# ANNA UNIVERSITY, CHENNAI
## AFFILIATED INSTITUTIONS
### R-2013
#### B.E. COMPUTER SCIENCE AND ENGINEERING
##### I TO VIII SEMESTER CURRICULUM AND SYLLABUS

### SEMESTER I

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### SEMESTER VII – Elective II

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### SEMESTER VIII – Elective V

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OBJECTIVES:
- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.
- To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading and writing leading to effective and efficient communication.

UNIT I
9+3
Listening - Introducing learners to GIE - Types of listening - Listening to audio (verbal & sounds); Speaking - Speaking about one's place, important festivals etc. – Introducing oneself, one's family / friend; Reading - Skimming a reading passage – Scanning for specific information - Note-making; Writing - Free writing on any given topic (My favourite place / Hobbies / School life, etc.) - Sentence completion - Autobiographical writing (writing about one's leisure time activities, hometown, etc.); Grammar - Prepositions - Reference words - Wh-questions - Tenses (Simple); Vocabulary - Word formation - Word expansion (root words / etymology); E-materials - Interactive exercises for Grammar & Vocabulary - Reading comprehension exercises - Listening to audio files and answering questions.

UNIT II
9+3
Listening - Listening and responding to video lectures / talks; Speaking - Describing a simple process (filling a form, etc.) - Asking and answering questions - Telephone skills – Telephone etiquette; Reading – Critical reading - Finding key information in a given text - Sifting facts from opinions; Writing - Biographical writing (place, people) - Process descriptions (general/specific) - Definitions - Recommendations – Instructions; Grammar - Use of imperatives - Subject-verb agreement; Vocabulary - Compound words - Word Association (connotation); E-materials - Interactive exercises for Grammar and Vocabulary - Listening exercises with sample telephone conversations / lectures – Picture-based activities.

UNIT III
9+3
Listening - Listening to specific task - focused audio tracks; Speaking - Role-play – Simulation - Group interaction - Speaking in formal situations (teachers, officials, foreigners); Reading - Reading and interpreting visual material; Writing - Jumbled sentences - Coherence and cohesion in writing - Channel conversion (flowchart into process) - Types of paragraph (cause and effect / compare and contrast / narrative / analytical) - Informal writing (letter/e-mail/blogs) - Paraphrasing; Grammar - Tenses (Past) - Use of sequence words - Adjectives; Vocabulary - Different forms and uses of words, Cause and effect words; E-materials - Interactive exercises for Grammar and Vocabulary - Excerpts from films related to the theme and follow up exercises - Pictures of flow charts and tables for interpretations.

UNIT IV
9+3
Listening - Watching videos / documentaries and responding to questions based on them; Speaking - Responding to questions - Different forms of interviews - Speaking at different types of interviews; Reading - Making inference from the reading passage - Predicting the content of a reading passage; Writing - Interpreting visual materials (line graphs, pie charts etc.) - Essay writing – Different types of essays; Grammar - Adverbs – Tenses – future time reference; Vocabulary - Single word substitutes - Use of abbreviations and acronyms; E-materials - Interactive exercises for Grammar and Vocabulary - Sample interviews - film scenes - dialogue writing.
UNIT V

Listening - Listening to different accents, Listening to Speeches/Presentations, Listening to broadcast and telecast from Radio and TV; Speaking - Giving impromptu talks, Making presentations on given topics; Reading - Email communication - Reading the attachment files having a poem/joke/proverb - Sending their responses through email; Writing - Creative writing, Poster making; Grammar - Direct and indirect speech; Vocabulary - Lexical items (fixed / semi fixed expressions); E-materials - Interactive exercises for Grammar and Vocabulary - Sending emails with attachment – Audio / video excerpts of different accents - Interpreting posters.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
Learners should be able to:

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.
- Listen/view and comprehend different spoken discourses/excerpts in different accents.

TEXTBOOKS:

REFERENCES:

EXTENSIVE Reading (Not for Examination)

WEBSITES:

TEACHING METHODS:
- Lectures
- Activities conducted individually, in pairs and in groups like self introduction, peer introduction, group poster making, grammar and vocabulary games, etc.
- Discussions
- Role play activities
- Short presentations
- Listening and viewing activities with follow up activities like discussion, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc.
EVALUATION PATTERN:

Internal assessment: 20%
3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like
- Project
- Assignment
- Reviews
- Creative writing
- Poster making, etc.

All the four skills are to be tested with equal weightage given to each.
- Speaking assessment: Individual speaking activities, Pair work activities like role play, Interview, Group discussions
- Reading assessment: Reading passages with comprehension questions graded from simple to complex, from direct to inferential
- Writing assessment: Writing paragraphs, essays etc. Writing should include grammar and vocabulary.
- Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content.

End Semester Examination: 80%

MA6151 MATHEMATICS – I

OBJECTIVES:
- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/ she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I MATRICES 9+3

UNIT II SEQUENCES AND SERIES 9+3
UNIT III
APPLICATIONS OF DIFFERENTIAL CALCULUS  9+3
Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes - Evolute as envelope of normals.

UNIT IV
DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES  9+3

UNIT V
MULTIPLE INTEGRALS  9+3

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
- This course equips students to have basic knowledge and understanding in one fields of materials, integral and differential calculus.

TEXT BOOKS:

REFERENCES:

PH6151
ENGINEERING PHYSICS – I
L T P C
3 0 0 3

OBJECTIVES:
- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I
CRYSTAL PHYSICS  9
Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures (qualitative treatment)- Crystal growth techniques –solution, melt (Bridgman and Czochralski) and vapour growth techniques (qualitative)
UNIT II PROPERTIES OF MATTER AND THERMAL PHYSICS

Elasticity - Hooke’s law - Relationship between three modulii of elasticity (qualitative) – stress -strain diagram – Poisson’s ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever –Young’s modulus by uniform bending- I-shaped girders


UNIT III QUANTUM PHYSICS


UNIT IV ACOUSTICS AND ULTRASONICS


Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications - Sonogram

UNIT V PHOTONICS AND FIBRE OPTICS


Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – attenuation, dispersion, bending - Fibre Optical Communication system (Block diagram) - Active and passive fibre sensors- Endoscope.

OUTCOMES:
The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
1. Searls and Zemansky. University Physics, 2009
OBJECTIVES:

- To make the students conversant with basics of polymer chemistry.
- To make the student acquire sound knowledge of second law of thermodynamics and second law based derivations of importance in engineering applications in all disciplines.
- To acquaint the student with concepts of important photophysical and photochemical processes and spectroscopy.
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
- To acquaint the students with the basics of nano materials, their properties and applications.

UNIT I  POLYMER CHEMISTRY  9

Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Types and mechanism of polymerization: Addition (Free Radical, cationic and anionic); 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. Preparation, properties and uses of Nylon 6,6, and Epoxy resin.

UNIT II  CHEMICAL THERMODYNAMICS  9

Terminology of thermodynamics - Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions (problems); Criteria of spontaneity; Gibbs-Helmholtz equation (problems); Clausius-Clapeyron equation; Maxwell relations – Van’t Hoff isotherm and isochore(problems).

UNIT III  PHOTOCHEMISTRY AND SPECTROSCOPY  9


UNIT IV  PHASE RULE AND ALLOYS  9


UNIT V  NANO CHEMISTRY  9

Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. nanoparticles: nano cluster, nano rod, nanotube(CNT) and nanowire. Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition, laser ablation; Properties and applications

TOTAL :45 PERIODS
OUTCOMES:
- The knowledge gained on polymer chemistry, thermodynamics, spectroscopy, phase rule and nano materials will provide a strong platform to understand the concepts on these subjects for further learning.

TEXT BOOKS:

REFERENCES:

GE6151 COMPUTER PROGRAMMING

OBJECTIVES:
The students should be made to:
- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT I INTRODUCTION

UNIT II C PROGRAMMING BASICS

UNIT III ARRAYS AND STRINGS
UNIT IV FUNCTIONS AND POINTERS

UNIT V STRUCTURES AND UNIONS
Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

OUTCOMES:
At the end of the course, the student should be able to:
- Design C Programs for problems.
- Write and execute C programs for simple applications

TEXTBOOKS:

REFERENCES:

GE6152 ENGINEERING GRAPHICS

OBJECTIVES:
- To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products
- To 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 HAND SKETCHING
Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects
UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 5+ 9
Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to the principal planes - Determination of true lengths and true inclinations by rotating line 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 5+9
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5+9
Sectioning of above 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 6+9
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.

COMPUTER AIDED DRAFTING (Demonstration Only) 3
Introduction to drafting packages and demonstration of their use.

TOTAL: 75 PERIODS

OUTCOMES:
On completion of the course the student will be able to:
• Perform free hand sketching of basic geometrical constructions and multiple views of objects.
• Do orthographic projection of lines and plane surfaces.
• Draw projections and solids and development of surfaces.
• Prepare isometric and perspective sections of simple solids.
• Demonstrate computer aided drafting.

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.

GE6161  COMPUTER PRACTICES LABORATORY  L T P C

0 0 3 2

OBJECTIVES:
The student should be made to:
- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Be familiar with programming in C.
- Learn to use Arrays, strings, functions, structures and unions.

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 – Includes Parameter Passing
9. Program using Recursive Function and conversion from given program to flow chart.
10. Program using structures and unions.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
Standalone desktops with C compiler  30 Nos.
(or)
Server with C compiler supporting 30 terminals or more.
OBJECTIVES:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I  CIVIL ENGINEERING PRACTICE

Buildings:
(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:
(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.
(c) Preparation of plumbing line sketches for water supply and sewage works.
(d) Hands-on-exercise:
   Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:
(a) Study of the joints in roofs, doors, windows and furniture.
(b) Hands-on-exercise:
   Wood work, joints by sawing, planing and cutting.

II  MECHANICAL ENGINEERING PRACTICE

Welding:
(a) Preparation of arc welding of butt joints, lap joints and tee joints.
(b) Gas welding practice

Basic Machining:
(a) Simple Turning and Taper turning
(b) Drilling Practice

Sheet Metal Work:
(a) Forming & Bending:
(b) Model making – Trays, funnels, etc.
(c) Different type of joints.

Machine assembly practice:
(a) Study of centrifugal pump
(b) Study of air conditioner

Demonstration on:
(a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
(b) Foundry operations like mould preparation for gear and step cone pulley.
(c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.
GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 10
1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
5. Measurement of energy using single phase energy meter.

IV ELECTRONICS ENGINEERING PRACTICE 13
1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
2. Study of logic gates AND, OR, EOR and NOT.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL: 45 PERIODS

OUTCOMES:
- Ability to fabricate carpentry components and pipe connections including plumbing works.
- Ability to use welding equipments to join the structures.
- Ability to fabricate electrical and electronics circuits.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets.
2. Carpentry vice (fitted to work bench) 15 Nos.
4. Models of industrial trusses, door joints, furniture joints 5 each
5. Power Tools: (a) Rotary Hammer 2 Nos
    (b) Demolition Hammer 2 Nos
    (c) Circular Saw 2 Nos
    (d) Planer 2 Nos
    (e) Hand Drilling Machine 2 Nos
    (f) Jigsaw 2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders 5 Nos.
2. Welding booth with exhaust facility 5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc. 5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. 2 Nos.
5. Centre lathe 2 Nos.
6. Hearth furnace, anvil and smithy tools 2 Sets.
7. Moulding table, foundry tools 2 Sets.
8. Power Tool: Angle Grinder  2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner  One each.

**ELECTRICAL**
1. Assorted electrical components for house wiring  15 Sets
2. Electrical measuring instruments 10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp 1 each
4. Megger (250V/500V) 1 No.
5. Power Tools: (a) Range Finder  2 Nos
  (b) Digital Live-wire detector  2 Nos

**ELECTRONICS**
1. Soldering guns  10 Nos.
2. Assorted electronic components for making circuits 50 Nos.
3. Small PCBs 10 Nos.
5. Study purpose items: Telephone, FM radio, low-voltage power supply

**REFERENCES:**

**GE6163 PHYSICS AND CHEMISTRY LABORATORY – I**

**PHYSICS LABORATORY – I**

**OBJECTIVES:**
To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

**LIST OF EXPERIMENTS**
(Any FIVE Experiments)
1. (a) Determination of Wavelength, and particle size using Laser
   (b) Determination of acceptance angle in an optical fiber.
2. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
3. Determination of wavelength of mercury spectrum – spectrometer grating
5. Determination of Young’s modulus by Non uniform bending method
6. Determination of specific resistance of a given coil of wire – Carey Foster’s Bridge
OUTCOMES:
The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Diode laser, lycopodium powder, glass plate, optical fiber.
2. Ultrasonic interferometer
3. Spectrometer, mercury lamp, grating
4. Lee’s Disc experimental set up
5. Traveling microscope, meter scale, knife edge, weights
6. Carey foster’s bridge set up
   (vernier Caliper, Screw gauge, reading lens are required for most of the experiments)

CHEMISTRY LABORATORY-I
LIST OF EXPERIMENTS
(Any FIVE Experiments)

OBJECTIVES:
• To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
• To acquaint the students with the determination of molecular weight of a polymer by vacometry.

