniques.
- Apply the reasoning mechanisms of proposition and predicate logic to agents.
- Use the learning mechanisms for an artificial agent.
• Execute different communication and co-operation methodologies in a multi-agent setup.

TEXT BOOKS:

REFERENCES:

IT7004 C# AND .NET PROGRAMMING L T P C 3 0 0 3

OBJECTIVES:
• To cover all segments of programming in C# starting from the language basis, followed by the object oriented programming concepts
• To update and enhance skills in writing Windows applications, ADO.NET and ASP .NET
• To introduce advanced topics namely data connectivity, WPF, WCF and WPF with C# and .NET 4.5
• To implement mobile applications using .Net Compact Framework

UNIT I C# LANGUAGE BASICS 9
.Net Architecture - Core C# - Variables - Data Types - Flow control - Objects and Types- Classes and Structs - Inheritance- Generics – Arrays and Tuples - Operators and Casts - Indexers

UNIT II C# ADVANCED FEATURES 9
Delegates - Lambdas - Lambda Expressions - Events - Event Publisher - Event Listener - Strings and Regular Expressions - Generics - Collections - Memory Management and Pointers - Errors and Exceptions - Reflection

UNIT III BASE CLASS LIBRARIES AND DATA MANIPULATION 9

UNIT IV WINDOW BASED APPLICATIONS, WCF AND WWF 9
Window based applications - Core ASP.NET- ASP.NET Web forms -Windows Communication Foundation (WCF)- Introduction to Web Services - .Net Remoting - Windows Service - Windows Workflow Foundation (WWF) - Activities - Workflows

UNIT V .NET FRAMEWORK AND COMPACT FRAMEWORK 9

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:

98
• Write various applications using C# Language in the .NET Framework
• Develop distributed application using .NET Framework
• Create Mobile Application using .NET compact Framework

TEXT BOOK:

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<tr>
<td>Understand the development and deployment cycles of enterprise applications.</td>
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<td>Utilize the .net framework to build distributed enterprise applications.</td>
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<td>Write various applications using C# language in the .net framework.</td>
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<td>Develop web applications using a combination of client-side and server-side technologies</td>
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<td>Develop network applications using state-of-the-art rpc technologies including: .net remoting, and web services (soap).</td>
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<tr>
<td>Create mobile application using .net compact framework</td>
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IT7005 CLOUD COMPUTING

OBJECTIVES:
• To learn about the concept of cloud and utility computing.
• To have knowledge on the various issues in cloud computing.
• To be familiar with the lead players in cloud.
• To appreciate the emergence of cloud as the next generation computing paradigm.

UNIT I INTRODUCTION

UNIT II VIRTUALIZATION
UNIT III  CLOUD ENABLING TECHNOLOGIES AND INFRASTRUCTURE

UNIT IV  RESOURCE MANAGEMENT AND SECURITY IN CLOUD

UNIT V  PROGRAMMING MODELS

OUTCOMES:
On Completion of the course, the students should be able to:
- Articulate the main concepts, key technologies, strengths and limitations of cloud computing. Identify the architecture, infrastructure and delivery models of cloud computing.
- Explain the core issues of cloud computing such as security, privacy and interoperability.
- Choose the appropriate technologies, algorithms and approaches for the related issues.

TEXT BOOKS:

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<tr>
<td>Articulate the main concepts, key technologies, strengths and limitations of cloud computing</td>
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<td>Identify the architecture, infrastructure and delivery models of cloud computing</td>
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<td>Apply and design suitable virtualization concept, cloud resource management and design scheduling algorithms</td>
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<td>Identify problems, and explain, analyze, and evaluate various cloud computing solutions</td>
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<td>Explain the core issues of cloud computing such as security, privacy and interoperability</td>
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Choose the appropriate technologies, algorithms and approaches for the related issues.

IT7006  COMPUTATIONAL LINGUISTICS  L T P C
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OBJECTIVES:
- Learn about the statistical modeling and classification for NLP
- Learn the basic techniques of information retrieval
- Know about the basics of text mining
- Learn the generic issues in speech processing and applications relevant to natural language generation

UNIT I  NATURAL LANGUAGE PROCESSING  9

UNIT II  INFORMATION RETRIEVAL  9
- Information Retrieval architecture - Indexing - Storage - Compression techniques - Retrieval approaches - Evaluation - Search Engines - Commercial search Engine features - comparison - Performance measures - Document processing - NLP based Information Retrieval - Information Extraction - Vector Space Model

UNIT III  TEXT MINING  9
- Categorization: Extraction based Categorization - Clustering - Hierarchical clustering - Flat Clustering - Document classification and routing - Finding and organizing answers from text search - Categories and clusters for organizing retrieval results - Text Categorization - Efficient summarization using lexical chains - Pattern extraction

UNIT IV  GENERIC ISSUES  9

UNIT V  APPLICATIONS  9
- Machine translation - Transfer metaphor - Interlingua and statistical approaches - Discourse processing - Dialog and conversational agents - Natural language generation - Surface Realization and discourse planning.