1. Determination of DO content of water sample by Winkler’s method.
2. Determination of chloride content of water sample by argentometric method
3. Determination of strength of given hydrochloric acid using pH meter
4. Determination of strength of acids in a mixture using conductivity meter
5. Estimation of iron content of the water sample using spectrophotometer
6. (1,10- phenanthroline / thiocyanate method)
7. Determination of molecular weight of polyvinylalcohol using Ostwald viscometer
8. Conductometric titration of strong acid vs strong base

TOTAL: 30 PERIODS

OUTCOMES:
The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters

REFERENCES:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Iodine flask - 30 Nos
2. pH meter - 5 Nos
3. Conductivity meter - 5 Nos
4. Spectrophotometer - 5 Nos
5. Ostwald Viscometer - 10 Nos

Common Apparatus : Pipette, Burette, conical flask, percelain tile, dropper (each 30 Nos.)
OBJECTIVES:

- To make learners acquire listening and speaking skills in both formal and informal contexts.
- To help them develop their reading skills by familiarizing them with different types of reading strategies.
- To equip them with writing skills needed for academic as well as workplace contexts.
- To make them acquire language skills at their own pace by using e-materials and language lab components.

UNIT I

Listening - Listening to informal conversations and participating; Speaking - Opening a conversation (greetings, comments on topics like weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading; Writing - Effective use of SMS for sending short notes and messages - Using ‘emoticons’ as symbols in email messages; Grammar - Regular and irregular verbs - Active and passive voice; Vocabulary - Homonyms (e.g. ‘can’) - Homophones (e.g. ‘some’, ‘sum’); E-materials - Interactive exercise on Grammar and vocabulary – blogging; Language Lab - Listening to different types of conversation and answering questions.

UNIT II

Listening - Listening to situation based dialogues; Speaking - Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); Reading - Reading a short story or an article from newspaper, Critical reading, Comprehension skills; Writing - Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his / her success, thanking one’s friends / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials - Interactive exercises on Grammar and vocabulary, Extensive reading activity (reading stories / novels), Posting reviews in blogs - Language Lab - Dialogues (Fill up exercises), Recording students’ dialogues.

UNIT III

Listening - Listening to the conversation - Understanding the structure of conversations; Speaking - Conversation skills with a sense of stress, intonation, pronunciation and meaning - Seeking information – expressing feelings (affection, anger, regret, etc.); Reading - Speed reading – reading passages with time limit - Skimming; Writing - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading articles from journals - Format for journal articles – elements of technical articles (abstract, introduction, methodology, results, discussion, conclusion, appendices, references) - Writing strategies; Grammar - Conditional clauses - Cause and effect expressions; Vocabulary - Words used as nouns and verbs without any change in the spelling (e.g. ‘rock’, ‘train’, ‘ring’); E-materials - Interactive exercise on Grammar and vocabulary - Speed Reading practice exercises; Language Lab - Intonation practice using EFLU and RIE materials – Attending a meeting and writing minutes.

UNIT IV

Listening - Listening to a telephone conversation, Viewing model interviews (face-to-face, telephonic and video conferencing); Speaking - Role play practice in telephone skills - listening and responding, - asking questions, - note taking – passing on messages, Role play and mock interview for grasping interview skills; Reading - Reading the job advertisements and the profile of the company concerned – scanning; Writing - Applying for a job – cover letter - résumé preparation – vision, mission and goals of the candidate; Grammar - Numerical expressions - Connectives (discourse markers); Vocabulary -
Idioms and their meanings – using idioms in sentences; E-materials - Interactive exercises on Grammar and Vocabulary - Different forms of résumés- Filling up a résumé / cover letter; Language Lab - Telephonic interview – recording the responses - e-résumé writing.

UNIT V

Listening - Viewing a model group discussion and reviewing the performance of each participant - Identifying the characteristics of a good listener; Speaking - Group discussion skills – initiating the discussion – exchanging suggestions and proposals – expressing dissent/agreement – assertiveness in expressing opinions – mind mapping technique; Reading - Note making skills – making notes from books, or any form of written materials - Intensive reading; Writing – Checklist - Types of reports – Feasibility / Project report – report format – recommendations / suggestions – interpretation of data (using charts for effective presentation); Grammar - Use of clauses; Vocabulary – Collocation; E-materials - Interactive grammar and vocabulary exercises - Sample GD - Pictures for discussion, Interactive grammar and vocabulary exercises; Language Lab - Different models of group discussion.

TOTAL: 60 PERIODS

OUTCOMES:
Learners should be able to:

- Speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies.
- Write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- Read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation.
- Listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings.

TEXTBOOKS:

REFERENCES:

EXTENSIVE Reading (Not for Examination)

Websites
2. http://owl.english.purdue.edu
TEACHING METHODS:
- Lectures
- Activities conducted individually, in pairs and in groups like individual writing and presentations, group discussions, interviews, reporting, etc
- Long presentations using visual aids
- Listening and viewing activities with follow up activities like discussions, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc
- Projects like group reports, mock interviews etc using a combination of two or more of the language skills

EVALUATION PATTERN:

Internal assessment: 20%
3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like
- Project
- Assignment
- Report
- Creative writing, etc.

All the four skills are to be tested with equal weightage given to each.
- Speaking assessment: Individual presentations, Group discussions
- Reading assessment: Reading passages with comprehension questions graded following Bloom’s taxonomy
- Writing assessment: Writing essays, CVs, reports etc. Writing should include grammar and vocabulary.
- Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content graded following Bloom’s taxonomy.

End Semester Examination: 80%

MA6251 MATHEMATICS – II

OBJECTIVES:
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- 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 the of 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 VECTOR CALCULUS
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stokes’ theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.
UNIT II ORDINARY DIFFERENTIAL EQUATIONS
Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT III LAPLACE TRANSFORM

UNIT IV ANALYTIC FUNCTIONS
Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: w = z+k, kz, 1/z, z^2, e^z and bilinear transformation.

UNIT V COMPLEX INTEGRATION
Complex integration – Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula – Taylor’s and Laurent’s series expansions – Singular points – Residues – Cauchy’s residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).

OUTCOMES:
The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
• To enrich the understanding of various types of materials and their applications in engineering and technology.

UNIT I CONDUCTING MATERIALS

UNIT II SEMICONDUCTING MATERIALS

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS

UNIT IV DIELECTRIC MATERIALS

UNIT V ADVANCED ENGINEERING MATERIALS

OUTCOMES:
The students will have the knowledge on physics of materials and that knowledge will be used by them in different engineering and technology applications

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

UNIT I       WATER TECHNOLOGY
Introduction to boiler feed water-requirements-formation of deposits in steam boilers and heat exchangers- disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) prevention of scale formation -softening of hard water -external treatment zeolite and demineralization - internal treatment- boiler compounds (phosphate, calgon, carbonate, colloidal) - caustic embrittlement-boiler corrosion-priming and foaming- desalination of brackish water –reverse osmosis.

UNIT II     ELECTROCHEMISTRY AND CORROSION

UNIT III    ENERGY SOURCES
Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusion- differences between nuclear fission and fusion- nuclear chain reactions- nuclear reactor power generator-classification of nuclear reactor- light water reactor- breeder reactor- solar energy conversion- solar cells- wind energy. Batteries and fuel cells: Types of batteries- alkaline battery- lead storage battery- nickel-cadmium battery- lithium battery- fuel cell H₂ -O₂ fuel cell- applications.

UNIT IV     ENGINEERING MATERIALS
Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth. Refractories: definition, characteristics, classification, properties – refactororiness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of alumina, magnesite and silicon carbide, Portland cement- manufacture and properties - setting and hardening of cement, special cement-waterproof and white cement–properties and uses. Glass - manufacture, types, properties and uses.

UNIT V     FUELS AND COMBUSTION

TOTAL: 45 PERIODS
OUTCOMES:
The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

REFERENCES:

CS6201 DIGITAL PRINCIPLES AND SYSTEM DESIGN L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:
- Learn the various number systems.
- Learn Boolean Algebra
- Understand the various logic gates.
- Be familiar with various combinational circuits.
- Be familiar with designing synchronous and asynchronous sequential circuits.
- Be exposed to designing using PLD

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES

UNIT II COMBINATIONAL LOGIC

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC
UNIT V  MEMORY AND PROGRAMMABLE LOGIC  9

TOTAL: 45 PERIODS

OUTCOMES:
At the end of this course, the student will be able to:

- Perform arithmetic operations in any number system.
- Simplify the Boolean expression using K-Map and Tabulation techniques.
- Use boolean simplification techniques to design a combinational hardware circuit.
- Design and Analysis of a given digital circuit – combinational and sequential.
- Design using PLD.

TEXT BOOK:

REFERENCES:

CS6202 PROGRAMMING AND DATA STRUCTURES I L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:

- Be familiar with the basics of C programming language.
- Be exposed to the concepts of ADTs
- Learn linear data structures – list, stack, and queue.
- Be exposed to sorting, searching, hashing algorithms

UNIT I  C PROGRAMMING FUNDAMENTALS- A REVIEW  9
Conditional statements – Control statements – Functions – Arrays – Preprocessor - Pointers - Variation in pointer declarations – Function Pointers – Function with Variable number of arguments

UNIT II  C PROGRAMMING ADVANCED FEATURES  9
Structures and Unions - File handling concepts – File read – write – binary and Stdio - File Manipulations

UNIT III  LINEAR DATA STRUCTURES – LIST  9
Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operation (Insertion, Deletion, Merge, Traversal)
UNIT IV  LINEAR DATA STRUCTURES – STACKS, QUEUES  9
Stack ADT – Evaluating arithmetic expressions- other applications- Queue ADT – circular queue implementation – Double ended Queues – applications of queues

UNIT V  SORTING, SEARCHING AND HASH TECHNIQUES  9

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Use the control structures of C appropriately for problems.
- Implement abstract data types for linear data structures.
- Apply the different linear data structures to problem solutions.
- Critically analyse the various algorithms.

TEXT BOOKS:

REFERENCES:

GE6262 PHYSICS AND CHEMISTRY LABORATORY – II  L  T  P  C
0  0  2  1

PHYSICS LABORATORY – II

OBJECTIVES:
- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

(Any FIVE Experiments)

LIST OF EXPERIMENTS:
1. Determination of Young’s modulus by uniform bending method
2. Determination of band gap of a semiconductor
3. Determination of Coefficient of viscosity of a liquid –Poiseuille’s method
4. Determination of Dispersive power of a prism - Spectrometer
5. Determination of thickness of a thin wire – Air wedge method
6. Determination of Rigidity modulus – Torsion pendulum
OUTCOMES:
- The students will have the ability to test materials by using their knowledge of applied physics principles in optics and properties of matter.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Traveling microscope, meter scale, Knife edge, weights
2. Band gap experimental set up
3. Burette, Capillary tube, rubber tube, stop clock, beaker and weighing balance
4. spectrometer, prism, sodium vapour lamp.
5. Air-wedge experimental set up.
6. Torsion pendulum set up.
   (vernier Caliper, Screw gauge, reading lens are required for most of the experiments)

CHEMISTRY LABORATORY -II

OBJECTIVES:
- To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.
   (Any FIVE Experiments)
1. Determination of alkalinity in water sample
2. Determination of total, temporary & permanent hardness of water by EDTA method
3. Estimation of copper content of the given solution by EDTA method
4. Estimation of iron content of the given solution using potentiometer
5. Estimation of iron content of the given solution using potentiometer
6. Estimation of sodium present in water using flame photometer
7. Corrosion experiment – weight loss method
8. Conductometric precipitation titration using BaCl₂ and Na₂SO₄

TOTAL: 30 PERIODS

OUTCOMES:
The students will be conversant with hands-on knowledge in the quantitative chemical analysis of water quality related parameters, corrosion measurement and cement analysis.

REFERENCES:

- Laboratory classes on alternate weeks for Physics and Chemistry.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Potentiometer - 5 Nos
2. Flame photo meter - 5 Nos
3. Weighing Balance - 5 Nos
4. Conductivity meter - 5 Nos

Common Apparatus : Pipette, Burette, conical flask, percelain tile, dropper (30 Nos each)
OBJECTIVES:
The student should be made to:
- Understand the various logic gates.
- Be familiar with various combinational circuits.
- Understand the various components used in the design of digital computers.
- Be exposed to sequential circuits
- Learn to use HDL

ST OF EXPERIMENTS:
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
   - Magnitude Comparator
   - Application using multiplexers
4. Design and implementation of sequential circuits:
   - Shift – registers
   - Synchronous and asynchronous counters
5. Coding combinational / sequential circuits using HDL.
6. Design and implementation of a simple digital system (Mini Project).