OUTCOMES:
On Completion of the course, the students should be able to:
- Develop applications related to speech processing
- Develop applications related to text mining

TEXT BOOKS:

REFERENCES:

IT7007 COMPUTER FORENSICS

OBJECTIVES:
- To introduce the concept of Computer Forensic and Investigations
- To know about the principles of evidence collection and management
- To learn about the types of attacks and remedial actions in the context of systems, networks, images and video.

UNIT I INCIDENT AND INCIDENT RESPONSE 9

UNIT II FILE STORAGE AND DATA RECOVERY 9

UNIT III NETWORK AND EMAIL FORENSICS 9

UNIT IV SYSTEM FORENSICS 9

UNIT V IMAGE AND VIDEO FORENSICS 9
Image encryption and decryption – Steganography – Fraud using image and video – Detection of Fraud in images and video.

TOTAL: 45 PERIODS

OUTCOMES:
On completion of the course, the students should be able to:
- Able to recognize attacks on systems
- Design an counter attack incident response

102
• To plan and implement counter-attacks
• To use Forensic tools and collect evidences of a computer crime.

TEXT BOOKS:

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<td>To know about the principles of evidence collection and management</td>
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<td>Outline of encryption and decryption in images. detection of fraud in images.</td>
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<td>Use Forensic tools and collect Evidences of a computer crime</td>
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IT7008 E-LEARNING TECHNIQUES

OBJECTIVES:
• To gain knowledge about modern technology for learning.
• To be acquainted with e-Learning Tools.
• To learn technologies involved in e-learning application development.
• To become aware of the current business potential of e-learning based business.

UNIT I INTRODUCTION
UNIT II DESIGN
Identifying and organizing course content-Needs analysis- Analyzing the target audience-Identifying course content-Defining learning objectives-Defining the course sequence-Defining instructional, media, evaluation and delivery strategies-Defining instructional methods, Defining the delivery strategy, Defining the evaluation strategy. Instructional design – Design issues – Types of learning engagements – Blended learning – Team – Infra structure – Vendor relationships

UNIT III CREATING INTERACTIVE CONTENT

UNIT IV WEB BASED TRAINING

UNIT V LEARNING METHODOLOGY

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Work with technologies involved in e-Learning Applications.
- Design and Develop e-Learning Application and working with e-Learning tools.

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<tr>
<td>1. Distinguish the phases of activities in models of E-learning</td>
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<td>3. Choose appropriate E-learning Authoring tools</td>
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<td>4. Create interactive E-Learning courseware</td>
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<td>5. Evaluate the E-learning courseware</td>
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<td>6. Manage the E-learning</td>
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IT7009  GAME PROGRAMMING  L T P C  3 0 0 3

OBJECTIVES:
- To know the mechanics and logic of Game design
- To train the students to acquire knowledge in game modeling techniques
- To acquire knowledge about the issues in game design
- To gain skill in game engine development

UNIT I  3D GRAPHICS FOR GAME PROGRAMMING  9
Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation

UNIT II  GAME DESIGN PRINCIPLES  9
Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI, Path Finding

UNIT III  GAMING ENGINE DESIGN  9
Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics

UNIT IV  GAMING PLATFORMS AND FRAMEWORKS  9
Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DX Studio, Unity

UNIT V  GAME DEVELOPMENT  9
Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Have knowledge on the concepts and techniques used in Game design
- Design and model interactive game.
- Design and implement algorithms and techniques applied to Game design

REFERENCES:
Gives the outline knowledge on the concepts and techniques used in game development

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<td>Apply the concepts of 3d graphics for game development</td>
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<td>Analyze the techniques and algorithms relevant to game development</td>
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<td>Learn and develop the optimize games using different game engines</td>
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<td>Interpret the platforms and frameworks for game development</td>
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IT7010 HETEROGENEOUS COMPUTING

OBJECTIVES:
- To learn about the development of massively parallel systems
- To learn about the challenges in heterogeneous processing systems
- Learn to program heterogeneous systems
- Learn to provide effective parallel solutions for GPGPU architectures

UNIT I PARALLEL COMPUTING BASICS
Importance of parallelism - Processes, tasks and threads - Modifications to von-Neumann model - ILP, TLP - Parallel hardware - Flynns classification - Shared memory and distributed memory architectures - Cache Coherence - Parallel software - Performance - Speedup and scalability - Massive parallelism - GPUs - GPGPUs

UNIT II SHARED MEMORY PROGRAMMING WITH OpenMP
OpenMP program structure - OpenMP Clauses and directives - Scheduling primitives - Synchronization primitives - Performance issues with caches - Case study - Tree Search

UNIT III PROGRAMMING GPs
GPU architectures - Data parallelism - CUDA Basics - CUDA program structure - Threads, Blocks, Grids - Memory handling

UNIT IV PROGRAMMING WITH CUDA
Parallel patterns - Convolution - Prefix sum - Sparse matrix-vector multiplication - Imaging case study

UNIT V OTHER GPU PROGRAMMING PLATFORMS
Introduction to Open CL - Open ACC - C++AMP - Thrust - Programming Heterogeneous clusters - CUDA and MPI

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Identify parallelism in an application
- Choose the right parallel processing paradigm for a given problem
- Devise solutions for an application on a heterogeneous multi-core platform
• Program using CUDA and Open MP

TEXT BOOKS:

REFERENCES:

IT7011 INTELLECTUAL PROPERTY RIGHTS L T P C
3 0 0 3

OBJECTIVES:
• To learn about the patents processing system
• To be familiar with copyrights and IPR related issues

UNIT I INTRODUCTION TO IPR 9

UNIT II CLASSIFICATIONS OF IPR 9

UNIT III INTERNATIONAL TREATIES ON IPR 9

UNIT IV INDIAN IPR LEGISLATIONS 9

UNIT V IPR IN ELECTRONICS AND INFORMATION TECHNOLOGY 9
IPR in Electronics & Information Technology -Case Studies on – Patents pertaining to Electronics & Information Technology – Software patents International scenario – Patent & Copyright Protection for software& Electronic inventions - IPR in Electronics and Information Technology.

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
• File patents for their innovations.
• Distinguish between legal procedures for patents and copyrights.

TEXT BOOKS:

REFERENCES:

### IT7012  INTERNET OF THINGS  L T P C  3 0 0 3

**OBJECTIVES:**
- To learn about the fundamentals of Internet of Things
- To build a small low cost embedded system using Arduino/ Raspberry Pi or equivalent boards
- To apply the concept of Internet of Things in real world scenario

**UNIT I  FUNDAMENTALS OF IOT  9**
Introduction-Characteristics - Physical design - Protocols-Logical design - Enabling technologies - IoT levels-Domain specific IoTs - IoT vs M2M

**UNIT II  IOT DESIGN METHODOLOGY  9**
IoT systems management - IoT design methodology-Specifications - Integration and Application Development

**UNIT III  IOT COMPONENTS  9**
Sensors and activators - Communication modules - Zigbee-RFID-Wi-Fi-Power sources.

**UNIT IV  BUILDING IOT WITH HARDWARE PLATFORMS  9**
Platform - Arduino/Intel Galileo/Raspberry Pi- Physical device - Interfaces - Programming - APIs/Packages - Web services.

**UNIT V  CASE STUDIES AND ADVANCED TOPICS  9**
Various Real time applications of IoT-Connecting IoT to cloud-Cloud storage for IoT-Data Analytics for IoT- Software & Management Tools for IoT.

**TOTAL:45 PERIODS**

**OUTCOMES:**
On Completion of the course, the students should be able to:
- Design a portable IoT using Arduino/Equivalent boards and relevant protocols
- Develop web services to access/control IoT devices
- Deploy an IoT application and connect to the cloud
- Analyze applications of IoT in real time scenario

**TEXT BOOK:**
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<td>Develop web services to access/control IoT devices</td>
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<td>Deploy an IoT application and connect to the cloud</td>
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<td>Analyze applications of IOT in real time scenario</td>
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<td>Apply analytics in the design of IOT based applications</td>
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<td>Manage IOT systems based on the level of complexity</td>
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IT7013 MOBILE APPLICATION DEVELOPMENT

OBJECTIVES:
- To learn the characteristics of mobile applications.
- To learn about the intricacies of UI required by mobile applications.
- To study about the design aspects of mobile application.
- To learn development of mobile applications.

UNIT I INTRODUCTION

UNIT II USER INTERFACE

UNIT III APPLICATION DESIGN

UNIT IV APPLICATION DEVELOPMENT

UNIT V TOOLS

TOTAL: 45 PERIODS
OUTCOMES:
On Completion of the course, the students should be able to:
- To design and implement the user interfaces for mobile applications.
- To design the mobile applications that is aware of the resource constraints of mobile devices.
- To develop advanced mobile applications that accesses the databases and the web.
- To develop useful mobile applications in the current scenario using Google Android and Eclipse simulator.