OUTCOMES:
At the end of this course, the student will be able to:
- Use boolean simplification techniques to design a combinational hardware circuit.
- Design and Implement combinational and sequential circuits.
- Analyze a given digital circuit – combinational and sequential.
- Design the different functional units in a digital computer system.
- Design and Implement a simple digital system.

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS
HARDWARE:
1. Digital trainer kits 30
2. Digital ICs required for the experiments in sufficient numbers 96

SOFTWARE:
1. HDL simulator.
OBJECTIVES:
The students should be made to:
- Be familiar with C programming
- Be exposed to implementing abstract data types
- Learn to use files
- Learn to implement sorting and searching algorithms.

1. C Programs using Conditional and Control Statements
2. C Programs using Arrays, Strings and Pointers and Functions
3. Representation of records using Structures in C – Creation of Linked List – Manipulation of records in a Linked List
4. File Handling in C – Sequential access – Random Access
5. Operations on a Stack and Queue – infix to postfix – simple expression evaluation using stacks - Linked Stack Implementation – Linked Queue Implementation
6. Implementation of Sorting algorithms
7. Implementation of Linear search and Binary Search.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Design and implement C programs for implementing stacks, queues, linked lists.
- Apply good programming design methods for program development.
- Apply the different data structures for implementing solutions to practical problems.
- Develop searching and sorting programs.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
Standalone desktops with C compiler 30 Nos.
(or)
Server with C compiler supporting 30 terminals or more.

MA6351 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

OBJECTIVES:
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I  PARTIAL DIFFERENTIAL EQUATIONS 9+3
Formation of partial differential equations – Singular integrals -- Solutions of standard types of first order partial differential equations - Lagrange’s linear equation -- Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.
UNIT II  FOURIER SERIES

UNIT III  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS
Classification of PDE – Method of separation of variables - Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction (excluding insulated edges).

UNIT IV  FOURIER TRANSFORMS

UNIT V  Z - TRANSFORMS AND DIFFERENCE EQUATIONS

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
- The understanding of the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
The student should be made to:
- Be familiar with the C++ concepts of abstraction, encapsulation, constructor, polymorphism, overloading and Inheritance.
- Learn advanced nonlinear data structures.
- Be exposed to graph algorithms
- Learn to apply Tree and Graph structures

UNIT I OBJECT ORIENTED PROGRAMMING FUNDAMENTALS 9
C++ Programming features - Data Abstraction - Encapsulation - class - object - constructors - static members – constant members – member functions – pointers – references - Role of this pointer – Storage classes – function as arguments.

UNIT II OBJECT ORIENTED PROGRAMMING CONCEPTS 9

UNIT III C++ PROGRAMMING ADVANCED FEATURES 9

UNIT IV ADVANCED NON-LINEAR DATA STRUCTURES 9

UNIT V GRAPHS 9

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Design problem solutions using Object Oriented Techniques.
- Apply the concepts of data abstraction, encapsulation and inheritance for problem solutions.
- Use the control structures of C++ appropriately.
- Critically analyse the various algorithms.
- Apply the different data structures to problem solutions.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To expose the students to the fundamentals of Database Management Systems.
- To make the students understand the relational model.
- To familiarize the students with ER diagrams.
- To expose the students to SQL.
- To make the students to understand the fundamentals of Transaction Processing and Query Processing.
- To familiarize the students with the different types of databases.
- To make the students understand the Security Issues in Databases.

UNIT I  INTRODUCTION TO DBMS
File Systems Organization - Sequential, Pointer, Indexed, Direct - Purpose of Database System-
Database System Terminologies-Database characteristics- Data models – Types of data models –
Components of DBMS- Relational Algebra. LOGICAL DATABASE DESIGN: Relational DBMS -
Codd's Rule - Entity-Relationship model - Extended ER Normalization – Functional Dependencies,
Anomaly- 1NF to 5NF- Domain Key Normal Form – Denormalization

UNIT II  SQL & QUERY OPTIMIZATION
SQL Standards - Data types - Database Objects- DDL-DML-DCL-TCL-Embedded SQL-Static Vs
Dynamic SQL - QUERY OPTIMIZATION: Query Processing and Optimization - Heuristics and Cost
Estimates in Query Optimization.

UNIT III  TRANSACTION PROCESSING AND CONCURRENCY CONTROL
Introduction-Properties of Transaction- Serializability- Concurrency Control – Locking Mechanisms-
Two Phase Commit Protocol-Dead lock.

UNIT IV  TRENDS IN DATABASE TECHNOLOGY
Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B
tree Index Files – Static Hashing – Dynamic Hashing - Introduction to Distributed Databases- Client
server technology- Multidimensional and Parallel databases- Spatial and multimedia databases-
Mobile and web databases- Data Warehouse-Mining- Data marts.

UNIT V  ADVANCED TOPICS
DATABASE SECURITY: Data Classification-Threats and risks – Database access Control – Types of
Privileges –Cryptography- Statistical Databases.- Distributed Databases-Architecture-Transaction
Processing-Data Warehousing and Mining-Classification-Association rules-Clustering-Information
Retrieval- Relevance ranking-Crawling and Indexing the Web- Object Oriented Databases-XML
Databases.

OUTCOMES:
At the end of the course, the student should be able to:
- Design Databases for applications.
- Use the Relational model, ER diagrams.
- Apply concurrency control and recovery mechanisms for practical problems.
- Design the Query Processor and Transaction Processor.
- Apply security concepts to databases.

TOTAL: 45 PERIODS
TEXT BOOK:

REFERENCES:

CS6303 COMPUTER ARCHITECTURE

OBJECTIVES:
- To make students understand the basic structure and operation of digital computer.
- To understand the hardware-software interface.
- To familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- To expose the students to the concept of pipelining.
- To familiarize the students with hierarchical memory system including cache memories and virtual memory.
- To expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I OVERVIEW & INSTRUCTIONS

UNIT II ARITHMETIC OPERATIONS
ALU - Addition and subtraction – Multiplication – Division – Floating Point operations – Subword parallelism.

UNIT III PROCESSOR AND CONTROL UNIT
Basic MIPS implementation – Building datapath – Control Implementation scheme – Pipelining – Pipelined datapath and control – Handling Data hazards & Control hazards – Exceptions.

UNIT IV PARALLELISM
Instruction-level-parallelism – Parallel processing challenges – Flynn’s classification – Hardware multithreading – Multicore processors

35
UNIT V MEMORY AND I/O SYSTEMS
Memory hierarchy - Memory technologies – Cache basics – Measuring and improving cache performance - Virtual memory, TLBs - Input/output system, programmed I/O, DMA and interrupts, I/O processors.

OUTCOMES:
At the end of the course, the student should be able to:
- Design arithmetic and logic unit.
- Design and analyse pipelined control units
- Evaluate performance of memory systems.
- Understand parallel processing architectures.

TEXT BOOK:

REFERENCES:

CS6304 ANALOG AND DIGITAL COMMUNICATION

OBJECTIVES:
The student should be made to:
- Understand analog and digital communication techniques.
- Learn data and pulse communication techniques.
- Be familiarized with source and Error control coding.
- Gain knowledge on multi-user radio communication.

UNIT I ANALOG COMMUNICATION
UNIT II DIGITAL COMMUNICATION

UNIT III DATA AND PULSE COMMUNICATION
Data Communication: History of Data Communication - Standards Organizations for Data Communication- Data Communication Circuits - Data Communication Codes - Error Detection and Correction Techniques - Data communication Hardware - serial and parallel interfaces.

UNIT IV SOURCE AND ERROR CONTROL CODING
Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, channel coding theorem, Error Control Coding, linear block codes, cyclic codes, convolution codes, viterbi decoding algorithm.

UNIT V MULTI-USER RADIO COMMUNICATION
Advanced Mobile Phone System (AMPS) - Global System for Mobile Communications (GSM) - Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse - Channel Assignment and Hand - Overview of Multiple Access Schemes - Satellite Communication - Bluetooth.

OUTCOMES:
At the end of the course, the student should be able to:
• Apply analog and digital communication techniques.
• Use data and pulse communication techniques.
• Analyze Source and Error control coding.
• Utilize multi-user radio communication.

TEXT BOOK:

REFERENCES:
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
Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – 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
Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry-Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission, Control of SO2, NOx, CO and HC) (b) Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters – physical, chemical and biological; absorption of heavy metals - Water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies – 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 overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; 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

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

TOTAL: 45 PERIODS

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:
OBJECTIVES:
The student should be made to:
- Be familiarized with good programming design methods, particularly Top-Down design.
- Getting exposure in implementing the different data structures using C++
- Appreciate recursive algorithms.

LIST OF EXPERIMENTS:
IMPLEMENTATION IN THE FOLLOWING TOPICS:
1. Constructors & Destructors, Copy Constructor.
2. Friend Function & Friend Class.
3. Inheritance.
4. Polymorphism & Function Overloading.
5. Virtual Functions.
6. Overload Unary & Binary Operators Both as Member Function & Non Member Function.
7. Class Templates & Function Templates.
8. Exception Handling Mechanism.
10. File Stream classes.
11. Applications of Stack and Queue
12. Binary Search Tree
13. Tree traversal Techniques
14. Minimum Spanning Trees
15. Shortest Path Algorithms

OUTCOMES:
At the end of the course, the student should be able to:
- Design and implement C++ programs for manipulating stacks, queues, linked lists, trees, and graphs.
- Apply good programming design methods for program development.
- Apply the different data structures for implementing solutions to practical problems.
- Develop recursive programs using trees and graphs.

REFERENCE:
spoken-tutorial.org.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
Standalone desktops with C++ compiler 30 Nos.
(or)
Server with C++ compiler supporting 30 terminals or more.
OBJECTIVES:
The student should be made to:

- Learn to create and use a database
- Be familiarized with a query language
- Have hands on experience on DDL Commands
- Have a good understanding of DML Commands and DCL commands
- Familiarize advanced SQL queries.
- Be Exposed to different applications

LIST OF EXPERIMENTS:
1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Creation of Views, Synonyms, Sequence, Indexes, Save point.
4. Creating an Employee database to set various constraints.
5. Creating relationship between the databases.
7. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
8. Write a PL/SQL block that handles all types of exceptions.
10. Creation of database triggers and functions
11. Mini project (Application Development using Oracle/ Mysql )
   a) Inventory Control System.
   b) Material Requirement Processing.
   c) Hospital Management System.
   d) Railway Reservation System.
   e) Personal Information System.
   f) Web Based User Identification System.
   g) Timetable Management System.
   h) Hotel Management System

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:

- Design and implement a database schema for a given problem-domain
- Populate and query a database
- Create and maintain tables using PL/SQL.
- Prepare reports.

REFERENCE:
spoken-tutorial.org

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE:
Standalone desktops 30 Nos.
(or)
Server supporting 30 terminals or more.
SOFTWARE:
Front end: VB/VC ++/JAVA or Equivalent

Back end: Oracle / SQL / MySQL/ Postgress / DB2 or Equivalent

MA6453 PROBABILITY AND QUEUEING THEORY

OBJECTIVE:
To provide the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of science and engineering.

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

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables.

UNIT III RANDOM PROCESSES

UNIT IV QUEUEING MODELS
Markovian queues – Birth and Death processes – Single and multiple server queueing models – Little’s formula - Queues with finite waiting rooms – Queues with impatient customers: Balking and reneging.

UNIT V ADVANCED QUEUEING MODELS
Finite source models - M/G/1 queue – Pollaczek Khinchin formula - M/D/1 and M/E_κ/1 as special cases – Series queues – Open Jackson networks.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
- The students will have a fundamental knowledge of the probability concepts.
- Acquire skills in analyzing queueing models.
- It also helps to understand and characterize phenomenon which evolve with respect to time in a probabilistic manner.

TEXT BOOKS:

REFERENCES:

CS6551                  COMPUTER NETWORKS                 L T P C
                                                        3 0 0 3

OBJECTIVES:
The student should be made to:
- Understand the division of network functionalities into layers.
- Be familiar with the components required to build different types of networks.
- Be exposed to the required functionality at each layer.
- Learn the flow control and congestion control algorithms.

UNIT I       FUNDAMENTALS & LINK LAYER
Building a network – Requirements - Layering and protocols - Internet Architecture – Network software – Performance ; Link layer Services - Framing - Error Detection - Flow control

UNIT II      MEDIA ACCESS & INTERNETWORKING
Media access control - Ethernet (802.3) - Wireless LANs – 802.11 – Bluetooth - Switching and bridging – Basic Internetworking (IP, CIDR, ARP, DHCP, ICMP)

UNIT III     ROUTING
Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, IPv6), Multicast – addresses – multicast routing (DVMRP, PIM)

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

UNIT V       APPLICATION LAYER
Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS - SNMP

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Identify the components required to build different types of networks.
- Choose the required functionality at each layer for given application.
- Identify solution for each functionality at each layer.
- Trace the flow of information from one node to another node in the network.

TEXT BOOK:
REFERENCES:

CS6401 OPERATING SYSTEMS

OBJECTIVES:
The student should be made to:
- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

UNIT I OPERATING SYSTEMS OVERVIEW

UNIT II PROCESS MANAGEMENT

UNIT III STORAGE MANAGEMENT
Main Memory-Contiguous Memory Allocation, Segmentation, Paging, 32 and 64 bit architecture Examples; Virtual Memory- Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT IV I/O SYSTEMS

UNIT V CASE STUDY
Linux System- Basic Concepts;System Administration-Requirements for Linux System Administrator, Setting up a LINUX Multifunction Server, Domain Name System, Setting Up Local Network Services; Virtualization- Basic Concepts, Setting Up Xen,VMware on Linux Host and Adding Guest OS.

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course, the student should be able to:
- Design various Scheduling algorithms.
- Apply the principles of concurrency.
- Design deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Design and implement a prototype file systems.
- Perform administrative tasks on Linux Servers.

TEXT BOOK:

REFERENCES:
5. http://nptel.ac.in/.

CS6402 DESIGN AND ANALYSIS OF ALGORITHMS L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:
- Learn the algorithm analysis techniques.
- Become familiar with the different algorithm design techniques.
- Understand the limitations of Algorithm power.

UNIT I INTRODUCTION

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE
UNIT IV  ITERATIVE IMPROVEMENT  9

UNIT V  COPING WITH THE LIMITATIONS OF ALGORITHM POWER  9

OUTCOMES:
At the end of the course, the student should be able to:
- Design algorithms for various computing problems.
- Analyze the time and space complexity of algorithms.
- Critically analyze the different algorithm design techniques for a given problem.
- Modify existing algorithms to improve efficiency.

TEXT BOOK:

REFERENCES:
5. http://nptel.ac.in/

EC6504  MICROPROCESSOR AND MICROCONTROLLER  L T P C  3 0 0 3

OBJECTIVES:
The student should be made to:
- Study the Architecture of 8086 microprocessor.
- Learn the design aspects of I/O and Memory Interfacing circuits.
- Study about communication and bus interfacing.
- Study the Architecture of 8051 microcontroller.

UNIT I  THE 8086 MICROPROCESSOR  9
Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.
UNIT II  8086 SYSTEM BUS STRUCTURE 9

UNIT III  I/O INTERFACING 9

UNIT IV  MICROCONTROLLER 9
Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V  INTERFACING MICROCONTROLLER 9

OUTCOMES:
At the end of the course, the student should be able to:
- Design and implement programs on 8086 microprocessor.
- Design I/O circuits.
- Design Memory Interfacing circuits.
- Design and implement 8051 microcontroller based systems.

TEXT BOOKS:

REFERENCE:
1. Doughlas V.Hall, “Microprocessors and Interfacing, Programming and Hardware;TMH, 2012

CS6403  SOFTWARE ENGINEERING  
L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:
- Understand the phases in a software project
- Understand fundamental concepts of requirements engineering and Analysis Modelling.
- Understand the major considerations for enterprise integration and deployment.
- Learn various testing and maintenance measures
UNIT I SOFTWARE PROCESS AND PROJECT MANAGEMENT


UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION


UNIT III SOFTWARE DESIGN


UNIT IV TESTING AND IMPLEMENTATION


UNIT V PROJECT MANAGEMENT


OUTCOMES:

At the end of the course, the student should be able to
- Identify the key activities in managing a software project.
- Compare different process models.
- Concepts of requirements engineering and Analysis Modeling.
- Apply systematic procedure for software design and deployment.
- Compare and contrast the various testing and maintenance.

TEXT BOOK:


REFERENCES:

OBJECTIVES:
The student should be made to:

- Learn socket programming.
- Be familiar with simulation tools.
- Have hands on experience on various networking protocols.

LIST OF EXPERIMENTS:
1. Implementation of Stop and Wait Protocol and Sliding Window Protocol.
2. Study of Socket Programming and Client – Server model
3. Write a code simulating ARP /RARP protocols.
4. Write a code simulating PING and TRACEROUTE commands
5. Create a socket for HTTP for web page upload and download.
6. Write a program to implement RPC (Remote Procedure Call)
7. Implementation of Subnetting.
8. Applications using TCP Sockets like
   a. Echo client and echo server
   b. Chat
   c. File Transfer
9. Applications using TCP and UDP Sockets like
   d. DNS
   e. SNMP
   f. File Transfer
10. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS
11. Perform a case study about the different routing algorithms to select the network path with its
    optimum and economical during data transfer:
    i. Link State routing
    ii. Flooding
    iii. Distance vector

TOTAL: 45 PERIODS

REFERENCE:
spoken-tutorial.org.

OUTCOMES:
At the end of the course, the student should be able to

- Use simulation tools
- Implement the various protocols.
- Analyse the performance of the protocols in different layers.
- Analyze various routing algorithms

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

SOFTWARE:
- C / C++ / Java / Equivalent Compiler 30
- Network simulator like NS2/Glomosim/OPNET/Equivalent

HARDWARE:
- Standalone desktops 30 Nos
OBJECTIVES:
The student should be made to:
- Introduce ALP concepts and features
- Write ALP for arithmetic and logical operations in 8086 and 8051
- Differentiate Serial and Parallel Interface
- Interface different I/Os with Microprocessors
- Be familiar with MASM

LIST OF EXPERIMENTS:
8086 Programs using kits and MASM
1. Basic arithmetic and Logical operations
2. Move a data block without overlap
3. Code conversion, decimal arithmetic and Matrix operations.
4. Floating point operations, string manipulations, sorting and searching
5. Password checking, Print RAM size and system date
6. Counters and Time Delay

Peripherals and Interfacing Experiments
7. Traffic light control
8. Stepper motor control
9. Digital clock
10. Key board and Display
11. Printer status
12. Serial interface and Parallel interface
13. A/D and D/A interface and Waveform Generation

8051 Experiments using kits and MASM
14. Basic arithmetic and Logical operations
15. Square and Cube program, Find 2’s complement of a number
16. Unpacked BCD to ASCII

OUTCOMES:
At the end of the course, the student should be able to:
- Write ALP Programmes for fixed and Floating Point and Arithmetic
- Interface different I/Os with processor
- Generate waveforms using Microprocessors
- Execute Programs in 8051
- Explain the difference between simulator and Emulator

LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE:
8086 development kits - 30 nos
Interfacing Units - Each 10 nos
Microcontroller - 30 nos

SOFTWARE:
Intel Desktop Systems with MASM - 30 nos
8086 Assembler
8051 Cross Assembler
OBJECTIVES:
The student should be made to:
- Learn shell programming and the use of filters in the UNIX environment.
- Be exposed to programming in C using system calls.
- Learn to use the file system related system calls.
- Be exposed to process creation and inter process communication.
- Be familiar with implementation of CPU Scheduling Algorithms, page replacement algorithms and Deadlock avoidance

LIST OF EXPERIMENTS:
2. Shell Programming.
3. Implement the following CPU scheduling algorithms
   a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies
   a) Sequential b) Indexed c) Linked
5. Implement Semaphores
6. Implement all File Organization Techniques
   a) Single level directory b) Two level c) Hierarchical d) DAG
7. Implement Bankers Algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement e all page replacement algorithms
   a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique of memory management.
12. Implement Threading & Synchronization Applications

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to
- Implement deadlock avoidance, and Detection Algorithms
- Compare the performance of various CPU Scheduling Algorithm
- Critically analyze the performance of the various page replacement algorithms
- Create processes and implement IPC

REFERENCE:
spoken-tutorial.org

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
Standalone desktops with C / C++ / Java / Equivalent compiler 30 Nos.

(or)

Server with C / C++ / Java / Equivalent compiler supporting 30 terminals
MA6566  DISCRETE MATHEMATICS  L T P C  3 1 0 4

OBJECTIVES:
To extend student’s Logical and Mathematical maturity and ability to deal with abstraction and to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

UNIT I  LOGIC AND PROOFS  9+3

UNIT II  COMBINATORICS  9+3

UNIT III  GRAPHS  9+3
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  9+3

UNIT V  LATTICES AND BOOLEAN ALGEBRA  9+3

TOTAL (L: 45+T:15): 60 PERIODS

OUTCOMES:
At the end of the course, students would:
• 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 and output functions in computer science.
• Be aware of the counting principles.
• Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
The student should be made to:
- Learn Java Programming.
- Understand different Internet Technologies.
- Be exposed to java specific web services architecture.

UNIT I  JAVA PROGRAMMING  9

UNIT II  WEBSITES BASICS, HTML 5, CSS 3, WEB 2.0  8
Web 2.0: Basics-RIA Rich Internet Applications - Collaborations tools - Understanding websites and web servers: Understanding Internet – Difference between websites and web server- Internet technologies Overview –Understanding the difference between internet and intranet; HTML and CSS: HTML 5.0 , XHTML, CSS 3.

UNIT III  CLIENT SIDE AND SERVER SIDE PROGRAMMING  11

UNIT IV  PHP and XML  8

UNIT V  INTRODUCTION TO AJAX and WEB SERVICES  9

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Implement Java programs.
- Create a basic website using HTML and Cascading Style Sheets.
- Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.
- Design rich client presentation using AJAX.
- Design and implement simple web page in PHP, and to present data in XML format.
- Design and implement server side programs using Servlets and JSP.
TEXT BOOKS:

REFERENCES:

CS6502 OBJECT ORIENTED ANALYSIS AND DESIGN L T P C 3 0 0 3

OBJECTIVES:
The student should be made to:
- Learn the basics of OO analysis and design skills.
- Learn the UML design diagrams.
- Learn to map design to code.
- Be exposed to the various testing techniques.

UNIT I UML DIAGRAMS 9

UNIT II DESIGN PATTERNS 9

UNIT III CASE STUDY 9
Case study – the Next Gen POS system, Inception -Use case Modeling - Relating Use cases – include, extend and generalization - Elaboration - Domain Models - Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies - Aggregation and Composition.

UNIT IV APPLYING DESIGN PATTERNS 9
System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement - UML class diagrams - UML interaction diagrams - Applying GoF design patterns.

UNIT V CODING AND TESTING 9

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course, the student should be able to:
- Design and implement projects using OO concepts.
- Use the UML analysis and design diagrams.
- Apply appropriate design patterns.
- Create code from design.
- Compare and contrast various testing techniques.

TEXT BOOK:

REFERENCES:

CS6503 THEORY OF COMPUTATION L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:
- Understand various Computing models like Finite State Machine, Pushdown Automata, and Turing Machine.
- Be aware of Decidability and Un-decidability of various problems.
- Learn types of grammars.

UNIT I FINEST AUTOMATA

UNIT II GRAMMARS

UNIT III PUSHDOWN AUTOMATA
UNIT IV TURING MACHINES
Definitions of Turing machines – Models – Computable languages and functions – Techniques for Turing machine construction – Multi head and Multi tape Turing Machines - The Halting problem – Partial Solvability – Problems about Turing machine- Chomskian hierarchy of languages.

UNIT V UNSOLVABLE PROBLEMS AND COMPUTABLE FUNCTIONS
Unsolvable Problems and Computable Functions – Primitive recursive functions – Recursive and recursively enumerable languages – Universal Turing machine. MEASURING AND CLASSIFYING COMPLEXITY: Tractable and Intractable problems- Tractable and possibly intractable problems - P and NP completeness - Polynomial time reductions.

OUTCOMES:
At the end of the course, the student should be able to:
- Design Finite State Machine, Pushdown Automata, and Turing Machine.
- Explain the Decidability or Undecidability of various problems

TEXT BOOKS:

REFERENCES:

CS6504 COMPUTER GRAPHICS L T P C 3 0 0 3

OBJECTIVES:
The student should be made to:
- Gain knowledge about graphics hardware devices and software used.
- Understand the two dimensional graphics and their transformations.
- Understand the three dimensional graphics and their transformations.
- Appreciate illumination and color models.
- Be familiar with understand clipping techniques.

UNIT I INTRODUCTION
Survey of computer graphics, Overview of graphics systems – Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.
UNIT II  TWO DIMENSIONAL GRAPHICS
Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; widow-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms.

UNIT III  THREE DIMENSIONAL GRAPHICS
Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations - Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces. TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations; Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.