TEXT BOOKS:

REFERENCES:
1. Professional mobile Application Development paperback,2012 Jeff Mchert(Author),Scott Gowell (Author), Wiley India Private Limited
6. Pro iOS Table Views: for iPhone, iPad and IPod Touch Paperback,2012, Tim Duckett, Apress
10. Android App Development for Young Adults & The Rest of US Paperback, 2015, Paula Beer, Carl Simmons.

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<td>To Understand the characteristics and framework of mobile applications</td>
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<td>To design and implement the user interface for mobile applications</td>
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<td>To design mobile applications that is aware of the resource constraints of mobile devices.</td>
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<td>To develop advanced mobile applications that accesses the database and the web.</td>
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<td>To develop useful mobile applications in the current scenario using Google Android and Eclipse simulator</td>
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<td>To develop mobile applications in diverse platforms</td>
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OBJECTIVES:
- To learn the basics of socket programming using TCP Sockets.
- To learn about Socket Options
- To learn to develop Macros for including Objects In MIB Structure
- To have knowledge on SNMPv1 and SDN concepts.

UNIT I - SOCKETS AND APPLICATION DEVELOPMENT
Introduction to Socket Programming - System Calls - Address conversion functions - POSIX Signal Handling - Server with multiple clients - Boundary conditions - Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown - I/O Multiplexing - I/O Models - TCP echo client/server with I/O Multiplexing.

UNIT II - SOCKET OPTIONS
Socket options - getsockopt and setsockopt functions - Generic socket options - IP socket options - ICMP socket options - TCP socket options - Multiplexing TCP and UDP sockets - SCTP Sockets - SCTP Client/server - Streaming Example - Domain name system - gethostbyname, gethostbyaddr, getservbyname and getservbyport functions - Protocol Independent functions in TCP Client/Server Scenario.

UNIT III - ADVANCED SOCKETS
IPv4 and IPv6 interoperability - Threaded servers - Thread creation and termination - TCP echo server using threads - Mutex - Condition variables - Raw sockets - Raw socket creation - Raw socket output - Raw socket input - ping program - trace route program.

UNIT IV - SIMPLE NETWORK MANAGEMENT

UNIT V - SOFTWARE DEFINED NETWORK

OUTCOMES:
On Completion of the course, the students should be able to:
- Implement Client/Server communications using TCP and UDP Sockets
- Describe the usage of Socket Options for handling various Sockets in programming
- Learn about handling Raw sockets
- Learn the functionalities of SNMP and MIB structure
- Articulate network engineering principles and implementation of SDN.

TEXT BOOKS:

REFERENCES:
IT7015  

**PATTERN RECOGNITION**  

**OBJECTIVES:**  
- To know about supervised and unsupervised Learning.  
- To study about feature extraction and structural pattern recognition.  
- To explore different classification models.  
- To learn about fuzzy pattern classifiers and perception.  

**UNIT I  PATTERN CLASSIFIER**  
Overview of Pattern recognition  
- Discriminant functions  
- Supervised learning  
- Parametric estimation  
- Maximum Likelihood Estimation  
- Bayesian parameter estimation  
- Problems with Bayes approach  
- Pattern classification by distance functions  
- Minimum distance pattern classifier.

**UNIT II  CLUSTERING**  
Clustering for unsupervised learning and classification  
- Clustering concept  
- C Means algorithm  
- Hierarchical clustering  
- Graph theoretic approach to pattern Clustering  
- Validity of Clusters.

**UNIT III  FEATURE EXTRACTION AND STRUCTURAL PATTERN RECOGNITION**  
KL Transforms  
- Feature selection through functional approximation  
- Binary selection -Elements of formal grammars -Syntactic description -Stochastic grammars -Structural representation.

**UNIT IV  HIDDEN MARKOV MODELS AND SUPPORT VECTOR MACHINE**  
State Machines  
- Hidden Markov Models  
- Training  
- Classification  
- Support vector Machine  
- Feature Selection.

**UNIT V  RECENT ADVANCES**  
Fuzzy logic  
- Fuzzy Pattern Classifiers  
- Pattern Classification using Genetic Algorithms  
- Case Study Using Fuzzy Pattern Classifiers and Perception.

**OUTCOMES:**  
On Completion of the course, the students should be able to:  
- Classify the data and identify the patterns.
• Extract feature set and select the features from given data set.

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<td>1. Implement basic pattern classifier algorithms.</td>
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<td>2. Have knowledge about the working principle of unsupervised algorithms.</td>
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<td>3. Have knowledge about functionality of classifiers.</td>
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<td>4. Perceive the recent advancement in pattern recognition.</td>
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<td>5. Apply SVM and HMM algorithms for real time applications.</td>
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<td>6. Implement advanced methodologies over image processing Applications.</td>
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IT7016 PROGRAMMING WITH OPEN SOURCE SOFTWARE L T P C 3 0 0 3

OBJECTIVES:
• To learn about the various Linux distributions.
• To learn the programming practices in FOSS
• To explore Linux embedded device
• To acquire the knowledge of open source programming using embedded Linux device.

UNIT I INTRODUCTION TO LINUX BASED DISTRIBUTIONS 9
Philosophy - licences - Distributions - Desktop environments - Bash commands - Files and file systems - Partitions - Installing software - Configuration

UNIT II PROGRAMMING TECHNIQUES AND PRACTICES 9
Programming using python - GUI development - Menu and toolbar - Layout management - event-dialog - widget - Programming practices - Documentation - use of version control system in FOSS

UNIT III OVERVIEW OF AN EMBEDDED LINUX DEVICE 9
Peripherals - Choice of distribution and installation - commands - files and file systems - configuration - game programming
UNIT IV WEB PROGRAMMING USING EMBEDDED LINUX DEVICE 9
Web server - Linux - Apache - Mysql - Php - Content management systems - adding content - text - images - components, modules and plugin- development of a sample content management site.

UNIT V INTERFACE WITH OTHER HARDWARE 9
Basic inputs and outputs - Scheduling commands with Cron - installing and testing GPIO with python- Expansion boards - Prototyping boards

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Work in the linux environment and contribute to free and open source software
- Implement content management systems
- Install and configure linux os distribution in embedded devices that support linux
- Build simple hardware projects using embedded linux devices

TEXT BOOK:

REFERENCES:
1. Philosophy of GNU URL: http://www.gnu.org/philosophy/
5. Version control system , URL: http://git-scm.com/

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<th>Course Outcomes (COs) / Program Outcomes (POs)</th>
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<td>4. To understand the Content Management Systems and the deployment using LAMP</td>
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<td>5. To develop automated algorithms using embedded devices</td>
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IT7017 SEMANTIC WEB L T P C

OBJECTIVES:
- To learn the fundamentals of semantic web and to conceptualize and depict Ontology for semantic web.
• To make a study of languages for semantic web.
• To learn about the ontology learning algorithms and to utilize in the development of an application.
• To know the fundamental concepts of management of ontology.

UNIT I  
THE QUEST FOR SEMANTICS  
9

UNIT II  
LANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES  
9

UNIT III  
ONTOLOGY LEARNING FOR SEMANTIC WEB  
9

UNIT IV  
ONTOLOGY MANAGEMENT AND TOOLS  
9

UNIT V  
APPLICATIONS  
9

TOTAL : 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:

• Create Ontology for a given domain.
• Develop an application using ontology languages and tools.
• Design and develop web service applications using semantic portals.

TEXT BOOKS:

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<td>Understand the concepts of semantic Web</td>
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<td>Develop an application using ontology languages and tools.</td>
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<td>Model ontologies using Resource Description Framework (RDF) and Web Ontology Language (OWL)</td>
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<td>Develop and understand Ontology management and tools and Design RDF Schemas for ontologies.</td>
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<td>Design and develop web service applications using semantic portals.</td>
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**IT7018**

**SERVICE ORIENTED ARCHITECTURE**

**OBJECTIVES:**
- To learn the concepts of distributed application development
- To differentiate XML based web services from other standard models
- To study the importance of service composition

**UNIT I**

**SOA FUNDAMENTALS**

**UNIT II**

**SERVICE-ORIENTED ANALYSIS AND DESIGN**

**UNIT III**

**SERVICE COMPOSITION**
- Service Composition with REST - Fundamental Service Composition with REST - Advanced Service Composition with REST - Service Composition with REST Case Study - Design Patterns for SOA with REST - Service Versioning with REST - Uniform Contract Profiles

**UNIT IV**

**RESTFUL SERVICES AND THE RESOURCE-ORIENTED ARCHITECTURE**

116
UNIT V  SOA TRANSACTION AND SECURITY
SOA and performance - SOA and security – Service Management - Model driven service deployment – Establishing SOA and SOA governance

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Analyze and design SOA based solutions
- Create RESTful and SOAP based services
- Define workflow automation and develop BPM based applications

TEXT BOOKS:
1. Nicolai M.Josuttis, SOA in design - The art of distributed system design, O'REILLY publication, 2007.
3. Leonard Richardson and Sam Ruby, RESTful Web Services, O'REILLY publication, 2007.

REFERENCE:

IT7019  SOCIAL NETWORK ANALYSIS
L T P C
3 0 0 3

OBJECTIVES:
- To gain knowledge about social networks, its structure and social network data sources
- To learn the analysis and mining techniques for Social Networks
- To study about the semantic technologies for social network analysis
- To gain knowledge on Visualization of Social networks and its applications

UNIT I  INTRODUCTION

UNIT II  SOCIAL NETWORK ANALYSIS
Introduction to Social networks profiles – types of commercial social network profiles (CSNP) - Quantitative and Qualitative Analysis of CSNPs – Analysis of social networks extracted from log files - Data Mining Methods Related to SNA and Log Mining - Clustering Techniques – Case study.