UNIT IV  ILLUMINATION AND COLOUR MODELS
Light sources - basic illumination models – halftone patterns and dithering techniques; Properties of light - Standard primaries and chromaticity diagram; Intuitive colour concepts - RGB colour model - YIQ colour model - CMY colour model - HSV colour model - HLS colour model; Colour selection.

UNIT V  ANIMATIONS & REALISM

OUTCOMES:
At the end of the course, the student should be able to:

- Design two dimensional graphics.
- Apply two dimensional transformations.
- Design three dimensional graphics.
- Apply three dimensional transformations.
- Apply Illumination and color models.
- Apply clipping techniques to graphics.
- Design animation sequences.

TEXT BOOKS:

REFERENCES:
6. http://nptel.ac.in/
OBJECTIVES:
The student should be made to:
- Learn the basics of OO analysis and design skills.
- Be exposed to the UML design diagrams.
- Learn to map design to code.
- Be familiar with the various testing techniques.

LIST OF EXPERIMENTS:
To develop a mini-project by following the 9 exercises listed below.
1. To develop a problem statement.
2. Identify Use Cases and develop the Use Case model.
3. Identify the conceptual classes and develop a domain model with UML Class diagram.
4. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence diagrams.
5. Draw relevant state charts and activity diagrams.
6. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
7. Develop and test the Technical services layer.
8. Develop and test the Domain objects layer.
9. Develop and test the User interface layer.

SUGGESTED DOMAINS FOR MINI-PROJECT:
1. Passport automation system.
2. Book bank
3. Exam Registration
4. Stock maintenance system.
5. Online course reservation system
6. E-ticketing
7. Software personnel management system
8. Credit card processing
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference Management System
13. BPO Management System
14. Library Management System
15. Student Information System

OUTCOMES:
At the end of the course, the student should be able to
- Design and implement projects using OO concepts.
- Use the UML analysis and design diagrams.
- Apply appropriate design patterns.
- Create code from design.
- Compare and contrast various testing techniques.
LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

Suggested Software Tools:
Rational Suite (or) Argo UML (or) equivalent, Eclipse IDE and Junit

Software Tools
30 user License
Rational Suite
Open Source Alternatives: ArgoUML, Visual Paradigm
Eclipse IDE and JUnit

PCs
30

CS6512 INTERNET PROGRAMMING LABORATORY

OBJECTIVES:
The student should be made to:
- Be familiar with Web page design using HTML/XML and style sheets
- Be exposed to creation of user interfaces using Java frames and applets.
- Learn to create dynamic web pages using server side scripting.
- Learn to write Client Server applications.
- Be familiar with the frameworks JSP Strut, Hibernate, Spring
- Be exposed to creating applications with AJAX

LIST OF EXPERIMENTS:
IMPLEMENT THE FOLLOWING:

WEBPAGE CONCEPTS
a) Create a web page with the following using HTML
   a. To embed a map in a web page
   b. To fix the hot spots in that map
   c. Show all the related information when the hot spots are clicked.
b) Create a web page with the following.
   a. Cascading style sheets.
   b. Embedded style sheets.
   c. Inline style sheets. Use our college information for the web pages.

c) Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document.

SOCKETS & SERVLETS
a) Write programs in Java using sockets to implement the following:
   i. HTTP request
   ii. FTP
   iii. SMTP
   iv. POP3
b) Write a program in Java for creating simple chat application with datagram sockets and datagram packets.
c) Write programs in Java using Servlets:
   i. To invoke servlets from HTML forms
ii. To invoke servlets from Applets

d) Write programs in Java to create three-tier applications using servlets for conducting on-line examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
e) Write a program to lock servlet itself to a particular server IP address and port number. It requires an init parameter key that is appropriate for its servlet IP address and port before it unlocks itself and handles a request.
f) Session tracking using hidden form fields and Session tracking for a hit count.
g) Install TOMCAT web server. Convert the static webpages of programs 1&2 into dynamic web pages using servlets (or JSP) and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

ADVANCE CONCEPTS:
  a) Implement a simple program using following frameworks
      a. JSP Struts Framework  b. Hibernate  c. Spring
  b) Explore the following application in AJAX: Searching in real time with live searches, Getting the answer with auto complete, Chatting with friends, Dragging and dropping with Ajax, Getting instant login feedback, Ajax-enabled popup menus, Modifying Web pages on the fly.
  c) Write a web services for finding what people think by asking 500 people’s opinion for any consumer product.
  d) Write a web services for predicting for any product sales

OUTCOMES:
At the end of the course, the student should be able to
  • Design Web pages using HTML/XML and style sheets
  • Create user interfaces using Java frames and applets.
  • Create dynamic web pages using server side scripting.
  • Write Client Server applications.
  • Use the frameworks JSP Strut, Hibernate, Spring
  • Create applications with AJAX

REFERENCE:
spoken-tutorial.org.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS
SOFTWARE:
Java, Dream Weaver or Equivalent, MySQL or Equivalent, Apache Server

HARDWARE:
Standalone desktops 30 Nos

CS6513  COMPUTER GRAPHICS LABORATORY  L T P C
0 0 3 2

OBJECTIVES:
The student should be made to:
  • Understand graphics programming
  • Be exposed to creation of 3D graphical scenes using open graphics library suits
  • Be familiar with image manipulation, enhancement
  • Learn to create animations
  • To create a multimedia presentation/Game/Project.
LIST OF EXPERIMENTS:
IMPLEMENT THE EXERCISES USING C / OPENGL / JAVA

1. Implementation of Algorithms for drawing 2D Primitives – Line (DDA, Bresenham) – all slopes
   Circle (Midpoint)
2. 2D Geometric transformations –
   Translation
   Rotation Scaling
   Reflection Shear
   Window-Viewport
3. Composite 2D Transformations
4. Line Clipping
5. 3D Transformations - Translation, Rotation, Scaling.
6. 3D Projections – Parallel, Perspective.
7. Creating 3D Scenes.
8. Image Editing and Manipulation - Basic Operations on image using any image editing software, Creating gif animated images, Image optimization.
9. 2D Animation – To create Interactive animation using any authoring tool.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to
- Create 3D graphical scenes using open graphics library suits
- Implement image manipulation and enhancement
- Create 2D animations using tools

REFERENCE:
spoken-tutorial.org

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

SOFTWARE
   C, C++, Java, OpenGL

HARDWARE:
Standalone desktops - 30 Nos.
(or)
Server supporting 30 terminals or more.

CS6601 DISTRIBUTED SYSTEMS L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:
- Understand foundations of Distributed Systems.
- Introduce the idea of peer to peer services and file system.
- Understand in detail the system level and support required for distributed system.
- Understand the issues involved in studying process and resource management.
UNIT I  INTRODUCTION

UNIT II  COMMUNICATION IN DISTRIBUTED SYSTEM

UNIT III  PEER TO PEER SERVICES AND FILE SYSTEM

UNIT IV  SYNCHRONIZATION AND REPLICATION

UNIT V  PROCESS & RESOURCE MANAGEMENT

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Discuss trends in Distributed Systems.
- Apply network virtualization.
- Apply remote method invocation and objects.
- Design process and resource management systems.

TEXT BOOK:

REFERENCES:
OBJECTIVES:
The student should be made to:
- Understand the basic concepts of mobile computing
- Be familiar with the network protocol stack
- Learn the basics of mobile telecommunication system
- Be exposed to Ad-Hoc networks
- Gain knowledge about different mobile platforms and application development

UNIT I  INTRODUCTION

UNIT II  MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER

UNIT III  MOBILE TELECOMMUNICATION SYSTEM
Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

UNIT IV  MOBILE AD-HOC NETWORKS

UNIT V  MOBILE PLATFORMS AND APPLICATIONS

OUTCOMES:
At the end of the course, the student should be able to:
- Explain the basics of mobile telecommunication system
- Choose the required functionality at each layer for given application
- Identify solution for each functionality at each layer
- Use simulator tools and design Ad hoc networks
- Develop a mobile application.

TEXT BOOK:
REFERENCES:
8. Windows Phone Dev Center: http://developer.windowsphone.com

CS6660 COMPILER DESIGN

OBJECTIVES:
The student should be made to:
- Learn the design principles of a Compiler.
- Learn the various parsing techniques and different levels of translation
- Learn how to optimize and effectively generate machine codes

UNIT I INTRODUCTION TO COMPILERS
Translators-Compilation and Interpretation-Language processors -The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools -Programming Language basics.

UNIT II LEXICAL ANALYSIS
Need and Role of Lexical Analyzer-Lexical Errors-Expressing Tokens by Regular Expressions-Converting Regular Expression to DFA- Minimization of DFA-Language for Specifying Lexical Analyzers-LEX-Design of Lexical Analyzer for a sample Language.

UNIT III SYNTAX ANALYSIS

UNIT IV SYNTAX DIRECTED TRANSLATION & RUN TIME ENVIRONMENT
Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute Definitions- Design of predictive translator - Type Systems-Specification of a simple type checker-Equivalence of Type Expressions-Type Conversions.

RUN-TIME ENVIRONMENT: Source Language Issues-Storage Organization-Storage Allocation-Parameter Passing-Symbol Tables-Dynamic Storage Allocation-Storage Allocation in FORTAN.
UNIT V  CODE OPTIMIZATION AND CODE GENERATION  9

OUTCOMES:
At the end of the course, the student should be able to:
• Design and implement a prototype compiler.
• Apply the various optimization techniques.
• Use the different compiler construction tools.

TEXTBOOK:

REFERENCES:

IT6502  DIGITAL SIGNAL PROCESSING  L T P C
3 1 0 4

OBJECTIVES:
• To introduce discrete Fourier transform and its applications.
• To teach the design of infinite and finite impulse response filters for filtering undesired signals.
• To introduce 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
Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation.
UNIT IV     FIR FILTER DESIGN
Structures of FIR – Linear phase FIR filter – Fourier Series - Filter design using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques

UNIT V     FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS
Binary fixed point and floating point number representations – Comparison - Quantization noise – truncation and rounding – quantization noise power- input quantization error- coefficient quantization error – limit cycle oscillations-dead band- Overflow error-signal scaling.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
Upon completion of the course, students will be able to:
- Perform frequency transforms for the signals.
- Design IIR and FIR filters.
- Finite word length effects in digital filters

TEXT BOOK:

REFERENCES:

CS6659     ARTIFICIAL INTELLIGENCE

OBJECTIVES:
The student should be made to:
- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Introduce the concepts of Expert Systems and machine learning.

UNIT I     INTRODUCTION TO AI AND PRODUCTION SYSTEMS
Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.

UNIT II     REPRESENTATION OF KNOWLEDGE
Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.
UNIT III KNOWLEDGE INFRINGEMENT
Knowledge representation - Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

UNIT IV PLANNING AND MACHINE LEARNING

UNIT V EXPERT SYSTEMS

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Identify problems that are amenable to solution by AI methods.
- Identify appropriate AI methods to solve a given problem.
- Formalise a given problem in the language/framework of different AI methods.
- Implement basic AI algorithms.
- Design and carry out an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.

TEXT BOOKS:

REFERENCES:
4. http://nptel.ac.in

CS6611 MOBILE APPLICATION DEVELOPMENT LABORATORY L T P C
0 0 3 2

OBJECTIVES:
The student should be made to:
- Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- Understand how to work with various mobile application development frameworks.
- Learn the basic and important design concepts and issues of development of mobile applications.
- Understand the capabilities and limitations of mobile devices.

LIST OF EXPERIMENTS:
1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi threading
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates an alarm clock

OUTCOMES:
At the end of the course, the student should be able to:
- Design and Implement various mobile applications using emulators.
- Deploy applications to hand-held devices

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS
Standalone desktops with Windows or Android or iOS or Equivalent Mobile Application Development Tools with appropriate emulators and debuggers - 30 Nos.

CS6612 COMPILER LABORATORY

OBJECTIVES:
The student should be made to:
- Be exposed to compiler writing tools.
- Learn to implement the different Phases of compiler
- Be familiar with control flow and data flow analysis
- Learn simple optimization techniques

LIST OF EXPERIMENTS:
1. Implementation of Symbol Table
2. Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.)
3. Implementation of Lexical Analyzer using Lex Tool
4. Generate YACC specification for a few syntactic categories.
   a) Program to recognize a valid arithmetic expression that uses operator +, -, *, and /
   b) Program to recognize a valid variable which starts with a letter followed by any number of letters or digits.
   d) Implementation of Calculator using LEX and YACC
5. Convert the BNF rules into Yacc form and write code to generate Abstract Syntax Tree.
6. Implement type checking
7. Implement control flow analysis and Data flow Analysis
8. Implement any one storage allocation strategies (Heap, Stack, Static)
9. Construction of DAG
10. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.
11. Implementation of Simple Code Optimization Techniques (Constant Folding, etc.)

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course, the student should be able to
- Implement the different Phases of compiler using tools
- Analyze the control flow and data flow of a typical program
- Optimize a given program
- Generate an assembly language program equivalent to a source language program

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
Standalone desktops with C / C++ compiler and Compiler writing tools 30 Nos.
(or)
Server with C / C++ compiler and Compiler writing tools supporting 30 terminals or more.
LEX and YACC

GE6674 COMMUNICATION AND SOFT SKILLS - LABORATORY BASED  L T P C
0 0 4 2

OBJECTIVES:
- To enable learners to develop their communicative competence.
- To facilitate them to hone their soft skills.
- To equip them with employability skills to enhance their prospect of placements.

UNIT I LISTENING AND SPEAKING SKILLS 12
Conversational skills (formal and informal) – group discussion and interview skills – making presentations.
Listening to lectures, discussions, talk shows, news programmes, dialogues from TV/radio/Ted talk/Podcast – watching videos on interesting events on Youtube.

UNIT II READING AND WRITING SKILLS 12
Reading different genres of tests ranging from newspapers to philosophical treatises – reading strategies such as graphic organizers, summarizing and interpretation.

UNIT III ENGLISH FOR NATIONAL AND INTERNATIONAL EXAMINATIONS AND PLACEMENTS 12
International English Language Testing System (IELTS) – Test of English as a Foreign Language (TOEFL) – Graduate Record Examination (GRE) – Civil Service (Language related) – Verbal ability.

UNIT IV SOFT SKILLS (1) 12
UNIT V    SOFT SKILLS (2)

Multiple intelligences – emotional intelligence – spiritual quotient (ethics) – intercultural communication – creative and critical thinking – learning styles and strategies.

TOTAL: 60 PERIODS

TEACHING METHODS:
1. To be totally learner-centric with minimum teacher intervention as the course revolves around practice.
2. Suitable audio/video samples from Podcast/YouTube to be used for illustrative purposes.
3. Portfolio approach for writing to be followed. Learners are to be encouraged to blog, tweet, text and email employing appropriate language.
4. GD/Interview/Role Play/Debate could be conducted off the laboratory (in a regular classroom) but learners are to be exposed to telephonic interview and video conferencing.
5. Learners are to be assigned to read/write/listen/view materials outside the classroom as well for graining proficiency and better participation in the class.

LAB INFRASTRUCTURE:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description of Equipment (minimum configuration)</th>
<th>Qty Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Server</td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>• PIV System</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 1 GB RAM / 40 GB HDD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OS: Win 2000 server</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Audio card with headphones</td>
<td></td>
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<td></td>
<td>• JRE 1.3</td>
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</tr>
<tr>
<td>2</td>
<td>Client Systems</td>
<td>60 Nos.</td>
</tr>
<tr>
<td></td>
<td>• PIII System</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 256 or 512 MB RAM / 40 GB HDD</td>
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<td>• OS: Win 2000</td>
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<tr>
<td>3</td>
<td>Handicam</td>
<td>1 No.</td>
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<tr>
<td>4</td>
<td>Television 46”</td>
<td>1 No.</td>
</tr>
<tr>
<td>5</td>
<td>Collar mike</td>
<td>1 No.</td>
</tr>
<tr>
<td>6</td>
<td>Cordless mike</td>
<td>1 No.</td>
</tr>
<tr>
<td>7</td>
<td>Audio Mixer</td>
<td>1 No.</td>
</tr>
<tr>
<td>8</td>
<td>DVD recorder/player</td>
<td>1 No.</td>
</tr>
<tr>
<td>9</td>
<td>LCD Projector with MP3/CD/DVD provision for Audio/video facility</td>
<td>1 No.</td>
</tr>
</tbody>
</table>

EVALUATION:
INTERNAL: 20 MARKS
Record maintenance: Students should write a report on a regular basis on the activities conducted, focusing on the details such as the description of the activity, ideas emerged, learning outcomes and so on. At the end of the semester records can be evaluated out of 20 marks.

EXTERNAL: 80 MARKS
Online Test - 35 marks
Interview - 15 marks
Presentation - 15 marks
Group Discussion - 15 marks
NOTE ON INTERNAL AND EXTERNAL EVALUATION:
1. Interview – mock interview can be conducted on one-on-one basis.
2. Speaking – example for role play:
   a. Marketing engineer convincing a customer to buy his product.
   b. Telephonic conversation- fixing an official appointment / placing an order / enquiring and so on.
3. Presentation – should be extempore on simple topics.
4. Discussion – topics of different kinds; general topics, case studies and abstract concept.

OUTCOMES:
At the end of the course, learners should be able to
- Take international examination such as IELTS and TOEFL
- Make presentations and Participate in Group Discussions.
- Successfully answer questions in interviews.

REFERENCES:
2. Graded Examinations in Spoken English and Spoken English for Work downloadable materials from Trinity College, London.
3. Interactive Multimedia Programs on Managing Time and Stress.

WEB SOURCES:
http://www.slideshare.net/rohitjsh/presentation-on-group-discussion
http://www.washington.edu/doit/TeamN/present_tips.html
http://www.oxforddictionaries.com/words/writing-job-applications
http://www.kent.ac.uk/careers/cv/coveringletters.htm
http://www.mindtools.com/pages/article/newCDV_34.htm

CS6701 CRYPTOGRAPHY AND NETWORK SECURITY  L T P C 3 0 0 3

OBJECTIVES:
The student should be made to:
- Understand OSI security architecture and classical encryption techniques.
- Acquire fundamental knowledge on the concepts of finite fields and number theory.
- Understand various block cipher and stream cipher models.
- Describe the principles of public key cryptosystems, hash functions and digital signature.

UNIT I INTRODUCTION & NUMBER THEORY
Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography),FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid’s algorithm-Finite fields- Polynomial Arithmetic –Prime numbers-Fermat’s and Euler’s theorem-Testing for primality -The Chinese remainder theorem- Discrete logarithms.
UNIT II  BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY


UNIT III  HASH FUNCTIONS AND DIGITAL SIGNATURES


UNIT IV  SECURITY PRACTICE & SYSTEM SECURITY


UNIT V  E-MAIL, IP & WEB SECURITY


TOTAL: 45 PERIODS

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

- Compare various Cryptographic Techniques
- Design Secure applications
- Inject secure coding in the developed applications

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
The student should be made to:
- Be familiar with the most fundamental Graph Theory topics and results.
- Be exposed to the techniques of proofs and analysis.

UNIT I  INTRODUCTION  9

UNIT II  TREES, CONNECTIVITY & PLANARITY  9

UNIT III  MATRICES, COLOURING AND DIRECTED GRAPH  8

UNIT IV  PERMUTATIONS & COMBINATIONS  9
Fundamental principles of counting - Permutations and combinations - Binomial theorem - combinations with repetition - Combinatorial numbers - Principle of inclusion and exclusion - Derangements - Arrangements with forbidden positions.

UNIT V  GENERATING FUNCTIONS  10
Generating functions - Partitions of integers - Exponential generating function – Summation operator - Recurrence relations - First order and second order – Non-homogeneous recurrence relations - Method of generating functions.

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to:
- Write precise and accurate mathematical definitions of objects in graph theory.
- Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.
- Validate and critically assess a mathematical proof.
- Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.
- Reason from definitions to construct mathematical proofs.

TEXT BOOKS:
REFERENCES:

CS6703 GRID AND CLOUD COMPUTING

OBJECTIVES:
The student should be made to:
- Understand how Grid computing helps in solving large scale scientific problems.
- Gain knowledge on the concept of virtualization that is fundamental to cloud computing.
- Learn how to program the grid and the cloud.
- Understand the security issues in the grid and the cloud environment.

UNIT I INTRODUCTION

UNIT II GRID SERVICES

UNIT III VIRTUALIZATION
Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

UNIT IV PROGRAMMING MODEL

UNIT V SECURITY
Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course, the student should be able to:
- Apply grid computing techniques to solve large scale scientific problems.
- Apply the concept of virtualization.
- Use the grid and cloud tool kits.
- Apply the security models in the grid and the cloud environment.

TEXT BOOK:

REFERENCES:
1. Jason Venner, “Pro Hadoop- Build Scalable, Distributed Applications in the Cloud”, A Press, 2009

CS6704 RESOURCE MANAGEMENT TECHNIQUES

OBJECTIVES:
The student should be made to:
- Be familiar with resource management techniques.
- Learn to solve problems in linear programming and Integer programming.
- Be exposed to CPM and PERT.

UNIT I LINEAR PROGRAMMING

UNIT II DUALITY AND NETWORKS

UNIT III INTEGER PROGRAMMING
Cutting plan algorithm – Branch and bound methods, Multistage (Dynamic) programming.

UNIT IV CLASSICAL OPTIMISATION THEORY:
UNIT V  OBJECT SCHEDULING:
Network diagram representation – Critical path method – Time charts and resource leveling – PERT.

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to:
• Solve optimization problems using simplex method.
• Apply integer programming and linear programming to solve real-life applications.
• Use PERT and CPM for problems in project management

TEXT BOOK:

REFERENCES:

CS6711  SECURITY LABORATORY
L T P C 0 0 3 2

OBJECTIVES:
The student should be made to:
• Be exposed to the different cipher techniques
• Learn to implement the algorithms DES, RSA, MD5, SHA-1
• Learn to use network security tools like GnuPG, KF sensor, Net Strumbler

LIST OF EXPERIMENTS:
1. Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:
   a) Caesar Cipher
   b) Playfair Cipher
   c) Hill Cipher
   d) Vigenere Cipher
   e) Rail fence – row & Column Transformation
2. Implement the following algorithms
   a) DES
   b) RSA Algorithm
   c) Diffiee-Hellman
   d) MD5
   e) SHA-1
5. Implement the SIGNATURE SCHEME - Digital Signature Standard
6. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
7. Setup a honey pot and monitor the honeypot on network (KF Sensor)
8. Installation of rootkits and study about the variety of options
9. Perform wireless audit on an access point or a router and decrypt WEP and WPA.( Net Stumbler)
10. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course, the student should be able to
- Implement the cipher techniques
- Develop the various security algorithms
- Use different open source tools for network security and analysis

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
SOFTWARE:
- C / C++ / Java or equivalent compiler
- GnuPG, KF Sensor or Equivalent, Snort, Net Stumbler or Equivalent

HARDWARE:
- Standalone desktops - 30 Nos.
- (or) Server supporting 30 terminals or more.

CS6712 GRID AND CLOUD COMPUTING LABORATORY

OBJECTIVES:
The student should be made to:
- Be exposed to tool kits for grid and cloud environment.
- Be familiar with developing web services/Applications in grid framework
- Learn to run virtual machines of different configuration.
- Learn to use Hadoop

LIST OF EXPERIMENTS:
GRID COMPUTING LAB
Use Globus Toolkit or equivalent and do the following:
1. Develop a new Web Service for Calculator.
2. Develop new OGSA-compliant Web Service.
4. Develop applications using Java or C/C++ Grid APIs
5. Develop secured applications using basic security mechanisms available in Globus Toolkit.
6. Develop a Grid portal, where user can submit a job and get the result. Implement it with and without GRAM concept.

CLOUD COMPUTING LAB
Use Eucalyptus or Open Nebula or equivalent to set up the cloud and demonstrate.
1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
2. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
3. Install a C compiler in the virtual machine and execute a sample program.
4. Show the virtual machine migration based on the certain condition from one node to the other.
5. Find procedure to install storage controller and interact with it.
6. Find procedure to set up the one node Hadoop cluster.
7. Mount the one node Hadoop cluster using FUSE.
8. Write a program to use the API's of Hadoop to interact with it.
9. Write a wordcount program to demonstrate the use of Map and Reduce tasks

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to
- Use the grid and cloud tool kits.
- Design and implement applications on the Grid.
- Design and Implement applications on the Cloud.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:
Globus Toolkit or equivalent
Eucalyptus or Open Nebula or equivalent

HARDWARE
Standalone desktops 30 Nos

CS6801 MULTI-CORE ARCHITECTURES AND PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:
- Understand the challenges in parallel and multi-threaded programming.
- Learn about the various parallel programming paradigms, and solutions.

UNIT I MULTI-CORE PROCESSORS

UNIT II PARALLEL PROGRAM CHALLENGES
Performance – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – deadlocks and livelocks – communication between threads (condition variables, signals, message queues and pipes).

UNIT III SHARED MEMORY PROGRAMMING WITH OpenMP

UNIT IV DISTRIBUTED MEMORY PROGRAMMING WITH MPI
MPI program execution – MPI constructs – libraries – MPI send and receive – Point-to-point and Collective communication – MPI derived datatypes – Performance evaluation
UNIT V  PARALLEL PROGRAM DEVELOPMENT

Case studies - n-Body solvers – Tree Search – OpenMP and MPI implementations and comparison.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:

- Program Parallel Processors.
- Develop programs using OpenMP and MPI.
- Compare and contrast programming for serial processors and programming for parallel processors.

TEXT BOOKS:

REFERENCES:

CS6811  PROJECT WORK

OBJECTIVES:
- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 180 PERIODS

OUTCOMES:
- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.
OBJECTIVES:
The student should be made to:
- Understand the foundations of CLR execution.
- Learn the technologies of the .NET framework.
- Know the object oriented aspects of C#.
- Be aware of application development in .NET.
- Learn web based applications on .NET (ASP.NET).

UNIT I  INTRODUCTION TO C#  9
Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing.

UNIT II  OBJECT ORIENTED ASPECTS OF C#  9
Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.

UNIT III  APPLICATION DEVELOPMENT ON .NET  9
Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, handling exceptions, validating controls, windows application configuration.

UNIT IV  WEB BASED APPLICATION DEVELOPMENT ON .NET  9
Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web.config, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.

UNIT V  CLR AND .NET FRAMEWORK  9
Assemblies, Versioning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshalling, remote, security in .NET

OUTCOMES:
After completing this course, the student will be able to:
- List the major elements of the .NET frame work
- Explain how C# fits into the .NET platform.
- Analyze the basic structure of a C# application
- Debug, compile, and run a simple application.
- Develop programs using C# on .NET
- Design and develop Web based applications on .NET
- Discuss CLR.

TEXT BOOKS:
REFERENCES:

GE6757 TOTAL QUALITY MANAGEMENT

OBJECTIVES:
- To facilitate the understanding of Quality Management principles and process.

UNIT I INTRODUCTION

UNIT II TQM PRINCIPLES
Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I
The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II

UNIT V QUALITY SYSTEMS

TOTAL: 45 PERIODS

OUTCOMES:
- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXTBOOK:

REFERENCES:
OBJECTIVES:
The student should be made to:
- Be familiar with the concepts of data warehouse and data mining,
- Be acquainted with the tools and techniques used for Knowledge Discovery in Databases.

UNIT I DATA WAREHOUSING
Data warehousing Components – Building a Data warehouse – Mapping the Data Warehouse to a
Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and
Transformation Tools – Metadata.

UNIT II BUSINESS ANALYSIS
Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos
Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP
Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and
the Internet.

UNIT III DATA MINING
Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns –
Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining
System with a Data Warehouse – Issues – Data Preprocessing.

UNIT IV ASSOCIATION RULE MINING AND CLASSIFICATION
Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of
Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and
Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based
Classification – Classification by Back propagation – Support Vector Machines – Associative
Classification – Lazy Learners – Other Classification Methods – Prediction.

UNIT V CLUSTERING AND TRENDS IN DATA MINING
Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – K-means–
Partitioning Methods – Hierarchical Methods - Density-Based Methods – Grid Based Methods –
Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster
Analysis – Outlier Analysis – Data Mining Applications.

TOTAL: 45 PERIODS

OUTCOMES:
After completing this course, the student will be able to:
- Apply data mining techniques and methods to large data sets.
- Use data mining tools
- Compare and contrast the various classifiers.

TEXT BOOKS:
1. Alex Berson and Stephen J.Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw
2. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition,
REFERENCES:

CS6002 NETWORK ANALYSIS AND MANAGEMENT

L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:
• Learn network devices functions and configurations hub, switch, tap and routers.
• Be familiar with network Security Devices.
• Be exposed to network services.
• Understand and analyze application performance.
• Learn to analyze network traffic and protocols.
• Be aware of network-troubleshooting concepts.
• Understand network security concepts.

UNIT I  A SYSTEM APPROACH TO NETWORK DESIGN AND REQUIREMENT ANALYSIS


UNIT II  FLOW ANALYSIS: CONCEPTS, GUIDELINES AND PRACTICE


UNIT III  LOGICAL DESIGN: CHOICES, INTERCONNECTION MECHANISMS, NETWORK MANAGEMENT AND SECURITY

UNIT IV NETWORK DESIGN: PHYSICAL, ADDRESSING AND ROUTING

Introduction- Evaluating cable plant design options – Network equipment placement- diagramming the physical design- diagramming the worksheet –case study. Introduction to Addressing and routing- establishing routing flow in the design environments- manipulating routing flows- developing addressing strategies- developing a routing strategy- case study.

UNIT V NETWORK MANAGEMENT AND SNMP PROTOCOL MODEL

Network and System management, Network management system platform; Current SNMP Broadband and TMN management, Network management standards. SNMPV1, SNMPV2 system architecture, SNMPV2, structure of management information. SNMPV2 – MIB – SNMPV2 protocol, SNMPV3-Architecture, Application, MIB, security user based security model, access control RMON.

OUTCOMES:
At the end of this course the students should be able to:

- Explain the key concepts and algorithms in complex network analysis.
- Apply a range of techniques for characterizing network structure.
- Discuss methodologies for analyzing networks of different fields.
- Demonstrate knowledge of recent research in the area and exhibit technical writing and presentation skills.

TEXT BOOKS:

REFERENCES:

IT6004 SOFTWARE TESTING

OBJECTIVES:
The student should be made to:

- Expose the criteria for test cases.
- Learn the design of test cases.
- Be familiar with test management and test automation techniques.
- Be exposed to test metrics and measurements.
UNIT I  INTRODUCTION  9

UNIT II  TEST CASE DESIGN  9

UNIT III  LEVELS OF TESTING  9

UNIT IV  TEST MANAGEMENT  9

UNIT V  TEST AUTOMATION  9

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the students will be able to
- Design test cases suitable for a software development for different domains.
- Identify suitable tests to be carried out.
- Prepare test planning based on the document.
- Document test plans and test cases designed.
- Use of automatic testing tools.
- Develop and validate a test plan.

TEXT BOOKS:
REFERENCES:

GE6084 HUMAN RIGHTS L T P C 3 0 0 3

OBJECTIVES:
• 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

OUTCOMES:
• Engineering students will acquire the basic knowledge of human rights.

REFERENCES:
OBJECTIVES:
The student should be made to:
- Understand the design issues in ad hoc and sensor networks.
- Learn the different types of MAC protocols.
- Be familiar with different types of adhoc routing protocols.
- Be expose to the TCP issues in adhoc networks.
- Learn the architecture and protocols of wireless sensor networks.

UNIT I INTRODUCTION

UNIT II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS
Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS
Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS
Single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT V WSN ROUTING, LOCALIZATION & QOS

OUTCOMES:
Upon completion of the course, the student should be able to:
- Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks
- Analyze the protocol design issues of ad hoc and sensor networks
- Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
- Evaluate the QoS related performance measurements of ad hoc and sensor networks

TEXT BOOK:
REFERENCES:

CS6004 CYBER FORENSICS L T P C 3 0 0 3

OBJECTIVES:
The student should be made to:
- Learn the security issues network layer and transport layer
- Be exposed to security issues of the application layer
- Learn computer forensics
- Be familiar with forensics tools
- Learn to analyze and validate forensics data

UNIT I NETWORK LAYER SECURITY & TRANSPORT LAYER SECURITY

UNIT II E-MAIL SECURITY & FIREWALLS
PGP - S/MIME - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions.

UNIT III INTRODUCTION TO COMPUTER FORENSICS

UNIT IV EVIDENCE COLLECTION AND FORENSICS TOOLS

UNIT V ANALYSIS AND VALIDATION
Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the student should be able to:
- Discuss the security issues network layer and transport layer
- Apply security principles in the application layer
- Explain computer forensics
- Use forensics tools
- Analyze and validate forensics data
TEXT BOOKS:

REFERENCES:

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<td>ADVANCED DATABASE SYSTEMS</td>
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OBJECTIVES:
The student should be made to:
- Learn different types of databases.
- Be exposed to query languages.
- Be familiar with the indexing techniques.

UNIT I    PARALLEL AND DISTRIBUTED DATABASES

UNIT II    ACTIVE DATABASES

UNIT III   TEMPORAL AND OBJECT DATABASES

UNIT IV    COMPLEX QUERIES AND REASONING

UNIT V     SPATIAL, TEXT AND MULTIMEDIA DATABASES

TOTAL: 45 PERIODS
OUTCOMES:  
Upon completion of the course, the student should be able to:  
- Design different types of databases.  
- Use query languages.  
- Apply indexing techniques.  

TEXT BOOK:  

REFERENCES:  

BM6005 BIO INFORMATICS L T P C 3 0 0 3  

OBJECTIVES:  
The student should be made to:  
- Exposed to the need for Bioinformatics technologies  
- Be familiar with the modeling techniques  
- Learn microarray analysis  
- Exposed to Pattern Matching and Visualization  

UNIT I INTRODUCTION 9  
Need for Bioinformatics technologies – Overview of Bioinformatics technologies Structural bioinformatics – Data format and processing – Secondary resources and applications – Role of Structural bioinformatics - Biological Data Integration System.

UNIT II DATAWAREHOUSING AND DATAMINING IN BIOINFORMATICS 9  
Bioinformatics data – Data warehousing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics.

UNIT III MODELING FOR BIOINFORMATICS 9  

UNIT IV PATTERN MATCHING AND VISUALIZATION 9  
UNIT V MICROARRAY ANALYSIS

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to
• Develop models for biological data.
• Apply pattern matching techniques to bioinformatics data – protein data genomic data.
• Apply micro array technology for genomic expression study.

TEXT BOOK:

REFERENCES:

IT6801 SERVICE ORIENTED ARCHITECTURE

OBJECTIVES:
The student should be made to:
• Learn XML fundamentals.
• Be exposed to build applications based on XML.
• Understand the key principles behind SOA.
• Be familiar with the web services technology elements for realizing SOA.
• Learn the various web service standards.

UNIT I INTRODUCTION TO XML

UNIT II BUILDING XML- BASED APPLICATIONS

UNIT III SERVICE ORIENTED ARCHITECTURE
Characteristics of SOA, Comparing SOA with Client-Server and Distributed architectures – Benefits of SOA -- Principles of Service orientation – Service layers.

UNIT IV WEB SERVICES
UNIT V  BUILDING SOA-BASED APPLICATIONS


TOTAL : 45 PERIODS

OUTCOMES:

Upon successful completion of this course, students will be able to:

- Build applications based on XML.
- Develop web services using technology elements.
- Build SOA-based applications for intra-enterprise and inter-enterprise applications.

TEXTBOOKS:


REFERENCES:


IT6005  DIGITAL IMAGE PROCESSING  L T P C

OBJECTIVES:

The student should be made to:

- Learn digital image fundamentals.
- Be exposed to simple image processing techniques.
- Be familiar with image compression and segmentation techniques.
- Learn to represent image in form of features.

UNIT I  DIGITAL IMAGE FUNDAMENTALS


UNIT II  IMAGE ENHANCEMENT


UNIT III  IMAGE RESTORATION AND SEGMENTATION

UNIT IV WAVELETS AND IMAGE COMPRESSION 9
Wavelets – Subband coding - Multiresolution expansions - Compression: Fundamentals – Image
Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding –
Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression
Standards.

UNIT V IMAGE REPRESENTATION AND RECOGNITION 9
Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments –
Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors –
Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

OUTCOMES:
Upon successful completion of this course, students will be able to:
• Discuss digital image fundamentals.
• Apply image enhancement and restoration techniques.
• Use image compression and segmentation Techniques.
• Represent features of images.

TEXT BOOK:

REFERENCES:

EC6703 EMBEDDED AND REAL TIME SYSTEMS L T P C 3 0 0 3

OBJECTIVES:
The student should be made to:
• Learn the architecture and programming of ARM processor.
• Be familiar with the embedded computing platform design and analysis.
• Be exposed to the basic concepts of real time Operating system.
• Learn the system design techniques and networks for embedded systems

UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS 9
Complex systems and micro processors– Embedded system design process –Design example: Model
train controller- Instruction sets preliminaries - ARM Processor – CPU: programming input and output-
supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU
performance- CPU power consumption.
UNIT II EMBEDDED COMPUTING PLATFORM DESIGN 9
The CPU Bus-Memory devices and systems—Designing with computing platforms—consumer electronics architecture—platform-level performance analysis—Components for embedded programs—Models of programs—Assembly, linking and loading—compilation techniques—Program level performance analysis—Software performance optimization—Program level energy and power analysis and optimization—Analysis and optimization of program size—Program validation and testing.

UNIT III PROCESSES AND OPERATING SYSTEMS 9
Introduction—Multiple tasks and multiple processes—Multirate systems—Preemptive real-time operating systems—Priority based scheduling—Interprocess communication mechanisms—Evaluating operating system performance—power optimization strategies for processes—Example Real time operating systems-POSIX-Windows CE.

UNIT V SYSTEM DESIGN TECHNIQUES AND NETWORKS 9

UNIT V CASE STUDY 9
Data compressor—Alarm Clock—Audio player—Software modem—Digital still camera—Telephone answering machine—Engine control unit—Video accelerator.

TOTAL: 45 PERIODS

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

- Describe the architecture and programming of ARM processor.
- Outline the concepts of embedded systems
- Explain the basic concepts of real time Operating system design.
- Use the system design techniques to develop software for embedded systems
- Differentiate between the general purpose operating system and the real time operating system
- Model real-time applications using embedded-system concepts

TEXT BOOK:

REFERENCES:
OBJECTIVES:
The student should be made to:
- Understand the concepts of Game design and development.
- Learn the processes, mechanics and issues in Game Design.
- Be exposed to the Core architectures of Game Programming.
- Know about Game programming platforms, frame works and engines.
- Learn to develop games.

UNIT I  3D GRAPHICS FOR GAME PROGRAMMING  9
3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation, Physics-based Simulation, Scene Graphs.

UNIT II  GAME ENGINE DESIGN  9
Game engine architecture, Engine support systems, Resources and File systems, Game loop and real-time simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling.

UNIT III  GAME PROGRAMMING  9
Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management.

UNIT IV  GAMING PLATFORMS AND FRAMEWORKS  9
2D and 3D Game development using Flash, DirectX, Java, Python, Game engines - DX Studio, Unity.

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

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, students will be able to
- Discuss the concepts of Game design and development.
- Design the processes, and use mechanics for game development.
- Explain the Core architectures of Game Programming.
- Use Game programming platforms, frame works and engines.
- Create interactive Games.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
The Student should be made to:
- Learn the information retrieval models.
- Be familiar with Web Search Engine.
- Be exposed to Link Analysis.
- Understand Hadoop and Map Reduce.
- Learn document text mining techniques.

UNIT I  INTRODUCTION  9
Introduction -History of IR - Components of IR - Issues -Open source Search engine Frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web.

UNIT II  INFORMATION RETRIEVAL  9

UNIT III  WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING  9

UNIT IV  WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH  9

UNIT V  DOCUMENT TEXT MINING  9
Information filtering; organization and relevance feedback – Text Mining -Text classification and clustering - Categorization algorithms: naive Bayes; decision trees; and nearest neighbor - Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).

OUTCOMES:
Upon completion of the course, students will be able to
- Apply information retrieval models.
- Design Web Search Engine.
- Use Link Analysis.
- Use Hadoop and Map Reduce.
- Apply document text mining techniques.

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:

IT6006 DATA ANALYTICS

OBJECTIVES:
The Student should be made to:
- Be exposed to big data
- Learn the different ways of Data Analysis
- Be familiar with data streams
- Learn the mining and clustering
- Be familiar with the visualization

UNIT I INTRODUCTION TO BIG DATA

UNIT II DATA ANALYSIS

UNIT III MINING DATA STREAMS
UNIT IV    FREQUENT ITEMSETS AND CLUSTERING  9

UNIT V  FRAMEWORKS AND VISUALIZATION  8
MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications:

OUTCOMES:
The student should be made to:
- Apply the statistical analysis methods.
- Compare and contrast various soft computing frameworks.
- Design distributed file systems.
- Apply Stream data model.
- Use Visualisation techniques

TEXT BOOKS:

REFERENCES:

CS6008  HUMAN COMPUTER INTERACTION  L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:
- Learn the foundations of Human Computer Interaction.
- Be familiar with the design technologies for individuals and persons with disabilities.
- Be aware of mobile HCI.
- Learn the guidelines for user interface.

UNIT I  FOUNDATIONS OF HCI  9
UNIT II DESIGN & SOFTWARE PROCESS

UNIT III MODELS AND THEORIES
Cognitive models – Socio-Organizational issues and stake holder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT IV MOBILE HCI

UNIT V WEB INTERFACE DESIGN

L: 45, T: 0, TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the student should be able to:
- Design effective dialog for HCI.
- Design effective HCI for individuals and persons with disabilities.
- Assess the importance of user feedback.
- Explain the HCI implications for designing multimedia/ e-commerce/ e-learning Web sites.
- Develop meaningful user interface.

TEXT BOOKS:

CS6009 NANO COMPUTING

OBJECTIVES:
The student should be made to:
- Learn nano computing challenges.
- Be familiar with the imperfections.
- Be exposed to reliability evaluation strategies.
- Learn nano scale quantum computing.
- Understand Molecular Computing and Optimal Computing.

UNIT I NANO COMPUTING-PROSPECTS AND CHALLENGES
UNIT II  NANOCOMPUTING WITH IMPERFECTIONS  9

UNIT III  RELIABILITY OF NANOCOMPUTING  9

UNIT IV  NANOSCALE QUANTUM COMPUTING  9

UNIT V  QCADESIGNER SOFTWARE AND QCA IMPLEMENTATION  9

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the student should be able to:
- Discuss nano computing challenges.
- Handle the imperfections.
- Apply reliability evaluation strategies.
- Use nano scale quantum computing.
- Utilize Molecular Computing and Optimal Computing.

TEXT BOOK:

REFERENCES:

IT6011  KNOWLEDGE MANAGEMENT  L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:
- Learn the Evolution of Knowledge management.
- Be familiar with tools.
- Be exposed to Applications.
- Be familiar with some case studies.
UNIT I INTRODUCTION
An Introduction to Knowledge Management - The foundations of knowledge management- including cultural issues- technology applications organizational concepts and processes- management aspects- and decision support systems. The Evolution of Knowledge management: From Information Management to Knowledge Management - Key Challenges Facing the Evolution of Knowledge Management - Ethics for Knowledge Management.

UNIT II CREATING THE CULTURE OF LEARNING AND KNOWLEDGE SHARING

UNIT III KNOWLEDGE MANAGEMENT-THE TOOLS
Telecommunications and Networks in Knowledge Management - Internet Search Engines and Knowledge Management - Information Technology in Support of Knowledge Management - Knowledge Management and Vocabulary Control - Information Mapping in Information Retrieval - Information Coding in the Internet Environment - Repackaging Information.

UNIT IV KNOWLEDGEMANAGEMENT-APPLICATION
Components of a Knowledge Strategy - Case Studies (From Library to Knowledge Center, Knowledge Management in the Health Sciences, Knowledge Management in Developing Countries).

UNIT V FUTURE TRENDS AND CASE STUDIES
Advanced topics and case studies in knowledge management - Development of a knowledge management map/plan that is integrated with an organization's strategic and business plan - A case study on Corporate Memories for supporting various aspects in the process life -cycles of an organization.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the student should be able to:
- Use the knowledge management tools.
- Develop knowledge management Applications.
- Design and develop enterprise applications.

TEXT BOOK:

REFERENCE:

CS6010 SOCIAL NETWORK ANALYSIS

OBJECTIVES:
The student should be made to:
- Understand the concept of semantic web and related applications.
- Learn knowledge representation using ontology.
- Understand human behaviour in social web and related communities.
- Learn visualization of social networks.
UNIT I  INTRODUCTION 9

UNIT II  MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION 9

UNIT III  EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS 9

UNIT IV  PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES 9

UNIT V  VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS 9

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the student should be able to:
- Develop semantic web related applications.
- Represent knowledge using ontology.
- Predict human behaviour in social web and related communities.
- Visualize social networks.

TEXT BOOKS:

REFERENCES:

CS6013 FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT

OBJECTIVE:
This program can be offered with all Undergraduate programs/courses for all engineering streams. The FSIPD program aims to improve student's awareness and understanding of the basic concepts involved in Integrated product Development (IPD) by providing exposure to the key product development concepts. Students, who complete this program, will stand a better chance to be considered for jobs in the Engineering industry.

COURSE OBJECTIVES:
After completing this program, the student will be able to obtain the technical skills needed to effectively play the entry level design engineer role in an engineering organization.

The student will be able to:
- Understand the global trends and development methodologies of various types of products and services
- 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
- Understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them into design specification
- Understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- Gain knowledge of the Innovation & Product Development process in the Business Context

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT

UNIT II REQUIREMENTS AND SYSTEM DESIGN
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

TOTAL: 45 PERIODS

COURSE OUTCOMES:
The students will be able to
- Define, formulate and analyze a problem
- Solve specific problems independently or as part of a team
- 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
- Work independently as well as in teams
- Manage a project from start to finish

COURSE MATERIAL AND PEDAGOGY:
- NASSCOM has agreed to prepare / revise the course materials [selected teachers Anna University from major disciplines will be included in the process] as PPT slides for all the UNITS. The PPTs can be printed and given to each student if necessary at a Nominal Fee. This is the best possible material for this special course.
- NASSCOM will train the teachers of Anna University to enable them to teach this course. A training programme for nearly 3500 teachers needs to be organized. The team is exploring use of technology including the EDUSAT facility at Anna University.
- The course is to be offered as an elective to all UG Students both in the Constituent Colleges and Affiliated colleges of Anna University.

TEXT BOOKS [INDIAN ECONOMY EDITIONS]:
REFERENCES:

MG6088 SOFTWARE PROJECT MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:
- To outline the need for Software Project Management
- To highlight different techniques for software cost estimation and activity planning.

UNIT I PROJECT EVALUATION AND PROJECT PLANNING

UNIT II PROJECT LIFE CYCLE AND EFFORT ESTIMATION

UNIT III ACTIVITY PLANNING AND RISK MANAGEMENT

UNIT IV PROJECT MANAGEMENT AND CONTROL

UNIT V STAFFING IN SOFTWARE PROJECTS

OUTCOMES:
- At the end of the course the students will be able to practice Project Management principles while developing a software.

TEXTBOOK:
REFERENCES:

GE6075 PROFESSIONAL ETHICS IN ENGINEERING

OBJECTIVES:
- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES

UNIT II ENGINEERING ETHICS

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society

TEXTBOOKS:
REFERENCES:

Web sources:
1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

CS6011  NATURAL LANGUAGE PROCESSING

OBJECTIVES:
The student should be made to:
- Learn the techniques in natural language processing.
- Be familiar with the natural language generation.
- Be exposed to machine translation.
- Understand the information retrieval techniques.

UNIT I  OVERVIEW AND LANGUAGE MODELING

UNIT II  WORD LEVEL AND SYNTACTIC ANALYSIS
Syntactic Analysis: Context-free Grammar-Constituency- Parsing-Probabilistic Parsing.

UNIT III  SEMANTIC ANALYSIS AND DISCOURSE PROCESSING

UNIT IV  NATURAL LANGUAGE GENERATION AND MACHINE TRANSLATION
UNIT V IN INFORMATION RETRIEVAL AND LEXICAL RESOURCES


TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the student should be able to:
- Analyze the natural language text.
- Generate the natural language.
- Do machine translation.
- Apply information retrieval techniques.

TEXT BOOK:

REFERENCES:

CS6012 SOFT COMPUTING

OBJECTIVES:
The student should be made to:
- Learn the various soft computing frame works.
- Be familiar with design of various neural networks.
- Be exposed to fuzzy logic.
- Learn genetic programming.
- Be exposed to hybrid systems.

UNIT I INTRODUCTION

UNIT II NEURAL NETWORKS
UNIT III  FUZZY LOGIC  9
Membership functions: features, fuzzification, methods of membership value assignments-
Defuzzification: lambda cuts - methods - fuzzy arithmetic and fuzzy measures: fuzzy arithmetic -
extension principle - fuzzy measures - measures of fuzziness -fuzzy integrals - fuzzy rule base and
approximate reasoning : truth values and tables, fuzzy propositions, formation of rules-decomposition
of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems-overview of fuzzy expert
system-fuzzy decision making.

UNIT IV  GENETIC ALGORITHM  9
Genetic algorithm and search space - general genetic algorithm – operators - Generational cycle -
stopping condition – constraints - classification - genetic programming – multilevel optimization – real
life problem- advances in GA.

UNIT V  HYBRID SOFT COMPUTING TECHNIQUES & APPLICATIONS  9
Neuro-fuzzy hybrid systems - genetic neuro hybrid systems - genetic fuzzy hybrid and fuzzy genetic
hybrid systems - simplified fuzzy ARTMAP - Applications: A fusion approach of multispectral images
with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft
computing based hybrid fuzzy controllers.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the student should be able to:
- Apply various soft computing frame works.
- Design of various neural networks.
- Use fuzzy logic.
- Apply genetic programming.
- Discuss hybrid soft computing.

TEXT BOOKS:
   Education 2004.

REFERENCES:
2. George J. Klir, Ute St. Clair, Bo Yuan, “Fuzzy Set Theory: Foundations and Applications”
   Education India, 2013.
4. James A. Freeman, David M. Skapura, “Neural Networks Algorithms, Applications, and
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
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)
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 stake-holders- 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
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
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
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:
The students will 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

TEXTBOOK:

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