UNIT III  SEMANTIC TECHNOLOGY FOR SOCIAL NETWORK ANALYSIS
Introduction to ontology-based knowledge representation - - Ontology languages for the Semantic Web – RDF and OWL - Modeling Social network data - State-of-the-art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships.

UNIT IV  SOCIAL NETWORK MINING
Detecting and discovering Communities in Social Networks - Definition of Community - Evaluating Communities - Methods for Community Detection – divisive, spectral and modularity optimization algorithms - Applications of Community Mining Algorithms - Overview of tools for Detecting Communities - Understanding and Predicting Human Behavior for Social Communities.

UNIT V  VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS
OUTCOMES:
On Completion of the course, the students should be able to:
- To apply knowledge for current web development in the era of Social Web
- To model and represent knowledge for Semantic Web
- To design extraction and mining tools for Social networks
- To develop personalized visualization for Social networks

TEXT BOOKS:

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<td>To develop and adopt effective visualization for social network data</td>
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IT7020 SOFTWARE PROJECT MANAGEMENT

OBJECTIVES:
- To develop an awareness of the need for project planning and management
- To learn about the stages in the software development lifecycle and associated activities.
- To know about the procedures needed to schedule, monitor and control the project.
- Discuss and where appropriate apply the principles of project risk management.
- Understand the key concepts relating to managing projects.
- Create and schedule tasks and add project constraints and deadlines.
- Assign costs and learn about different effort estimation techniques.
- View the critical path, monitor progress and reschedule work.
UNIT I FUNDAMENTALS
Conventional software management - Evolution of software economics - Improving software economics - Conventional Vs Modern software project management.

UNIT II SOFTWARE MANAGEMENT PROCESS FRAMEWORK
Lifecycle phases - Artifacts of the process - Model based software architectures - Workflows of the process - Checkpoints of the process.

UNIT III SOFTWARE PROCESS MATURITY MODELS

UNIT IV SOFTWARE EFFORT ESTIMATION

UNIT V SOFTWARE RISK AND PEOPLE MANAGEMENT

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Know about software Economics.
- Discuss about software process models: their advantages and disadvantages
- Discuss about software estimation techniques
- Know activity planning techniques
- Have project planning skills.
- Have Project scheduling and risk evaluation skills.
- Have Professional skills.

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<td>Know activity planning techniques</td>
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<td>Have project planning skills.</td>
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Have Project scheduling and risk evaluation skills.

**IT7021 SOFTWARE TESTING**

**OBJECTIVES:**
- To introduce the basics and necessity of Software testing
- To provide various testing techniques along with concepts of Software bugs and its impact
- To develop and validate a test plan
- To design and choose test cases
- To prepare testing policies and standards and make use of automation tools

**UNIT I** **OVERVIEW OF SOFTWARE TESTING**
- Software quality and reliability - Testing and Debugging - Verification and Validation - Test metrics – Test plan – Test-generation strategies - Static testing - Model based testing and Model checking - Saturation effect - Defect management - Origins of defects - Cost of defects - Defect classes - Defect repository and Test design.

**UNIT II** **TEST CASE DESIGN AND SELECTION**
- Design strategies - Black box approach - Random testing - Boundary value analysis - State based testing - Cause-effect graphing - User documentation testing - Domain testing - White box approach - Test adequacy criteria - Code functional testing - Coverage and control flow graphs - Covering code logic – Scaffolding - Generic Vs specific scaffolding - Test Oracles - Self-checks as Oracles - Capture and replay.

**UNIT III** **EXECUTION OF ADEQUACY TEST**
- Process: Test and analysis activities - Quality process - Planning and Monitoring - Testing - Improving the process - Organizational factors - Integration testing strategies - Testing components and assemblies - System testing - Acceptance testing - Usability - Regression testing - Regression test selection techniques - Test case prioritization.

**UNIT IV** **TEST MANAGEMENT**
- Organization structures for testing teams - Test plan components and attachments - Locating test items - Test management tools: HP ALM/Quality center, qTest, PractiTest, TestRail and TestLink - Reporting test results - Role of three groups in test planning and policy development - Test specialist - Skills - Building a testing group.

**UNIT V** **TEST AUTOMATION**
- Software test automation - Skills - Scope - Design and architecture for automation - Requirements for a test tool - Challenges in automation – Automated desktop application testing tools: Sikuli Script -web testing tools: Wind Mill and SOAPUI- GUI testing tools: Test Complete, Test Studio and eggplant – Android application testing tools: Robotium, Ranorex and Appium.

**TOTAL : 45 PERIODS**

**OUTCOMES:**
On Completion of the course, the students should be able to:
- An insight to Software Testing will be obtained
- Have knowledge about the role of software tester and aware of automated testing tools
- Emphasis on maintaining documentation for testing will be understood

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<td>Ability to design test case using various strategies and selecting optimal among them.</td>
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<td>Identification of test adequacy criterion and execution of it.</td>
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<td>Analysis and management of test plan and its execution.</td>
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<td>Software testing tools necessity to perform in an automated manner.</td>
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IT7022 VISUALIZATION TECHNIQUES

OBJECTIVES:
- To learn about the importance of data visualization.
- To know the different types of visualization techniques.
- To create various visualizations

UNIT I INTRODUCTION 9

UNIT II FOUNDATIONS FOR DATA VISUALIZATION 9
Visualization stages – Experimental Semiotics based on Perception Gibson’s Affordance theory – A Model of Perceptual Processing – power of visual perception-Types of Data-visualization and data objects.

UNIT III COMPUTER VISUALIZATION 9
Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Interacting with visualization

UNIT IV MULTIDIMENSIONAL VISUALIZATION 9

UNIT V CASE STUDIES 9
Small interactive calendars – Selecting one from many – Web browsing through a key hole – Communication analysis – Archival analysis

TOTAL : 45 PERIODS
OUTCOMES:
On Completion of the course, the students should be able to:
• Compare various visualization techniques.
• Design creative visualizations.
• Apply visualization over different types of data.

TEXT BOOKS:

REFERENCE:

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<tr>
<th>Course Outcomes (COs) / Program Outcomes (POs)</th>
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<tr>
<td>Apply mathematics and basic science knowledge for designing information visualizing System</td>
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<td>Collect data ethically and solve engineering problem in visualizing the information</td>
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<td>Compare various visualization techniques.</td>
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<td>Design creative visualizations.</td>
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<td>Conduct experiments by applying various modern visualization tools and solve the space layout problem</td>
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<td>Apply visualization over different types of data.</td>
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IT7023 WIRELESS SENSOR AND MESH NETWORKS

OBJECTIVES:
• To learn about the issues in the design of wireless sensor and mesh networks
• To learn about the working of protocols in different layers of sensor and mesh networks
• To expose the students to different aspects in sensor and mesh networks

UNIT I FUNDAMENTALS OF WSN AND WMN
Introduction and overview of WSN-Basic wireless sensor technology-Operating systems for WSN-Applications of WSN-Comparison between Ad hoc and mesh networks-Challenges and design issues in wireless mesh networks-Applications of WMNs.

UNIT II TRANSMISSION LAYER AND MAC LAYER FOR WSN
UNIT III ROUTING AND TRANSPORT LAYER IN WSN 9
Data dissemination and gathering - Routing challenges and routing strategies in WSNs - Routing strategies in WSN - Transport layer and QoS in wireless sensor networks - Coverage and deployment - Reliable data transport - Single packet delivery - Block delivery - Congestion control and rate control.

UNIT IV TRANSMISSION LAYER AND MAC LAYER FOR WMN 9
Adaptive coding/modulation and link adaptation - Cooperative diversity and cooperative communications - Multichannel systems - Advanced radio technologies - Design objective and challenges - Advanced MAC protocols for WMNs.

UNIT V ROUTING AND TRANSPORT LAYER IN WMN 9

OUTCOMES:
On Completion of the course, the students should be able to:
- Identify different issues in wireless sensor and mesh networks
- To analyze the protocols developed for sensor and mesh networks

TEXT BOOKS:

REFERENCES:

IT7071 DIGITAL IMAGE PROCESSING L T P C 3 0 0 3
OBJECTIVES:
- To learn about the basic concepts of digital image processing and various image transforms.
- To familiarize the student with the image enhancement techniques.
- To expose the student to a broad range of image processing techniques and their applications.
- To appreciate the use of current technologies those are specific to image processing systems.
- To expose the students to real-world applications of image processing.

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9
Introduction – Applications of Image Processing - Steps in image processing Applications - Digital imaging system - Sampling and Quantization - Pixel connectivity - Distance measures - Color fundamentals and models - File Formats, Image operations.

UNIT II IMAGE ENHANCEMENT AND IMAGE RESTORATION 9

UNIT III MULTI RESOLUTION ANALYSIS AND COMPRESSION
Multi Resolution analysis: Image pyramids - Multi resolution expansion - Wavelet transforms

UNIT IV IMAGE SEGMENTATION AND FEATURE EXTRACTION

UNIT V IMAGE CLASSIFICATION AND APPLICATIONS OF IMAGE PROCESSING

TOTAL: 45 PERIODS

OUTCOMES:
On Completion of the course, the students should be able to:
- Implement basic image processing algorithms
- Design an application that uses different concepts of Image Processing
- Apply and develop new techniques in the areas of image enhancement - restoration-segmentation- compression-wavelet processing and image morphology.
- Critically analyze different approaches to different modules of Image Processing.

TEXT BOOKS:

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<tr>
<td>Learn the basic concepts of digital image processing and various transforms</td>
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<td>Understand the image enhancement Techniques</td>
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<td>Understand the broad range of image processing techniques and their applications.</td>
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<td>Use the current technologies that are specific to image processing systems which use wavelets and compression</td>
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<td>Implement the object recognition systems using image processing and machine learning approach</td>
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Explore real world applications of image processing.

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<th>IT7072</th>
<th>TCP/IP DESIGN AND IMPLEMENTATION</th>
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OBJECTIVES:
- To learn about the design of TCP/IP Protocol structure
- To learn about the implementation of TCP and IP functionalities in the form of data structures
- To learn about how TCP handles input and output with synchronization
- To learn about the importance of timers and how it is managed in a TCP communication.
- To learn about the functionality of ICMP error processing routines.

UNIT I  FUNDAMENTALS
Internetworking concepts - IP and datagram forwarding - TCP services - Interactive data flow - Timeout and retransmission - Bulk data flow - Persist timer – Keep-alive timer

UNIT II  ARP AND IP
Structure of TCP/IP in OS - Data structures for ARP - Cache design and management - IP software design and organization - Sending a datagram to IP

UNIT III  IP ROUTING IMPLEMENTATION
Routing table - Routing algorithms - Fragmentation and reassembly - Error processing (ICMP) - Multicast Processing (IGMP)

UNIT IV  TCP I/O PROCESSING AND FSM
Data structure and input processing - Transmission control blocks - Segment format - Comparison - Finite state machine implementation - Output processing - Mutual exclusion - Computing TCP data length

UNIT V  TCP TIMER AND FLOW CONTROL
Timers - Events and messages - Timer process - Deleting and inserting timer event - Flow control and adaptive retransmission - Congestion avoidance and control - Urgent data processing and push function

OUTCOMES:
On Completion of the course, the students should be able to:
- Learn the fundamentals of internetworking
- Have knowledge on the data structures of ARP, IP and TCP software design
- Analyze the routing of packets by routers using its table contents

TEXT BOOKS:

REFERENCE:
OBJECTIVES:
- To introduce the basic notions of groups, rings, fields which will then be used to solve related problems.
- To examine the key questions in the Theory of Numbers.
- To give an integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

UNIT I  GROUPS AND RINGS
Groups: Definition - Properties - Homomorphism - Isomorphism - Cyclic groups - Cosets - Lagrange’s theorem. Rings: Definition - Sub rings - Integral domain - Field - Integer modulo n - Ring homomorphism.

UNIT II  FINITE FIELDS AND POLYNOMIALS
Polynomial rings - Irreducible polynomials over finite fields - Factorization of polynomials over finite fields.

UNIT III  DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS
Division algorithm - Base-b representations - Number patterns - Prime and composite numbers - GCD - Euclidean algorithm - Fundamental theorem of arithmetic - LCM.

UNIT IV  DIOPHANTINE EQUATIONS AND CONGRUENCES
Linear Diophantine equations - Congruence’s - Linear Congruence’s - Applications: Divisibility tests - Modular exponentiation - Chinese remainder theorem - 2x2 linear systems.

UNIT V  CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS
Wilson’s theorem - Fermat’s Little theorem - Euler’s theorem - Euler’s Phi functions - Tau and Sigma functions.

OUTCOMES:
On Completion of the course, the students should be able to:
- Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
- Demonstrate accurate and efficient use of advanced algebraic techniques.
- The students should be able to demonstrate their mastery by solving non-trivial problems related to the concepts, and by proving simple theorems about the, statements proven by the text.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:

- To provide the mathematical foundations of numerical techniques for solving linear system, eigenvalue problems, interpolation, numerical differentiation and integration and the errors associated with them;
- To demonstrate the utility of numerical techniques of ordinary and partial differential equations in solving engineering problems where analytical solutions are not readily available.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS


UNIT II INTERPOLATION AND APPROXIMATION

Interpolation with unequal intervals - Lagrange interpolation – Newton’s divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae – Least square method - Linear curve fitting.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION


UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS


UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS

Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit (Crank-Nicholson) methods - One dimensional wave equation by explicit method.

TOTAL: 60 PERIODS

TEXT BOOKS:


REFERENCES: