## 23. SCHEME OF INSTRUCTION:

**B.TECH (Computer Science and Engineering) Course Structure – VR10**

**First Year – Semester I**

(Common to ECE, CSE & ME)

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*Final Examination with internal evaluation (25 marks: continuous+50 marks: final assessments)

**L:** Lecture  **T:** Tutorial  **P:** Practical  **C:** Credits  
**I:** Internal Assessment  **E:** End Semester  **T:** Total Marks
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L: Lecture  T: Tutorial  P: Practicles  C: Credits  
I: Internal Assessment  E: End Semester  T: Total Marks
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*Final Examination with internal evaluation (25 marks: continuous + 50 marks: final assessments)
L: Lecture, T: Tutorial, P: Practical, C: Credits, I: Internal Assessment, E: End Semester, T: Total Marks
* Personality Development Course is included in 3-1 and 3-2 with 1 credit and 2 tutorial hours
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**Total Credits:** 21 5 6 26 280 520 800

## IV/IV B.TECH(Computer Science and Engineering) – Semester VIII

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**Total Credits:** 14 7 3 26 165 360 525

L: Lecture, T: Tutorial, P: Practical, C: Credits, I: Internal Assessment E: End Semester, T: Total Marks
## 24. CATEGORIES OF COURSES AND THEIR DISTRIBUTION

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### Basic Engineering Sciences Courses (BES) >= 24

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* Students will have to earn a minimum of 4 credits during the entire tenure of the degree programme, out of which personality Development course is mandatory.
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25. DETAILED SYLLABUS:

**FY 1001**

**ENGINEERING MATHEMATICS – I**

<table>
<thead>
<tr>
<th>Lecture</th>
<th>4 hrs/ Week</th>
<th>Internal Assessment:</th>
<th>30</th>
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<tbody>
<tr>
<td>Tutorial</td>
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<td>Final Examination:</td>
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<tr>
<td>Practical</td>
<td>-</td>
<td>Credits:</td>
<td>4</td>
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**Objectives:**
The study of the course provides an understanding of ordinary and partial differential equations and give different methods for solving them. Linear algebra in the course cover material which is essential to any one who does mathematical computation in Engineering and sciences.

**Learning Outcomes:**
- Upon completing this course students should be able to solve system of Linear equations, be familiar with properties of matrices, find the inverse, eigen values and eigen vectors and use them in digitalization, reductive to quadratic form and identifying matrix of a quadratic form, understanding the concept of convergences and finding the sum of infinite series.
- Upon completing this course students should be able to solve first order separable and linear differential equations and use these methods to solve applied problems. Solve higher order constant linear coefficient and system of differential equations and use these methods to solve applied problems. Formation of Partial differential equations and solution to partial differential equations.

**UNIT – I**

**Matrices:**
- Rank of a matrix, Elementary transformations, Echelon-form of a matrix, normal form of a matrix, Inverse of a matrix by elementary transformations(Gauss – Jordan method).
- Solution of system of linear equations: Non homogeneous linear equations and homogeneous linear equations. Linear dependence and linear independence of vectors.

**UNIT – II**


**Sequences and Series:**

**UNIT – III**

UNIT – IV
Linear dependence of solutions, method of variation of parameters – equations reducible to linear equations – Cauchy’s homogeneous linear equation – Legendre’s linear equation simultaneous linear equations with constant coefficients.

Learning Resources:

Text Books:

Reference Books:
FY 1002C/ FY 2002C
ENGINEERING CHEMISTRY

Lecture : 4 hrs/ Week
Tutorial : 1 hr/ week
Practical: -

Internal Assessment: 30
Final Examination: 70
Credits: 3

Objectives: Basic engineering principles in engineering education are not totally independent and they go along with the principles of chemistry. It is a well-known fact that the application of principles of chemistry emerges into technology. Hence, a broad knowledge of chemistry is essential for the undergraduate students of engineering in any branch. The present syllabus is designed by keeping everything related to the role played by chemistry in the field of engineering.

Learning Outcomes: The objectives of this course will have the following outcomes:

• Water being an important engineering material, its role in the industries and in particular boilers is to be thoroughly understood. The various boiler troubles encountered and the remedial measures will help the students especially when they want to set up an industry of their own. A lot of work is being done on purification of brackish water and hence one is supposed to be informed of the technology of purification of sea water.

• Conducting polymers are replacing metals in the field of technology and hence it is essential to know the mechanism associated with conducting polymers.

• Electrochemistry and electrochemical energy systems provide an insight into the electrical world that includes power generators, battery systems and electrical sensors that control various systems.

• Corrosion, the global problem can well be understood so that the contribution of the undergraduate engineers in terms of protecting metals can always be enhanced in the field of Research and Development.

Any branch of engineering student requires analytical skills in handling various machines, instruments, apart from understanding the mechanism involved. Spectroscopy is such an analytical area that it imparts excellent knowledge of analytical work thereby it will provide broad path of understanding of any method that is taken up for study.

UNIT – I
Water Technology: Water treatment for drinking purpose - sedimentation, coagulation, and filtration, various methods of disinfection and concept of break-point chlorination.

Boiler Troubles: Scales, sludge’s, caustic embitterment and boiler corrosion – causes and prevention.

Desalination of Brackish Water: Principle and process of electro dialysis and reverse osmosis.


UNIT – II
Electrochemistry and Electrochemical Energy Systems
Reference Electrodes: Calomel electrode, silver-silver chloride electrode, quinhydrome
electrode and glass electrode, determination of pH using glass electrode, concept of concentration cells. Conductivity – Conductometric titrations and Potentiometric titrations.

**Electrochemical Energy Systems**: Types of electrochemical energy systems – Storage cells – Zinc-air battery, Ni-Cd battery, Lithium batteries – Li/MnO₂, Li/SOCl₂, Li/TiS₂ and LiₓC/LiCoO₂ – Advantages of lithium batteries – Electrochemical sensors – Principle, working and applications – Simple introduction to the terms – polarization, decomposition potential and over voltage.

**UNIT – III**


Forms of corrosion: pitting, crevice, stress corrosion cracking and microbiological corrosion. **Factors affecting Corrosion**: Relative anodic and cathodic areas, nature of corrosion product, concentration of D.O., pH and temperature.

**Protection Methods**: Cathodic protection (impressed current and sacrificial anode), anodic protection, corrosion inhibitors – types and mechanism of inhibition.


**UNIT – IV**

**Instrumental Techniques in Chemical Analysis**: Introduction of spectroscopy – interaction of electromagnetic radiation with matter.


**Learning Resources:**

**Text Books:**

**Reference Books:**
B.Tech. (CSE) Syllabus VR10

FY1002P/ FY 2002P
ENGINEERING PHYSICS

Lecture : 3 hrs/ Week  Internal Assessment: 30
Tutorial : 1 hr/ week  Final Examination: 70
Practical : -  Credits: 3

Objectives: The contents of Engineering Physics have been designed to cater the needs of B.Tech students at freshmen level. “Engineering Physics” deals with the physics of substances that are of practical utility. It helps the students to gain a deep understanding of the key elements and the emerging like LASERS, SUPER CONDUCTIVITY, OPTICAL FIBERS AND NANO TECHNOLOGY.

Learning Outcomes:

UNIT-I
The control of electricity is evident in many devices, from microwave ovens to computers.
In this technological age, it is important to understand the basics of electricity and how these basic ideas are used to sustain and enhance our current comfort safety and prosperity. In this unit student will learn the relationship of electrical currents to magnetism.

UNIT-II
In pre-graduation level students studied the basics of classical mechanics. In this unit the students will know the differences between classical and quantum mechanics. And also they will learn how this quantum mechanics is useful for the fields like medicine and industry.

UNIT-III
In this unit the students will learn how materials behave at low temperatures, causes for the behaviour and is advantages. In this unit students also learn about the advanced topics like LASERS, OPTICAL FIBERS and their applications in modern communication system.

UNIT-IV
In this unit students will learn about the “NANOTECHNOLOGY” which is an emerging field of Science and Emerging.
“NANOTECHNOLOGY” has a multi-disciplinary dimension exhibiting stronger interdependence in various fields. In this unit student also learn about the useful applications of nanotechnology in the various branches like medicine, biological, chemical, industrial,…etc.

UNIT – I
Electricity, Electromagnetism and Semiconductors: Gauss law in electricity (Statement and proof) and it’s applications: Coulomb’s law from Gauss law, spherically distributed charge, Hall effect.
Biot-Savart’s Law: B due to a current carrying wire and a circular loop, Faraday’s law of induction, Lenz’s law, Induced electric fields, Gauss’ law for magnetism, Maxwell equations (Qualitative treatment), Electromagnetic oscillations in LC circuit (quantitative), A.C. circuit containing series LCR circuit (Resonance condition).
Semiconductors: Carrier transport, Carrier drift, Carrier diffusion, generation and recombination process (qualitative), classification of materials based on energy diagram.
UNIT - II

**Modern Physics:** Dual nature of light, Matter waves and Debroglie’s hypothesis, Davisson & Germer experiment, Heisenberg’s uncertainty principle and its application (Non existence of electron in nucleus, Finite width of spectral lines), Classical and quantum aspects of particle. One dimensional time independent Schrodinger’s wave equation, physical significance of wave function, Particle in a box (One dimension).O.

**Optoelectronic Devices:** LED, LCD, Photo Emission, Photo diode, Photo transistor and Solar cell and its applications.

UNIT – III

**Superconductors and Advanced Physics:**

**Superconductivity:** Introduction, Critical parameters, Flux quantization, Meissner effect, Types of Superconductors, BCS theory, Cooper pairs, London’s equation-penetration depth, high temperature super conductors, Applications of superconductors.

**Advanced physics:** Lasers: Spontaneous emission, stimulated emission, population inversion, Solid state (Ruby) laser, Gas (He – Ne) laser, Semiconductor (Ga As) laser, Applications of lasers, applications of Infrared radiation.

**Fiber Optics:** Propagation of light through optical fiber, types of optical fibers, Numerical aperture, Fiber optics in communications and its advantages.

UNIT - IV

**Nanotechnology:** Introduction, Physical & Chemical properties. Fabrication: AFM, SEM, TEM, STM, MRFM. Production of nanoparticles: Plasma Arcing, Sol-gel, Chemical vapour deposition.

**Carbon Nanotubes:** SWNT, MWNT. Formation of carbon nanotubes: Arc discharge, Laser ablation; Properties of carbon nanotubes, Applications of CNT’s & Nanotechnology.

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**Learning Resources:**

**Text Books:**

**Reference Books:**
4. P.K. Palanisamy, *Engineering Physics*
FY 1003B/ 2003B
BASICS OF CIVIL AND MECHANICAL ENGINEERING

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<th>Lecture</th>
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<td>Final Examination:</td>
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<td>Practical</td>
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Objectives: Basic civil and Mechanical engineering is a foundation for Civil and Mechanical Engineering disciplines. This course is designed to enable the students to acquire fundamental knowledge in these two disciplines.

Learning Outcomes:
- Will have an idea about knowledge of stress, strain, various building materials used in construction industry, sub-structure elements, superstructure elements, surveying, dams, road transportation, bridges and its components.
- After completion of this course, the student acquires the knowledge about basic manufacturing processes, belt and gear drives for power transmission. They can have clear idea about the working of power plants, refrigeration, air conditioning and IC engines. They also acquire basic knowledge on roads and bridges along with principles of surveying and structures.

Part – A Civil Engineering

UNIT – I
Simple Stress and Strains: Definition of Mechanics- External and Internal forces-Stress and Strain-Elasticity and Hook’s Law- Relations between elastic constants.
Civil Engineering Materials: Bricks, Stones, Cement, Steel and Cement Concrete.

UNIT – II
Civil Engineering Structures: Roads- Classification, Cross section of roads. Bridges- Necessity, Components, Classification. Dams- Purpose, Classification.

Part – B Mechanical Engineering

UNIT – III
Basic Manufacturing Methods : Principles of casting, green sand moulds, Advantages and applications of casting; Principles of gas welding and arc welding, Soldering and Brazing; Hot working – hot rolling, Cold working – cold rolling; Description of basic machine tool- Lathe – operations – turning, threading, taper turning and drilling;
Power Transmission : Introduction to belt and gears drives, types of gears, Difference between open belts and cross belts, power transmission by belt drives; (theoretical treatment only).

UNIT – IV
Power Plants : Introduction, working principle of nuclear power plant and steam power plant, Alternate sources of energy – solar, wind and tidal power;
Refrigeration & Air Conditioning: Definition – COP, Unit of Refrigeration, Applications of refrigeration system, vapour compression refrigeration system, simple layout of summer
air conditioning system;

**IC Engines**: Introduction, Main components of IC engines, working of 4-stroke petrol engine and diesel engine, working of 2-stroke petrol engine and diesel engine, difference between petrol and diesel engine, difference between 4-stroke and 2-stroke engines.

**Learning Resources:**

**Text Books**

**References**
2. G. Shanmugam and M. S. Palanichamy, Basic Civil and Mechanical Engineering, TMH.

**Web references:**

www.result.khatana.net/2010/07/ge2152
www.engiblogger.com/mechanical/mechan
www.indiastudychannel.com/resources/5...
www.scribd.com/doc/15653381/Basic-Civ
FY1003E/ FY 2003E
TECHNICAL ENGLISH AND COMMUNICATION SKILLS

Lecture : 2 hrs/ Week Internal Assessment: 30
Tutorial : - Final Examination: 70
Practical : 2 hrs/ Week Credits: 3

Objectives: This Course Endeavors to Refurbish and Fortify the Linguistic Awareness and Communicative Competence of the learners by offering insights into various Morphological, Semantic, Syntactic & Stylistic aspects of English Language. The ultimate aim of the course is to equip the learners with different forms of written and spoken communication in order that they withstand the competition at the transnational technical environment so as to enable them to undertake various professional operations.

Learning Outcomes: This course arms the students to face the challenges in communication primarily in a technical milieu as communicating formal and technical messages is essential for students. It enables the learner to take up all Oral and writing tasks with ease and confidence. It acts as a launching pad to students concerned with professional advancement

UNIT – I
WRITTEN COMMUNICATION SKILLS
This area exposes the learners to the basic tenets of writing; the style and format of different tools of written communication
(I) Description (through Paragraph Writing)
(II) Reflection (through Essay Writing)
(III) Persuasion (through indented Letter Writing)

UNIT – II
Reading Comprehension:
This area exposes the learners to the techniques of deciphering and analyzing longer texts pertaining to various disciplines of study.
(I) Types of Reading
(II) Sub skills of Reading
(III) Eye span – fixation
(IV) Reading Aloud & Silent Reading
(V) Vocalization & Sub-vocalization.

UNIT – III
A) Vocabulary and Functional English:
This area attempts at making the learners withstand the competition at the transnational technical environment so as to enable them to undertake various professional operations.
(I) Vocabulary – a basic word list of one thousand words.
(II) Functional grammar, with special focus on Common Errors in English.
(III) Idioms & Phrasal verbs.

B) Listening and Speaking:
This area exposes the learners to the standard expressions including stress, rhythm and various aspects of isolated elements and connected speech.
UNIT – IV

Technical Communication Skills:
This area falls under English for Specific Purposes (ESP) which trains the learner in Basic Technical Communication.

(I) Technical Report Writing (Informational, Analytical & Special reports)
(II) Technical Vocabulary

Learning Resources:

### FY 1004 EM

**ENGINEERING MECHANICS – I**

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**Objectives:** Engineering mechanics is both a foundation and a framework for Civil and Mechanical engineering disciplines. This course provides a basic knowledge of rigid-body mechanics, elasticity and structural analysis. In particular, the principles of statics and their applications in engineering, the methods of static analysis, and techniques of engineering computation are expounded. This course is designed to enable students to acquire fundamental knowledge in engineering.

**Learning Outcomes:** After taking this course, the student acquires the knowledge and ability to:

- Solve for the resultants of any force systems;
- Determine equivalent force systems;
- Determine the internal forces in axial members and support reactions.
- Determine the centroids of plane and composite areas
- Determine the axial forces in the members of a given truss.
- Solve the problems associated with friction forces.

**UNIT – I**


**UNIT – II**

**Parallel Forces in a Plane:** Introduction, Types of parallel forces, Resultant. Couple, Resolution of Force into force and a couple. General case of parallel forces in a plane.

**Centroids:** Introduction, Determination of centroids by integration method, Centroids of composite plane figures.

**UNIT – III**

**General Case of Forces in a Plane:** Composition of forces in a plane – Equilibrium of forces in a plane -Plane Trusses: Method of joints.

**Principle Of Virtual Work:** Equilibrium of ideal systems.

**UNIT – IV**

**Friction:** Introduction, Classification of friction, Laws of dry friction. Co-efficient of friction, Angle of friction, Angle of repose, Cone of friction, Frictional forces on wheel, Wedge friction.
Learning Resources:

Text Books:

Reference Books:
1. Beer and Johnston, *Vector Mechanics for Engineers Statics and Dynamics*. TMH.

Web References:
http://openlibrary.org/books/OL22136590M/Basic_engineering_mechanics
http://nptel.iitm.ac.in/video.php?courseId=1048
http://imechanica.org/node/1551
http://emweb.unl.edu/

FY 1004M
MECHANICS FOR ENGINEERS

Lecture : 4 hrs/ Week
Tutorial : 1 Hr/Week
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 4

Objectives: Engineering mechanics is both a foundation and a framework for most of the engineering disciplines. This course provides the basic knowledge of Newtonian mechanics, rigid-body mechanics, and structural analysis, in particular, the principles of statics & dynamics and their applications in engineering. The methods of static analysis, and techniques of engineering computation are expounded. This course is designed to enable students to acquire fundamental knowledge in engineering design.

Learning Outcomes: After finishing this course, the student acquires the basic knowledge and skills to:

- Solve for the resultants of any force systems;
- Determine equivalent force systems;
- Determine the internal forces in axial members and support reactions.
- Solve the mechanics problems associated with friction forces;
- Find the centroid for some standard and composite areas;
- Describe the motion of a particle in terms of its position, velocity and acceleration (constant and variable).
- Use the equation of motion to describe the accelerated motion of a particle
- Analyze the forces causing the motion of a particle in rectilinear translation and curvilinear translation.
- Find the Moment of inertia of plane figures and material bodies.

UNIT I:

Parallel Forces in a Plane: Introduction, Types of parallel forces, Resultant. Couple, Resolution of Force into force and a couple. General case of parallel forces in a plane

Centroids: Determination of centroids by integration method, centroids of composite plane figures.

UNIT – II
General Case of Forces in a Plane: Composition of forces in a plane – Equilibrium of forces in a plane.


Moment of Inertia of Plane Figures & Rigid Bodies: Moment of Inertia of a plane figure with respect to an axis in its plane and an axis perpendicular to the plane of the figure, Parallel axis theorem. Concept of Mass moment of inertia.
UNIT – III
Kinematics of Rectilinear Translation: Introduction, displacement, velocity and acceleration. Motion with Uniform acceleration.

UNIT – IV
Kinematics of Curvilinear Motion: Introduction, rectangular Components of velocity & acceleration. Normal and Tangential acceleration, Motion of projectiles.

Learning Resources:
Textbooks:
1. S. Timoshenko and D.H.Young, Engineering Mechanics. TMH

Reference books:
1. Beer and Johnston, Vector Mechanics for Engineers Statics and Dynamics. TMH.
3. K.Vijaya Kumar Reddy and J Suresh Kumar, Singer’s Engineering Mechanics Static’s and Dynamics. 3 ed, BS Publications.

Web Resources:
http://openlibrary.org/books/OL22136590M/Basic_engineering_mechanics
http://nptel.iitm.ac.in/video.php?courseId=1048
http://imechanica.org/node/1551
http://emweb.unl.edu/
FY 1005
INTRODUCTION TO COMPUTING

Lecture : 2 hrs/ Week  
Internal Assessment: 30
Tutorial : -  
Final Examination: 70
Practical : -  
Credits: 2

Objectives: The objectives for Introduction to Computers will enable the student to use the computer effectively in a multitude of academic scenarios.

- Understand the basic parts of a computer system and their relationships.
- Understand and use basic computer terminology to equip the graduates with a broad foundation of basic engineering concepts and fundamentals of Computer Engineering.
- To develop in graduates the capability to apply these learned concepts in engineering design and to implement such a career as a practicing engineer.
- Use a computer system for interactive communications

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

- Convert and calculate in binary, decimal, and hexadecimal number systems.
- Describe an Information System using examples from business, education, and personal use.
- Compare input and output devices found with a variety of PCs – sub-notebooks, notebooks, laptops, desktops, and etc.
- List, compare, and contrast high-level and fourth-generation computer languages

UNIT I:
Data Representation: Representation of characters in computer, representation of Integers, fractions, number systems, binary system, octal system, hexadecimal system, organizing of memories, representation of numbers, alpha numeric characters, error detection codes.

UNIT II:
Computer Architecture: Interconnection of units, Input Units: Keyboard, VDU, OMR, MICR, OCR and BAR Coding. Output Units: Types of Printers, Plotters, Computer memory: Memory cell, Organization, Read-Only-Memory, Magnetic Hard Disk, CDROM.

UNIT III:
Computer Languages: Why programming Language, Assembly language, Higher Level Programming Languages, Compiling High Level Languages.
UNIT – IV
Introduction to operating system, functions of operating system, basic introduction to DOS, LINUX, WINDOWS –XP.
Definition and Applications of Computer Network, LAN, MAN and WAN, Intranet, Internet.

Learning Resources:

Text Book:

Reference Books:
FY 1006 /FY2006
PROFESSIONAL ETHICS

Lecture : 2Hrs/Week  Internal Assessment: 75
Tutorial : ---      Final Examination: -
Practical : --       Credits: 2

Objectives: The study of the course provides an understanding of Morals, characterization.

Learning outcomes: Upon completing this course students should be able to know the morals, Human Values, Ethics, Safety, Responsibilities and Rights

UNIT – I

UNIT – II

UNIT – III
Engineering as Social Experimentation: Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study

UNIT – IV
Global Issues: Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics (Specific to a particular Engineering Discipline).

Learning Resources:

TEXT BOOKS

ENGINEERING CHEMISTRY LABORATORY

Objectives:

- To make students familiarize with the practical aspects of volumetric analysis of water samples and determine the parameters like alkalinity, chlorides and hardness.
- To improve the knowledge of different types of titrations used in volumetric analysis.
- To make students develop in terms of practical skills required for analytical projects.
- To imbibe the advantages of instrumental methods of chemical analysis.
- To make students observe practically the aspects of corrosion rate determination, preparation of plastics and process of electroplating.

Learning Outcomes:

After performing the experiments listed in the syllabus, the students will be able to:

- Distinguish different types of titrations in the volumetric analysis.
- Assess the quality of water based on the analysis done by them.
- Acquire practical knowledge related to the concepts like corrosion and its inhibition process, photochemical reactions, electroplating, etc.
- Exhibit the skills in performing experiments based on the theoretical fundamentals available.

List of Experiments

1. Determination of total alkalinity of water sample
   a) Standardisation of HCl solution
   b) Determination of total alkalinity
2. Determination of chlorides in water sample
   a) Standardisation of AgNO₃ solution
   b) Determination of chlorides in the water sample
3. Determination of hardness of water sample
   a) Standardization of EDTA solution
   b) Determination of total hardness of water sample
4. Determination of available chlorine in bleaching powder
   a) Standardisation of sodium thiosulphate
   b) Determination of available chlorine
5. Estimation of Mohr’s salt – Dichrometry
   a) Standardization of K₂Cr₂O₇ solution
   b) Estimation of Mohr’s salt
6. Estimation of Mohr’s salt – Permanganometry
   a) Standardization of KMnO₄ solution
   b) Estimation of Mohr’s salt
7. Conductometric determination of a strong acid using a strong base
8. pH metric titration of a strong acid vs. a strong base
9. Determination of corrosion rate of mild steel in the absence and presence of an inhibitor
10. Electroplating of Nickel on iron article
11. Chemistry of Blue Printing
12. Colorimetric determination of potassium permanganate
13. Preparation of Phenol-Formaldehyde resin
14. Spectrophotometry

Learning Resources
# FY 1051P/ 2051P
## ENGINEERING PHYSICS LABORATORY

<table>
<thead>
<tr>
<th>Lecture</th>
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<tbody>
<tr>
<td>Tutorial</td>
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<tr>
<td>Practical</td>
<td>3 Hrs/week</td>
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### Internal Assessment:
- 25

### Final Examination:
- 50

### Credits:
- 2

### Objectives:
The main objective is to provide students to learn about some important experimental techniques in physics with knowledge in theoretical aspects so that they can excel in that particular field.

### Learning Outcomes:
These experiments in the laboratory are helpful in understanding important concepts of physics through involvement in the experiments by applying theoretical knowledge. It helps to recognize where the ideas of the students agree with those accepted by physics and where they do not.

### Minimum of 8 Experiments to be Completed out of the following

1. AC Sonometer – Verification of Laws
2. Sensitive Galvonometer – Figure of merit
3. Photo tube-study of V-I Characteristics, determination of work function
4. Torsional Pendulum-Rigidity modulus calculation
5. Variation of magnetic field along the axis of current-carrying circular coil
6. Fibre Optics-Numerical aperture calculation
7. Compound pendulum-Measurement of ‘g’
8. Solar cell – Determination of Fill Factor
9. Losses in Optical Fibres
10. LCR circuit-Resonance
11. Newton’s Rings-Radius of curvature of plano convex lens
12. Hall effect- Study of B & I Variation
13. Photovoltaic cell-Energy gap
14. Measurement of thickness of a foil using wedge method
15. Diffraction grating-Measurement of wavelength

### Learning Resources:

FY 1052
BASIC COMPUTING LABORATORY

Lecture : --  Internal Assessment: 25
Tutorial : -  Final Examination: 50
Practical : 3 hrs/ Week  Credits: 2

Objectives: The Basic Computing Lab for engineers is a training lab course on modules include training on Productivity tools including Word, Excel, Power Point, access, Internet & World Wide Web and PC Hardware.

Learning Outcomes: Information Technology has great influence on all aspects of life. Almost all work places and living environments are being computerized. In order to prepare Students to work in these environments, it is essential that they are exposed to various aspects of Information Technology such as understanding the concept of Information Technology and its Scope; Operating a Computer; use of various tools of MS-Office using Internet etc.

LIST OF PROGRAMS

1. Execution of Simple DOS Commands COPY, REN, DIR, TYPE, CD, MD, BACKUP
2. Create your Bio-Data in MSWord giving Educational and Personal Details.
3. Create an Excel Worksheet entering marks in 6 subjects of 10 Students. Give ranks on the basis of Total marks and also generate graphs.
4. Create a Database in MS-Access for Storing Library Information.
   Ex Fields: Book name, author, book code, subject, rack no, price, volumes Enter Sample data of 15 books in to database.
5 Design a PowerPoint presentation with not less than 10 slides on any of your interesting topic.
   Ex: Literacy, Freedom Struggle, Siddhartha Engineering College, Evolution of Computers, Internet etc.
6. Register for new Email address with any free Email provider and send Email using Internet to your friends, parents, teachers etc.
7. Search Internet using Search Engines like Google.com, Yahoo.com and ask.com for files, pictures, power point presentations etc. Downloading files, EBooks, EContent from Internet.
8. Practice in installing a Computer System by giving connection and loading System Software and Application Software.
10 Installing Windows XP operating System.
11 Assembling of PC.
12 Disassembling of PC.

Learning Resources:

Text Books :
1. Familiarity With the computer, Software, Internet and their uses
Reference Books:

ENGINEERING GRAPHICS

Lecture : 2 hrs/ Week  Internal Assessment: 25
Tutorial : -  Final Examination: 50
Practical : 6 hrs/ Week  Credits: 5

Objectives: The primary objective of this course is to develop the students to visualize and communicate all geometrical elements and also understanding the fundamentals of geometry like engineering curves, planes, solids, sections, developments & isometric views and its applications in the daily life.

Learning Outcomes: Student gets thorough knowledge of various Geometrical Elements used in Engineering Practice. He gets the insight into the Concepts of all 2 D elements like Conic Sections and 3 D Objects like various Prisms, Cylinders, Pyramids and Cones. He also understands the Projections of various objects and their representation and dimensioning. The Concept of Isometric Projections is thoroughly taught which will be useful for the visualization of any objects.

UNIT – I
General: Use of Drawing instruments, Lettering - Single stroke letters, Dimensioning, Representation of various type lines - Geometrical Constructions.
Scales: Construction and use of plain and diagonal scales.
Conic Sections: conic sections - general construction method for ellipse, parabola and hyperbola. Special methods for conic sections.
Curves: Curves used in Engineering practice - Cycloidal curves - Cycloid, Epicycloid and Hypocycloid; Involute of circle.

UNIT – II
Method of Projections: Principles of projection - First angle projection and third angle projection of points and straight lines.
Projection of Planes : Projections of planes of regular geometrical lamina.

UNIT – III
Projections of Solids: Projections of simple solids such as Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions.
Sections of Solids: Sections of solids such as Cubes, Prisms, Pyramids, Cylinders and Cones. true shapes of sections. (Limited to the Section Planes perpendicular to one of the Principal Planes).

UNIT – IV
Development of Surfaces: Lateral development of cut sections of Cubes, Prisms, Pyramids, Cylinders and Cones.
Isometric Projections: Isometric Projection and conversion of Orthographic Projections into isometric views. (Treatment is limited to simple objects only). Introduction to Isometric Projections to Orthographic Projections.
Learning Resources:

Text Book:

Reference Books:

Website:
http://www.youtube.com/watch?v=XCWJ_XrkWco
http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html#isodrawing
FY 1053W
WORKSHOP PRACTICE

Lecture : --  Internal Assessment: 25
Tutorial : -  Final Examination: 50
Practical : 3 hrs/ Week  Credits: 2

Objectives: To provide the students with hands on experience on different trades of Engineering like Carpentry, Tin Smithy, Welding and House Wiring.

Learning Outcomes:
- To familiarize with
- The Basics of tools and equipment used in Carpentry, Tin Smithy, Welding and House Wiring.
- The production of simple models in the above four trades.

List of Experiments:

1. Carpentry

   To make the following jobs with hand tools

   a) Lap joint
   b) Lap Tee joint
   c) Dove tail joint
   d) Mortise & Tenon joint
   e) Cross-Lap joint

2. Welding using electric arc welding process / gas welding.

   The following joints to be welded.

   a) Lap joint
   b) Tee joint
   c) Edge joint
   d) Butt joint
   e) Corner joint

3. Sheet metal operations with hand tools.

   a) Saw edge
   b) wired edge
   c) lap seam
   d) grooved seam
   e) funnel
4. House wiring

a) To connect one lamp with one switch
b) To connect two lamps with one switch
c) To connect a fluorescent tube
d) Stair case wiring
e) Go down wiring

Learning Resources:

Reference Books:
FY 2001
ENGINEERING MATHEMATICS – II

Lecture : 4 hrs/ Week
Tutorial : 1 hr/ week
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 4

Objectives: By the study of this course the student is able to compare and contrast the idea of continuity and differentiability. Able to interpret the idea of optimization, locate and classify the extreme points. Also the students are taught interpolation and approximation of functions using finite difference technique.

Learning Outcomes: Based upon objectives the learning outcomes are

- Understand the concept of limit, continuity, differentiability. Learn mean value theorems and apply them in approximating functions, maxima and minima of two variables with constraints and with without constraints, curvature, radius of curvature.
- Evaluation of double, triple integrals by using change of order and finding area and volume in polar form and Cartesian form.
- Define and understand the geometry of vector differential operators and line, surface, volume integrals. State and use the major theorems of vector analysis.
- Understand the concept of finite difference technique for finding polynomial approximations for given f(x) numerically.

UNIT – I

UNIT – II

UNIT – III
Line and surface integrals – Green’s theorem in a plane (without proof) – Gauss’ divergence theorem (without proof) – Stoke’s theorem (without proof).

UNIT – IV
Interpolation: Introduction, Finite Differences – Forward, Backward, Central Differences, Symbolic Relations, Differences of a polynomial, Newton’s formula for interpolation, Central difference interpolation formulae –Gauss’s, Sterling’s, Bessel’s formulæ Interpolation with unequal intervals – Lagrange’s and Newton’s Interpolation formulæ.
Learning Resources:

Text Books:

Reference Books:
ENGINEERING MECHANICS - II

Lecture : 3 hrs/ Week  
Tutorial : 1 Hr/Week  
Practical : -  

Internal Assessment: 30  
Final Examination: 70  
Credits: 3

Objectives: This course introduces the Moment of inertia of plane areas and material bodies to the engineering students and mainly focused on the dynamics of particles and rigid bodies. Methods like kinematic relationships, Newton's laws, conservation of energy, momentum, and angular momentum for analyzing the motion of particles and rigid bodies are covered.

Learning Outcomes: After taking this course, student should have the ability to:
- Obtain the Moment of inertia of plane figures and material bodies
- Learn the fundamental concepts of engineering dynamics
- Learn the mathematical formulations of dynamics problems
- Analyze the dynamics of particles and rigid bodies with applications
- Apply the laws of dynamics to analyze and interpret the dynamics of particles and rigid bodies.

UNIT – I

Moment of Inertia of Plane Figures: Moment of Inertia of a plane figure with respect to an axis in its plane – Moment of inertia with respect to an axis perpendicular to the plane of the figure – Parallel axis theorem

Kinematics of Rectilinear Translation: Introduction, displacement, velocity and acceleration. Motion with Uniform and Variable acceleration.

UNIT – II


UNIT – III


UNIT – IV

Moment of Inertia of Material Bodies: Moment of inertia of a rigid body – Moment of inertia of laminas- slender bar, rectangular plate, Circular plate, circular ring, Moment of inertia of 3D bodies- cone, solid cylinder, sphere & parallelepiped.

Rotation of a Rigid Body about a Fixed Axis: Kinematics of rotation, Equation of motion for a rigid body rotating about a fixed axis – Rotation under the action of a constant moment.
Learning Resources:

Text Books:


Reference books:

1. Beer and Johnston, *Vector Mechanics for Engineers Statics and Dynamics*. TMH.
Environmental science is an interdisciplinary academic field that integrates physical and biological sciences (including physics, chemistry, biology, soil science, geology, and geography) to the study of the environment, and the solution of environmental problems. Environmental science provides an integrated, quantitative, and interdisciplinary approach to the study of environmental systems.

The focus of this course is to introduce students to thinking about environmental issues from an interdisciplinary perspective.

UNIT – I

Introduction: Definition, Scope and Importance of Environmental Sciences Present global issues
Natural resources management: Forest resources – use and over exploitation, Mining and Dams their effects on Forest and Tribal people,
Water resources: Use and over utilization of surface and ground water, Floods, Droughts, Water logging and Salinity, Water conflicts.
Energy resources- Energy needs, renewable and Non renewable Energy sources, use of alternate Energy sources, Impact of Energy use on Environment;

UNIT – II

Ecosystems: Introduction, characteristic features, structure and functions of Ecosystem – Forest, Grass land, Desert, Aquatic.
Biodiversity and Conservation:
Value of Biodiversity- Consumptive and Productive use, Social, Ethical, aesthetic and option values, Bio-geographical classification of India- India as a mega diversity Habitat; Threats to Biodiversity- Hot spots, Habitat Loss, Poaching of Wildlife, loss of species, seeds, etc., In-situ and Ex-situ conservation of Biodiversity.

UNIT – III

Environmental Pollution
Causes, effects and control measures of Air pollution, Indoor Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution,
Solid waste management Urban, Industrial, nuclear and e-waste management

UNIT – IV

Information technology and Environment: Role of information technology in environmental sciences
Social issues and Environment: Effects of human activities on the Quality of Environment: Urbanization, Transportation, Industrialization, Green revolution; Water scarcity and Ground
water depletion, Population growth and Environment: Environmental Impact Assessment

**Environmental Acts-** Water (Prevention and control of pollution) act, air (prevention and control of pollution) act, Environmental Protection Act, Forest conservation act,

**Learning Resources**

**Text Books:**
1. Anjaneyulu Y. *Introduction to Environmental Sciences*. B S Publications PVT Ltd.

**Reference Books:**

1. A.K Dee – *Environmental Chemistry*, New Age India Publications
Objectives: This course will give a solid grasp of the fundamental concepts of C programming, including some of the more challenging aspects of pointers, arrays, structures and defined types. This course also covers standard C libraries.

Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated the following knowledge, skills, ability.

- An ability to use modern C application development tools and good knowledge of C’s keywords, data types and structures, control structures, and program organization.
- An ability to apply knowledge of mathematics, science, engineering and technology in problem solving using C programming language.
- Knowledge and skills of applying structure programming methods, techniques and standard library functions.

UNIT – I
Constants, Variables and Data Types: Character Set, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Assigning values to Variables, Declaring variable as a constant.


Managing Input and Output Operations: Introduction, reading a character, writing a character, formatted I/O.

UNIT – II

Decision Making and Looping: Introduction, the WHILE statement, the DO Statement, the FOR statement, Jumps in Loops.

UNIT – III
Arrays: Introduction, One Dimensional Arrays, Declaration of one dimensional arrays, Initialization of one dimensional arrays, two-dimensional arrays, initializing two dimensional arrays, multi dimensional arrays.

Character Arrays and Strings: Introduction, Declaring and Initializing string variables. Reading
strings from Terminal. Writing string to screen. Arithmetic operations on characters.
Putting strings together, Comparison of two strings, string handling functions.

**User Defined Functions:** Introduction, user defined functions, storage classes, a multi function program, elements of user defined functions, definition of functions, return values and their types, function calls, function declaration, parameter passing techniques, recursion.

**UNIT – IV**

**Structures and Unions:** Introduction, defining a structure, declaring structure variables, accessing structure members, structure initialization, operations on individual members, Unions.
Pointers: Introduction, Understanding Pointers, accessing the address of the variable, declaring pointer variables, Initialization of pointer variables. Accessing a variable through its pointer.
File Management in C: Introduction, defining and opening a file, closing a file, Input/Output operations on files, pre processor directives and macros.

**Learning Resources:**

**Text Book:**

**Reference Books:**

**Electronic Materials, Websites**
- www.cprogramming.com
- http://www.learn-c.com
FY 2052
C-PROGRAMMING LABORATORY

Lecture : --- Internal Assessment: 25
Tutorial : --- Final Examination: 50
Practical : 3 Hrs/week Credits: 2

Objectives: This course will give a solid grasp of the fundamental concepts of C programming, including some of the more challenging aspects of pointers, arrays, structures and defined types.

Learning Outcomes:

- Practical knowledge of C application development tools and good knowledge of C’s keywords, data types and structures, control structures, and program organization
- Practical knowledge and skills to apply mathematics, science, engineering and technology in problem solving using C programming language.
- Practical Knowledge and skills of applying structure programming methods, techniques and standard library functions

List of Lab Exercises

WEEK-I

1) Write a C-Program to perform the simple arithmetic operations.
2) Write a C-Program to calculate area and circumference of the triangle and rectangle.
3) Write a C-Program to swap the two numbers without using third variable.

WEEK-II

1) Write a C-Program to find the biggest of the given three numbers.
2) Write a C-Program to find the roots of the given quadratic equation.
3) Write a C-Program to implement the calculator application (using switch)

WEEK-III

1) Write a C-program to convert given Decimal number to Binary number.
2) Write a C-Program to check the given number is Palindrome or not.
3) Write a C-Program to check the given Armstrong or not.
WEEK-IV

1) Write a C-Program to find the sum first N natural numbers.
2) Write a C-Program to generate the Fibonacci series.
   Ex: 0, 1, 1, 2, 3, 5, 8, 13, 21, \( n^i \), \( n^{i+1} \), \( n^i + n^{i+1} \)
3) Write a C-Program to print the prime numbers between 1 to N.

WEEK-V

1) Write a C-Program to find the biggest and smallest numbers in the given array.
2) Write a C-Program to find the sum, mean and standard deviation by using arrays.

WEEK-VI

1) Write a C-program to remove duplicate elements in the given array.
2) Write a C-program to insert an element at the specified location of the array.
3) Write a C-program to store the polynomial using arrays and differentiate it.

WEEK-VII

1) Write a C-Program to perform the Matrix addition, subtraction and multiplication using arrays.
2) Write a C-Program to print the transpose of the given Matrix without using the second matrix.

WEEK-VIII

1) Write a C-Program to find the given element is exist in the given list or not.
2) Write a C-Program to arrange the given elements in the ascending order.

WEEK-IX

1) Write a C-Program to check the given string is Palindrome or not.
2) Write a C-Program to perform the following operations with and without using String handling functions
   i) Length of the string                   ii) Reverse the given string
   ii) Concatenate the two strings         iv) Compare the two strings

WEEK-X
1) Write a C-Program to swap the two number using call by value and call by reference.

2) Write a C-Program to find the factorial of the given number using recursion.

3) Write a Program to find NCR using functions.

4) Write a Program to find Mean and standard deviation of a given set of numbers.(Define functions for mean and standard deviation)

WEEK-XI

1) Write a ‘C’ program to read name of the student, roll number and marks obtained in subjects from keyboard and print name of the student, roll number, marks in 3 subjects, and total marks by using structures concept.

2) Write a C-program to count number of characters, spaces, words and lines in given file.

3) Write a ‘C’ Program to copy the contents of one file into another file.
CS 3001
ENGINEERING MATHEMATICS – III

Lecture : 4 hrs/ Week                  Internal Assessment: 30
Tutorial : 1 hr/ Week                  Final Examination: 70
Practical : -                          Credits: 4

Objectives: After studying the course the student can be able to:

- Determine the Laplace Transforms of function of time, inverse Laplace transforms of Laplace transforms, understand convolution theorem and solve differential equations
- Represent a periodic function in terms of the trigonometric or exponential form of the Fourier series.
- Determine the Fourier Transform of functions.
- Numerical differentiation and integration. Numerical solution of ODE and PDE.

Learning Outcomes: Upon completion of this course the student will be able to:

- Solve initial value problems using Laplace Transforms.
- Fourier series expansions of a function given analytically, numerically, graphically.
- Compute Fourier transforms and their inverse transforms for given functions. Evaluate improper integrals and solve integral equations.
- Solve algebraic and transcendental equations numerically. Solve system of equations.
- Find the function of f(x) for the given data set.
- Differentiate and integrate the functions given numerically.
- Solve boundary value problems.

UNIT I:

UNIT II:
FOURIER SERIES: Introduction, Euler's Formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, odd and even functions, Expansions of odd and even periodic functions, Half - range series, Parseval's formula, complex form of Fourier series.

UNIT III:
FOURIER SERIES : Practical harmonic analysis.

FOURIER TRANSFORMS: Introduction, Definition, Fourier integrals, Fourier sine and

UNIT – IV


Learning Resources:

Text Book:

Reference Book:
5. S.S.Sastry, Introductory Methods of Numerical Analysis(U-IV)
CS 3002
BASIC ELECTRICAL ENGINEERING

Lecture : 4 hrs/ Week  Internal Assessment: 30
Tutorial : -  Final Examination: 70
Practical : -  Credits: 4

Objectives:
• To impart the fundamentals of the electrical engineering.
• To enhance the knowledge of transformer.
• To give the fundamentals of the electrical machines.

Learning Outcomes:
After completing this course, students will be familiar with:
• Identify the basic elements of the electrical engineering
• The students will understand the basic theorems in Electrical Engineering
• The students will understand the basic operation of transformers and various electrical machines.

UNIT I:
Introduction to Electrical Engineering: Electric current, potential and potential difference, electromotive force, electric power, ohm’s law, basic circuit components, electromagnetism related laws, Magnetic field due to electric current flow, force on a current carrying conductor placed in a magnetic field, Faradays laws of electromagnetic induction. Self-inductance and mutual inductance, Types of induced e.m.f, Kirchhoff’s laws. Simple problems.
Network Analysis: Basic definitions, types of elements, types of sources, resistive networks, inductive networks, capacitive networks, and series parallel circuits, star delta and delta star transformation (simple problems on above topics).

UNIT II:
Network theorems (only on DC and independent sources) - Superposition, Thevenins’s, Maximum power transfer theorems and simple problems.
Alternating Quantities: Principle of ac voltages, waveforms and basic definitions, relationship between frequency, speed and number of poles, root mean square and average values of alternating currents and voltage, form factor and peak factor, phasor representation of alternating quantities, the ‘j’ operator and phasor algebra, analysis of AC circuits with single basic network element, single phase series circuits, single phase parallel circuits, single phase series parallel circuits, power in ac circuits.

UNIT III:
Transformers: Principles of operation, Constructional Details, Ideal Transformer and Practical Transformer, EMF equation, Losses, Transformer tests (OC and SC), efficiency and regulation calculations (All the above topics are only elementary treatment and simple problems)
DC Machines:
DC Generator: Principle of operation of dc generator, lap and wave windings, EMF equation of a dc generator (Simple problems on e.m.f.).
DC Motor: principle of operation of DC motor, back emf, Torque equation (only theory).
UNIT – IV

A.C Machines:

Three phase induction motor: construction and principle of operation, slip and rotor frequency.

Alternator: Principle of operation of AC generator, e.m.f. equation (Simple problems on e.m.f.), regulation by synchronous impedance method.

Learning Resources:

Text Books:
1. T K Nagasarkar, and M.S. Sukhija, Basic Electrical Engineering, Oxford University Press.
2. M.S.Naidu and S. Kamakshiah, Basic Electrical Engineering. TMH.

Reference Books:
2. B L Thereja, Electrical Technology.
CS 3003
DISCRETE MATHEMATICAL STRUCTURES

Lecture : 3 hrs/ Week
Tutorial : 1 hr/ Week
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 3

Objectives: The study of Discrete Mathematical structures is basic requirement to all Engineering branches. In particular CSE and IT students.
• Determine the given inference pattern is valid or not.
• Describe the properties of summations and products.
• Construct Hasse diagrams for partially ordered sets.
• Determine whether a graph contains an Euler path or circuit.

Learning Outcomes: Upon completing this course students should be able to
• Write a correct formal proof.
• Apply set identities, relations and properties to prove mathematical statements.
• Find equivalence classes of a given relation on a set.
• Distinguishing between correct an incorrect operations.
• Use ordinary generating functions to count unordered selections with restrictions.
• Find the transitive closure of a relation by using warshall’s algorithm.
• Identify isomorphism invariants of graphs.

UNIT I:
Fundamentals of Logic: Propositions, Connectives, Propositional functions, Truth tables, Tautology, Contradiction, Logical equivalences, Normal forms, Logical inferences, Methods of proof of an implication,
First Order Logic: Predicate, Quantifiers, Rules of Inference for Quantified Propositions.

UNIT II:
Basics of Counting: Sum and Product rules, indirect counting, One to One correspondence, Combinations and Permutations, Enumerating Combinations and Permutations with and without repetitions
Advanced Counting Techniques: Generating function of Sequences, Recurrence relations, Solving recurrence relations-Substitution-Generating functions-The method of Characteristic roots, Solution of In-homogeneous recurrence relations

UNIT III:
Relations and Directed Graphs: Special properties of binary relations, Equivalence relation, Partially ordered sets, Hasse diagrams, Lattices, Operations on relations, Paths and Closures, Directed graphs and Adjacency matrices, Warshall’s algorithm- Transitive closure

UNIT – IV
Basic concepts, Sum of degrees theorem, Isomorphism and sub graphs, Planar graphs, Euler’s formula, Multi graphs and Euler circuits, Hamiltonian graphs, Grin-bergs theorem, Graph coloring, Chromatic numbers
Learning Resources:

Text Books:


Reference Books:

1. Rosen, *Discrete Mathematics and its Applications*. TMH.
CS 3004
DATA STRUCTURES

Lecture: 4 hrs/ Week
Tutorial: 1 hr/ Week
Practical: -

Internal Assessment: 30
Final Examination: 70
Credits: 4

Objectives: The objective of the course is to introduce the fundamentals of Data Structures, Data Abstract concepts and how these concepts are useful in problem solving. After completion of this course student will be able to

• Learn the process of abstraction using a programming language.
• Analyze step by step and develop algorithms to solve real world problems. Implementing various data structures viz. Stacks, Queues, Linked Lists, Trees and Graphs.
• Learn various searching and sorting techniques.

Learning Outcomes: Up on completion of this course students will be familiar with

• Comprehend the terms "abstract data type", and "data structures", and how data structures and algorithms have to be blended carefully to obtain efficient implementations.
• Trade-offs involved in choosing static versus dynamic data structures also implementation of stacks, queues and linked lists, trees, Graphs and their applications.
• Implement appropriate data structure for a given application
• Different searching and sorting techniques..

UNIT I:
Queues: Queue and Its Sequential Representation, Queue as an abstract data type, implementation of queues, insert operation, circular queue, implementation and operations.

UNIT II:
Trees: Introduction: Terminology, Representation of Trees
Binary Trees: Properties of binary trees, binary tree representation, Complete Binary Tree, Expression trees construction and evaluation.
Binary Tree Traversals: Inorder, Preorder and Postorder – recursive and non-recursive.
Binary Search Trees: Definition, searching a Binary Search Trees (BST), Insertion into a binary search tree, Deletion from a binary search tree.
UNIT III:
**Graphs:** Terminology, Graph Representations: Adjacency Matrix, Adjacency List
**Elementary Graph Operations:** Depth First Search and Breadth First Search, Spanning Trees: Prims and Kruskals algorithms.
**Shortest Paths and Transitive Closure:** Dijkstra’s Algorithm, Warshall’s Algorithm, Floyd’s Algorithm.

UNIT – IV
**Efficient Binary and Multi Search Trees:** AVL trees- rotations, insertion and deletion, Introduction to m-way Search Trees, B Trees-insertion and deletion.
**Searching:** Sequential search, Binary Search, Comparison and analysis.
**Sorting:** Insertion Sort, Selection, Bubble Sort, Quick Sort, Merge Sort, Heap Sort, Radix Sort, Practical consideration for Internal Sorting.
**Hashing:** Hash Functions, Collision Resolution Strategies

Learning Resources:

Text Books:

Reference Books:
CS 3005
BASIC ELECTRONICS

Lecture : 4 hrs/ Week  Internal Assessment: 30
Tutorial : -  Final Examination: 70
Practical : -  Credits: 4

Objectives:
• Introduces electronic devices and their applications.
• To learn about diodes, transistors, unipolar devices, optical devices, feedback and oscillator circuits, power amplifiers, operational amplifier, Integrated Circuits and voltage regulators.

Learning Outcomes:
Upon successful completion of this course, students will be familiar with:
• Basic atomic structure of semi-conductors.
• Construction and characteristics of diodes, bipolar junction transistors (BJTs), field-effect transistors (FETs), and optical devices.
• Operation of basic biasing circuits.
• Analyze, design, and describe the operating characteristics of feedback amplifiers oscillators and power amplifiers.
• Ideal and non-ideal characteristics of operational amplifiers.
• Operation of inverting and non-inverting amplifiers.
• Importance of IC’s and their applications.
• Circuit operation of different types of voltage regulation circuits, including series, shunt and switching regulators.

UNIT I:
Semiconductor Diodes: Semiconductor Diode, Resistance levels, Diode Equivalent circuits, Zener diodes, Load line Analysis, Series diode configurations with D.C Inputs, Half-Wave rectification, Full-Wave rectification,
Bipolar Junction Transistor: Transistor construction, Transistor operation, Common base configuration. Transistor amplifying action, Common emitter configuration, Common collector configuration, Operating Point, Fixed Bias circuit, Emitter Stabilized Bias circuit, Voltage divider Bias.

UNIT II:
Unipolar Devices: Construction and characteristics of JFETs, Transfer characteristics. Depletion type MOSFETs, Enhancement type MOSFETs, Fixed bias configuration, Self-bias configuration, Uni junction Transistor

UNIT III:
Power Amplifiers: Amplifier types, Series-fed Class A Amplifiers, Class B Amplifier operation, Class C and D Amplifiers.
UNIT – IV


Linear I.C’s - Timer IC unit operation. Voltage Controlled Oscillator.

Voltage Regulators: I.C. Voltage regulators.

Learning Resources:

Text Book:

Reference Books:
CS 3006
DIGITAL LOGIC DESIGN

Lecture: 3 hrs/ Week
Internal Assessment: 30
Tutorial: 1 hr/ Week
Final Examination: 70
Practical: -
Credits: 3

Objectives:

• Analyzing and Designing of digital logic circuits
• Analyze uses of Logic functions as building Blocks
• Analyzing and Designing combinational circuits
• Design and Describe the operation of basic memory elements(Flip flops)
• Analyze the behavior of Synchronous and asynchronous circuits
• Knowing about Programmable Logic Devices.

Learning Outcomes:

Upon completion of this course the Student can able to

• Design complex Digital Logic circuits using Gates
• Simplify Complex Equations by using methods like map method etc.,
• Design Synchronous and Asynchronous circuits using memory elements.
• Design circuits using various Programmable Logic Devices

UNIT I:
Number Systems: Review of Number systems & codes, Representation of integers and Floating point numbers, Accuracy. Introduction to integer arithmetic operations.
Boolean Algebra and Logic Gates: Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and Properties of Boolean Algebra, Boolean functions, Canonical and Standard Forms, Other operations, Digital Logic Gates.
Simplification of Boolean Functions: The Map Method, Two and three variable Maps, Four-variable Map, Five and six-variable Maps, Product of Sums Simplification, NAND and NOR implementation, other two-level implementations, Don't-Care conditions, The Tabulation Method, Determination of Prime Implicants, Selection of Prime-Implicants.

UNIT II:
Combinational Logic with MSI and LSI: Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers.

UNIT III:
UNIT – IV

Registers, Counters: Registers, Shift Registers, Asynchronous Counters, Synchronous Counters, Ring Counter, Johnson Counter, Timing Sequences.

Memories: Classification of ROMs, EProms, EEProms, RAMs, Static and Dynamic Memories.

Programmable Logic: Read – Only Memory (ROM), Programmable Logic Device (PLD), Programmable Logic Array (PLA), Programmable Array Logic (PAL).

Learning Resources:

Text Book:

Reference Books:
CS 3051
DATA STRUCTURES LAB

Lecture : - Internal Assessment: 25
Tutorial : - Final Examination: 50
Practical : 3 hrs/ Week Credits: 2

Objectives:
• To provide an in-depth knowledge in problem solving techniques and data structures
• To teach the student to write programs in C to solve the data structure problems
• To introduce the student to simple linear and non linear data structures such as lists, stacks, queues, trees and graphs.

Learning Outcomes:
• Familiar to map real world problems into the Programming language
• To learn the systematic way of solving problems
• Efficiently implement linear, non linear data structures, and various searching and sorting techniques.

LIST OF PROGRAMS
Week 1:
Write a program to implement the operations on stacks.
Write a program for converting a given infix expression to postfix form
Write a program for evaluating a given postfix expression

Week 2:
Write a program to implement the operations on queues
Write a program to implement the operations on circular queues

Week 3:
Write a program to implement stack operations using singly linked list.
Write a program to implement the operations on doubly linked list.

Week 4:
Write a program to implement the operations on circular linked list.
Write a program for the representation of polynomials using circular linked list and for the addition of two such polynomials.

Week 5:
Write a program to create a binary search tree operations and also implementing the tree traversal techniques using recursion.

Week 6:
Write a program to create a binary search tree operations and also implementing the
tree traversal techniques using non-recursion.

**Week 7:**
Write a program to implement graph traversal techniques.
Write a program for finding the shortest path from a given source to any vertex in a digraph using Dijkstra’s algorithm.

**Week 8:**
Write a program to perform the following operations Insertion into an AVL-tree and Deletion from an AVL-tree.

**Week 9:**
Write a program to implement searching techniques.
Write a program to implement hashing techniques.

**Week 10:**
Write a program to implement all sorting techniques
Bubble sort
Selection sort
Quick Sort

**Week 11:**
Write a program to implement all sorting techniques
Merge Sort
Insertion sort
Heap sort

**Learning Resources:**

**Text Books :**
2. Lipschutz, *Data Structures*. Schaum’s Outline Series, TMH.
CS 3052
BASIC ELECTRONICS AND DIGITAL LOGIC DESIGN LAB

Lecture: --  Internal Assessment: 25
Tutorial: -  Final Examination: 50
Practical: 3 hrs/ Week  Credits: 2

Objectives:
• Detailed practical study on characteristics of diodes, BJT’s and FET’s
• Learn how to design complex logic circuits using gates, decoders and multiplexers, about memory elements like flip flops, about different types of Registers, designing of counters.

Learning Outcomes:
• To develop the student abilities with trouble shooting and use of the different test equipment.
• Design complex Digital Logic circuits using Gates

LIST OF PROGRAMS
Part A- BASIC ELECTRONICS
  Characteristics of PN junction diode.
  Characteristics of zener diode.
  Half wave rectifier
  Full wave rectifier
  Transistor characteristics in CB configuration
  Transistor characteristics in CE configuration
  Characteristics of FET
  Realization of logic gates using discrete components

PART-B DIGITAL LOGIC DESIGN
  Realization of logic gates using NAND & NOR gates
  Implementation of arithmetic circuits.
  Implementation of code converters
  Implementation of decoders and multiplexers.
  Verification of flip-flops
Implantation of synchronous counters

Implementation of asynchronous counters

Implementation of shift registers

Note: Students should complete at least 5 from each part

Learning Resources:

Text Books:
CS 4001
PROBABILITY AND STATISTICS

Lecture : 4 hrs/ Week  Internal Assessment: 30
Tutorial : 1 hr/ Week    Final Examination: 70
Practical : -  Credits: 4

Objectives:
• To learn about various types of distributions like discrete, continuous and sampling and learn about Inferences concerning means, variances and proportions.
• This Course is designed to equip the students with a working knowledge of probability, statistics, and modeling in the presence of uncertainties.
• The major objective of the course is to students to develop an intuition and interest for random phenomena
• The major objective is introduce both theoretical issues and applications that may be useful in real life

Learning Outcomes:
Upon completion of this course students will be familiar with
• Various types of distributions like discrete, continuous and sampling and Inferences concerning means, variances and proportions. The statistical content of Quality Improvement.
• Calculating probabilities of events and expectations of random variables for elementary problems such as games of chance
• Recognizing situations in which it is appropriate to consider the relevance of the Normal distribution and/or Exponential distribution
• Recognizing situations in which different approaches to sampling are relevant
• Computing fault coverage and reliability in simple hardware and software applications.
• Formulation of hypothesis and carryout appropriate tests to checks its acceptability

UNIT I:
Probability Distributions: Random variables (discrete and continuous), Expectation, variance and standard deviation of discrete random variable, Binomial distribution, Poisson distribution
Probability Densities: Expectations, variance and standard deviation of continuous random variable, Normal distribution, Normal approximation to the Binomial distribution, other probability densities, Uniform distribution, Log normal distribution, Gamma distribution, Beta distribution, Weibull distribution.
Sampling Distributions: Populations and samples-Sampling distribution of the mean (SD known)- Sampling distribution of the mean (SD unknown) – Sampling distribution of the variance.

UNIT II:

UNIT III:
Inferences Concerning Variances: Estimation of variances – Hypothesis concerning one variance - Hypothesis concerning two variances.
Inferences Concerning Proportions: Estimation of Proportions - Hypothesis concerning one Proportions - Hypothesis concerning several Proportions – The Analysis of r x c Tables – Goodness of fit

UNIT – IV
The Statistical Content of Quality Improvement Programs: Quality Control – Control Charts for Measurements - Control Charts for Attributes.

Learning Resources:

Text Book:
1. Richard A. Johnson, Probability and Statistics for Engineers. Prentice Hall of India

Reference Books:
1. R.E. Walpole, R.H.Myers and S.L.Myers, Probability and Statistics for Engineers and Scientist. 6 ed, Prentice Hall of India/Pearson Education.
CS 4002
MICROPROCESSORS AND INTERFACING

Objectives:
The students will learn:
- Fundamental concepts of microprocessors and their architectures.
- Programs in assembly level language of the 8086 family of microprocessors.
- Techniques of interfacing between the processors and peripheral devices so that they themselves can design and develop a complete microprocessor based system.
- Basic concepts of systems programming to enable the students to understand the entire space of microprocessor technology and specially the software aspects related to micro processing.
- Utility of faster modes of data transfer and technique.

Learning Outcomes:
Upon completion of the course the students will be familiar with
- Knowledge of internal architecture of 8086 microprocessor (Execution unit, Bus interfacing unit, queue, 8086 memory address).
- Programming structure and able to write programs in assembly language of the 8086 family of microprocessors.
- Instruction set of 8086 microprocessor.
- Interconnections of different co-processors with 8086 microprocessors.
- Hardware knowledge of programmable devices of 8086 microprocessors.
- Developing hardware applications involving microprocessors.

UNIT I:
Microprocessor: Introduction to Microcomputers and Microprocessors, Introduction to 8086 microprocessor family, 8086 internal architecture, Addressing modes, Programming the 8086, Instruction descriptions, Assembler directives.

UNIT II:
8086 Programming and System Connections: Program development steps, Constructing the machine codes for 8086 instructions, Writing programs for use with an assembler, Assembly language program development tools, Writing and using procedures and assembler macros.
An example minimum mode system: SDK 86, Addressing memory and ports in Microcomputer system.

UNIT III:
Interrupts: 8086 Interrupts and Interrupt Responses
Digital Interfacing: Programmable parallel ports and Handshake input/output, interfacing a microprocessor to keyboards.
Analog Interfacing: D/A converter operation, Interfacing and applications, A/D converter specifications, Types and interfacing.
UNIT – IV


Learning Resources:

Text Book:

Reference Books:

CS 4003
DESIGN AND ANALYSIS OF ALGORITHMS

Lecture : 4 hrs/ Week  Internal Assessment: 30
Tutorial : 1 hr/ Week  Final Examination: 70
Practical : -  Credits: 4

Objectives: The primary objective of this course is to introduce the topic of algorithms as a precise mathematical concept, and study how to design algorithms, establish their correctness, study their efficiency and memory needs. The course consists of a strong mathematical component in addition to the design of various algorithms. By the end of the course, the successful student will be able to:

- Understand, explain, model, and analyze a given software problem as an algorithm.
- Investigate whether the algorithm found is the most efficient.
- Formulate the time order analysis for an algorithm.
- Formulate the space needs for the implementation of an algorithm.
- Prove the correctness of an algorithm

Learning Outcomes: Up on completion of this course students will be familiar with

- Learn good principles of algorithm design;
- Learn how to analyse algorithms and estimate their worst-case and average-case behaviour.
- Know a variety of greedy algorithms; know the basic ingredients of a greedy algorithm, and how to approach arguing the correctness of such algorithms
- Familiarity with dynamic-programming algorithms, how to apply them via both memorization and tables, and recognize when a dynamic programming approach might yield a good solution to a problem.
- Backtracking, Branch and Bound technique, solution of n queen problems and traveling sales problem.
- Know some standard NP-Complete problems and know the basics of an NP-hardness

UNIT I:
Introduction: Algorithm, Algorithm Specification, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation,
Divide and Conquer: General method, Application-Binary Search, Quick sort, Merge sort, Strassen’s matrix multiplication.

UNIT II:  
Greedy method: General method, Applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Optimal storage on tapes, Optimal merge patterns, Single source shortest path problem,  
Dynamic Programming: General method, applications- Matrix chain multiplication, Multi stage graph problem, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem.

UNIT III:  
Basic Traversal and Search Techniques: Techniques for binary trees, graphs, connected components and spanning trees, Bi-connected components and DFS,  
Backtracking: General method, applications- n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles, 0/1 knapsack problem.

UNIT – IV  
Branch and Bound: General method, applications - Traveling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.  
NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, classes NP Hard and NP Complete, Cook’s theorem.

Learning Resources:  
Text Book:  

Reference Books:  
2. Introduction to Algorithms, 2/e ,T.H.Cormen,C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd. / Pearson Education  
CS 4004
OBJECT ORIENTED PROGRAMMING

Lecture: 4 hrs/ Week  
Internal Assessment: 30
Tutorial: 1 hr/ Week  
Final Examination: 70
Practical: -  
Credits: 5

Objectives:
- To provide different programming paradigms, need for object oriented programming
- The basic concepts of object oriented programming: Encapsulation, reusability, overloading.
- The course focuses on object oriented programming concepts like Data Abstraction, inheritance, polymorphism, Exception Handling
- Generic programming with templates
- Formatted and unformatted I/O
- The course also introduces the Standard template Library

Learning Outcomes:
- Understands fundamental constructs of OOP-classes, objects
- Understands the differences between functions and inline functions
- Understands friend functions to access the private data of a class
- Gets the knowledge of different forms of Inheritance.
- Virtual functions to realize runtime polymorphism
- Understand the concept of Stream computation with console.
- Understands error handling models and the standard template library

UNIT I:
An Overview of C++: Origins of C++, What is Object Oriented Programming, Overview of OOP features: Encapsulation, Inheritance and Polymorphism, C++ fundamentals: Sample C++ program, I/O Operators, Declaring Local variables, bool data type, old style vs Modern C++, new C++ headers, namespaces, Introducing C++ classes, function overloading, operator overloading, C++ keywords

Classes and Objects: Classes, structures and classes are related, Unions and classes are related, Anonymous unions, friend functions, friend classes, inline functions, defining inline functions within a class, constructors, destructors, parameterized constructors, static class members, static member functions, scope resolution operator, passing objects to functions, returning objects, object assignment

UNIT II:
Arrays, Pointers, References and the dynamic allocation operators: Arrays of objects, pointers to objects, this pointer, pointers to class members, passing references to objects, returning references, C++ dynamic allocation operators, initializing allocated memory, allocating arrays, allocating objects,
Copy Constructors and default arguments: Overloading constructors, Copy constructors, address of an overloaded function, default function arguments, default arguments vs overloading, function overloading and ambiguity
Operator Overloading: Creating a member operator function, creating prefix and postfix forms of the increment and decrement operators, overloading shorthand operators, operator overloading restrictions, overloading new and delete, overloading special operators like [],().-
UNIT III:
Inheritance: Base-class access control, inheritance and protected members, inheriting multiple base classes, constructors and destructors in inheritance, passing parameters to base class constructors, granting access, virtual base classes,
Virtual functions and polymorphism: Virtual functions, calling a virtual function through a base class reference, virtual attribute is inherited, virtual functions are hierarchical, pure virtual functions, abstract classes, early vs late binding
Templates: Generic Functions, A function with two generic types, overloading generic functions, overloading function template, generic function restrictions, Generic classes, an example with two generic data types, Applying template classes

UNIT – IV
Exception Handling: Exception handling fundamentals, catching class types, using multiple catch statements, handling derived class exceptions, catching all exceptions, restricting exceptions, Re-throwing an exception, uncaught_exception() function
C++ I/O system basics: C++ stream classes, C++ predetermined streams, formatting using ios members, setting the format flags, clearing format flags, using width(), precision() and fill(), using manipulators to format I/O
C++ File I/O: Opening and closing a file, reading and writing text files, unformatted and binary I/O: put(), get(), read(), write(), getline(), detecting EOF, Random Access, obtaining the current file position,
Introducing the standard Template Library: Introducing STL items: Containers, algorithms, iterators

Learning Resources:

Text Book:

Reference Books:
CS 4005
COMPUTER ORGANIZATION

Lecture : 4 hrs/ Week  Internal Assessment: 30
Tutorial : -  Final Examination: 70
Practical : -  Credits: 4

Objectives: This course helps

- To get knowledge on working of digital computer.
- To design modern digital computers.
- To learn the applications of processing Registers.
- To learn memory hierarchy concepts.
- To implement the fixed point and floating point arithmetic operations.

Learning Outcomes: Upon completion of this course the Student can

- Gain knowledge on Hardware and System Design.
- Be able to write assembly language programming by making use of Instruction set.
- Be able to design micro program control unit.
- Be able identify various hardware and software interrupts and various data transferring modes.

UNIT I:
Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction cycle, Memory-Reference Instruction, Input-Output and Interrupt, Design of Basic Computer, Design of Accumulator Logic.

UNIT II:
Micro Programmed Control: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.
Central Processing Unit: General register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).

UNIT III:
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management hardware.
UNIT – IV

Input-Output Organization: Peripheral Devices, Input-output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor, Serial Communication

Learning Resources:

Text Book:

Reference Books:
CS 4051
MICRO PROCESSORS AND INTERFACING LAB

Lecture : --  Internal Assessment: 25
Tutorial : -  Final Examination: 50
Practical : 3 hrs/ Week  Credits: 2

Objectives:
• The laboratory provides practical approaches to write Assembly Language programs based on Intel 8086 Microprocessor.
• It enables the students to understand the technique of how to write program in assembly language and debug them using the Microsoft’s code view Debugger.
• To provide a real experience of writing, Debugging and running 8086 machine codes programs on SDK-86 using the onboard keypad.
• The main theme of the Microprocessor Lab course is interfacing to microprocessor to wide variety of peripheral devices and systems.

Learning Outcomes:
• Students get knowledge of writing Assembly Language program using SDK 86.
• The interfacing programs help them to understand how 8086 MP are used to control the functioning of External Peripherals.

LIST OF PROGRAMS
WEEK 1
16-bit data Addition and Subtraction
Sum of the N Series of given data
Finding the Average of given N series of data.

WEEK 2:
Generation of Fibonacci Series starting from 01 H
16-bit data Multiplication
16-bit data Division

WEEK 3:
Finding the Largest/Smallest data number in the given array of data
Finding the Factorial of a given data

WEEK 4:
Finding the Square and Square root of the given Number.
Finding NCR for a given N and R values.

WEEK 5:
Program to arrange the given numbers in Ascending order/ Descending Order
Program to convert Binary to Gray code/ Gray code to Binary.

WEEK 6:
Finding the Count of Positive, Negative and Zero values in the given Signed data array.
Program to covert Decimal number to Hexadecimal number

WEEK 7:
Digital to Analog Converter Interface Program.

WEEK 8:
Keyboard Interfacing Program

WEEK 9:
Stepper Motor Program

WEEK 10:
Traffic Light Controller

Learning Resources:

Text Books :

Reference Books:
# CS 4052
## OBJECT ORIENTED PROGRAMMING LAB

<table>
<thead>
<tr>
<th>Lecture</th>
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<th>Internal Assessment:</th>
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<tr>
<td>Tutorial</td>
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<td>Final Examination:</td>
<td>50</td>
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<tr>
<td>Practical</td>
<td>3 hrs/Week</td>
<td>Credits:</td>
<td>2</td>
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### Objectives:
- Provides fundamental knowledge and skills to become proficient in C++ programming.
- Objects, their behaviors, and their relationships will be modeled.
- Programming experience on object oriented programming concepts like encapsulation, inheritance, overloading, polymorphism, Exception Handling, templates.

### Learning Outcomes:
- Implements fundamental constructs of OOP-classes, objects and inline functions.
- Understands friend functions to access the private data of a class.
- Implements different forms of Inheritance.
- Virtual functions to realize runtime polymorphism.
- Executes error handling models.

### LIST OF PROGRAMS

**Week 1.**
- a) Write a C++ program to exchange the contents of two variables using a call by value and call by reference.
- b) inline functions

**Week 2**
Define the matrix ADT using a class. The operations supported by this ADT are:
- i) Reading a matrix.
- ii) Printing a matrix.
- iii) Addition of matrices.
- iv) Subtraction of matrices.
- v) Multiplication of matrices.

**Week 3**
Design an application for the maintenance of library information system using Static data Members, Static member function, Friend function & Dynamic memory allocation.

**Week 4**
- a) Write a C++ program to generate a Fibonacci series by Operator overloading of
  - Prefix operator
  - Postfix operator.
- b) Write a C++ Program to implement function Overloading

**Week 5**
Write a C++ program to implement
- i) inserter and extractors,
- ii) Formatting I/O,
- iii) File I/O,
- iv) Unformatted and Binary I/O.

**Week 6**
Write a C++ program to implement
- i) Single Inheritance
- ii) Multiple Inheritance
- iii) Hybrid Inheritance
Week 7
Write programs to demonstrate
   (i) Virtual functions (ii) Virtual constructor (iii) Abstract base class.
   (iv) Pure virtual functions (v) virtual destructor

Week 8
a) Write a C++ program to implement sorting using function templates.
b) Write a C++ program to implement linked list using Class Templates.

Week 9
a) Write a C++ program to implement Queue using Exception Handling
b) Write a C++ program to implement Stack using Exception Handling.

Week 10
Write C++ programs to demonstrate command line arguments
a) Copies one file to another.
b) Counts the characters, lines and words in the Text file.

Learning Resources:

Text Books :
1. Robert Lafore, Object-Oriented Programming in C++. 4 ed, Sams publishers

Reference Books:
2. Dietel and Dietel, C++ - How to Program. 4 ed, Pearson Education.
CS 4053
COMMUNICATION SKILLS LAB

Lecture : -- Internal Assessment: 25
Tutorial : -- Final Examination: 50
Practical : 2 hrs/ Week Credits: 1

Objectives: This course endeavours to make the learners develop communicative competence in the light of the global expectations specific objectives are

- To expose the learners to Functional aspects of spoken expression.
- To expose the learners to phonetic standardization based on the sounds of English and their combinations
- To train the learners to career-oriented communication
- To offer opportunity to the learners to develop group dynamics
- To expose the learners academic and competitive examinations conducted at national and international levels

Learning Outcomes:

- It is expected that the course would refurbish and fortify the linguistic abilities of the learners
- It is expected that the learners would develop familiarity with different linguistic patterns including forms of writing
- It is expected that the aplomb of learners would develop by multifold

ORAL COMMUNICATION:

FLUENCY VS ACCURACY

Constructing authentic sentences
Contextual use of Rhetoric
Audience Orientation
Contextual Determination of scope and extent of speech acts, including job interviews.

Pre-programmed Presentation VS Spontaneous delivery of expressions

Sentence patterns (Technical & Semi-Technical)
Modes of Reference
Process of Argumentation & Substantiation

Discourse Analysis

Across the table discussion
Interactive Presentation
Modeling
PRACTICALS:

Brief and interludes, Group Discussions, MOCK press, MOCK Interviews, Seminar Presentations.

WRITING COMMUNICATION:

LETTER WRITING

Letters of Persuasion
Letters of Direction
Letters of Corporate Interaction
Announcements

ARTICLES

Types of Articles
Means of Literature search
Administering Questionnaires
Personal Interviews
Triangulation of Data & Composition

PRACTICALS:

Compilation of

Articles: Technical, Semi-Technical & popular articles

PREPARATIONS OF

Visual aids like Transparencies
Electronic presentations using power point, flash etc.,

PROJECT

Technical paper / Report Writing

EVALUATION:

Presentation of Technical Paper 15 min. duration using OHP/LCD.

Learning Resources:

Reference Books:
1. JOD CONNOR, Better English Pronunciation. CUP, 2001
3. VR Narayanan Swamy, Strengthen Your Writing. Orient Longman, 2004
CS 5001
SOFTWARE ENGINEERING

Objectives:
• To learn software development processes, system requirements analysis, software design, implementation, and testing.
• Students will learn about various methodologies used in all parts of the software development life cycle.
• Learn how to deal with real time problems in constructing software systems.
• Learn the principles and practices of software engineering.

Learning Outcomes:
The broad learning outcomes for the subject are as follows:

• Understand various process models.
• Familiar with various software metrics used.
• Understand about phases in software development.
• Understand about different testing methods.

UNIT I:

UNIT II:

UNIT III:


UNIT – IV


Learning Resources:

Text Book:

Reference Books:
CS 5002
THEORY OF COMPUTATION

Lecture : 3 hrs/ Week
Tutorial : 1 hr/ Week
Practical : -
Internal Assessment: 30
Final Examination: 70
Credits: 3

Objectives: Students Learn:
• Basics of Formal language of finite automata techniques.
• Basic concepts of regular sets and decision algorithms for context free grammars.
• Minimization of finite automata using Mhill Neode theorem
• Different Normal forms and properties of context free languages
• Design of Turing machines and undecidable Problems

Learning Outcomes:
• Student can construct different formal language methods.
• Can minimize the finite automata machine.
• Good understanding of different normal forms.
• Understand ideas of decidability and turing machine construction

UNIT I:

UNIT II:

UNIT III:

UNIT – IV

Learning Resources:

Text Book:
Reference Books:

CS 5003
OPERATIONS RESEARCH

Lecture : 4 hrs/ Week  Internal Assessment: 30
Tutorial : -  Final Examination: 70
Practical : -  Credits: 4

Objectives:
• Introduce the methods of Operations Research
• Emphasize the mathematical procedures of Linear and nonlinear programming search techniques
• Introduce advanced topics such as probabilistic models (Markov chain & queuing theory) and dynamic programming.
• Relate the course material to research activities

Learning Outcomes:
Up on completion of this course the students will be familiar with
• Methods of Operations Research
• Linear and Nonlinear programming search techniques
• Probabilistic models and dynamic programming.
• Relate this course to research activities

UNIT I:
Introduction to Operation Research: Introduction, Modeling in Operations Research, Phases of OR study, Scope of OR, Limitations of OR.
Linear Programming and its Applications: Linear Programming Problem – Formulation of LPP, Graphical solution of LP Problem. Simplex method, Artificial Variable Techniques (Big-M and Two-Phase Method), Dual Simplex method.

UNIT II:
Sequencing and Scheduling: Introduction-Flow Shop Scheduling, Johnson’s algorithm, Problems with n jobs and two machines, n jobs and m machines.

UNIT III:
Theory of Games: Introduction, to solve the rectangular two person zero sum games, solution of rectangular games in terms of mixed strategies, solution of 2x2 games without saddle point, solution of a two person zero sum 2Xn game, Graphical method for 2Xn and nX2 games.
Queuing Theory: Queuing systems and their characteristics. M/M/1 : FCFS/ ∞ / ∞ and M/M/1 : FCFS/ ∞ / N models
UNIT – IV
Project Management by PERT/CPM: Introduction, Basic steps in PERT/CPM techniques, Network diagram presentation, Rules of drawing network diagram, Fulkerson’s rule, Time estimates and Critical path in network analysis, Project Evaluation and Review Technique, Application areas of PERT/CPM. Crashing Cost consideration in CPM/PERT.
Learning Resources:

Text Book:

Reference Books:
CS 5004
DATABASE MANAGEMENT SYSTEMS

Lecture : 4 hrs/ Week Internal Assessment: 30
Tutorial : 1 hr/ Week Final Examination: 70
Practical : - Credits: 4

Objectives:
- To learn the fundamentals of data models and to conceptualize and depict a database system using ER Model.
- To provide a general introduction to relational model
- To make a study of SQL and relational database design.
- To know the fundamental concepts of transaction processing-concurrency control techniques and recovery procedure.

Learning Outcomes:
Upon completion of this course, students will be able to:
- Understand and describe the functional characteristics of a DBMS.
- Design the Databases for different applications.
- Use SQL to create, modify and retrieve relational database.
- Understand the concepts of transaction processing-concurrency control techniques and recovery procedures.

UNIT I:
INTRODUCTION: Purpose of Database system-Characteristics of database approach-Advantages of using DBMS-Database concept and architecture-Database System concepts and Architecture -Data Models, Schemas, and Instances -DBMS Architecture and Data Independence - Database Languages and Interfaces-Database Users

UNIT II:
Data Modeling Using the Entity-Relationship Approach High-Level Conceptual Data Models and Database Design - ER Model Concepts -Entity-Relationship (ER) Diagrams - Proper Naming of Schema Constructs -Relationship Types of Degree Higher than Two-Relational Database Design Using ER-to-Relational Mapping
The Relational Data Model and Relational Algebra Relational Model Concepts - Relational Integrity Constraints -Update Operations on Relations - Defining Relations - Relational Algebra - Relational Calculus- Tuple Relational Calculus -Domain Relational Calculus -Overview of the QBE Language

UNIT III:
Functional Dependencies and Normalization for Relational Databases Informal Design Guidelines for Relation Schemas -Functional Dependencies Normal Forms Based on Primary
Keys - General Definitions of Second and Third Normal Forms - Boyce-Codd Normal Form (BCNF) - Multivalued Dependencies and Fourth Normal Form - Join Dependencies and Fifth Normal Form.


UNIT – IV
Concurrency Control Techniques: Locking Techniques for Concurrency Control - Concurrency Control Techniques Based on Timestamp Ordering, Multi version based. Validation protocols and multi granularity.


Learning Resources:

Text Book:

Reference Books:
CS 5005
OPERATING SYSTEMS

Lecture : 4 hrs/ Week  Internal Assessment: 30
Tutorial : 1 hr/ Week  Final Examination: 70
Practical : -  Credits: 4

Objectives:
• Provides basics of different types of operating systems.
• Covers fundamental operating system abstractions such as Processes, threads, files, semaphores, IPC abstractions, etc.,
• Knowledge of basic resource management techniques (scheduling or time management, space management) and principles and how they can be implemented. These also include issues of performance and fairness objectives, avoiding deadlocks.
• To learn the principles of concurrency control methods and synchronization techniques.
• To learn various techniques of memory management

Learning Outcomes:
• Understand and analyze theory and implementation of processes, Resource control
• Recognize operating system types and structure.
• Learns OS support for processes and threads.
• Understands CPU Scheduling, synchronization, and deadlock.
• Know the OS support for virtual memory, disk scheduling, and I/O.

UNIT I:
Cpu Scheduling: Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Process scheduling, Real time Scheduling

UNIT II:
Process Synchronization: Background, Critical-Section Problem, Synchronization Hardware, Semaphores, Classical problem of synchronization, Critical Region, Monitors,

UNIT III:
Memory Management: Background, Logical Vs. Physical Address space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with paging.
Virtual Memory: Background, Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithm, Allocation of frames, Thrashing, Other Consideration, Demand Segmentation

UNIT – IV
File-System Implementation: File system structure, File system Implementation, Directory
Implementation, Allocation methods, Free space Management, Efficency and Performance, Recovery.


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**Learning Resources:**

**Text Book:**


**Reference Books:**

CS 5006
COMPUTER GRAPHICS

Lecture : 3 hrs/ Week  
Internal Assessment: 30
Tutorial : 1 hr/ Week  
Final Examination: 70
Practical : -  
Credits: 3

Objectives: To Learn

• Input and output primitive algorithms.
• Functioning of different display devices
• Line, Circle and Ellipse generation algorithms.
• 2D and 3D Transformation Techniques and different polygon interfacing Algorithms.

Learning Outcomes: At the end of the course student is able to understand/ implements

• Basic representations of image.
• Primitive algorithms for various objects creations
• Different 2D and 3D transformation techniques.
• Know the Polygon Filling and Clipping methods.

UNIT I:

UNIT II:
Two-Dimensional Geometric Transformations: Basic Transformations: Translation, Rotation and, Scaling; Matrix representation and Homogeneous coordinates, Composite Transformations: Translations, Rotations, Scalings, General Pivot-Point Rotation, General Fixed-Point Scaling, Concatenation Properties; Other Transformations: Reflections and shear
Polygons: Introduction-Polygons-An Inside-Outside Tests-Scan-Line Polygon Fill Algorithm- Boundary Fill Algorithm- Flood Fill algorithm- Fill Area Functions-Character Generation- Antialiasing

UNIT III:
Functions.

UNIT – IV

**Three Dimensional Viewing:** Viewing Pipeline- Viewing Coordinates- Projections: Parallel Projection and Perspective projection - General Parallel Projection Transformations- General Perspective Projection Transformations – Clipping.

**Three Dimensional Object representations:** Polygon Surfaces- Curved Lines and Surfaces- Quadratic Surfaces- Spline Representations - Cubic Spline methods-Bézier Curves and Surfaces- B Spline Curves and Surfaces.

**Learning Resources:**

**Text Book:**

**Reference Books:**
CS 5051
DATABASE MANAGEMENT SYSTEMS LAB

Objectives:
• Thorough understanding of the concepts of relational model and its applications
• Gives a comprehensive understanding of using procedural and nonprocedural query language.
• Designing databases.
• Practice on DDL, DML, DCL commands
• PL/SQL Programming.
• Designing forms.

Learning Outcomes:
Upon completion of this course the student will be able to
• Understand how to create and place constraints on databases.
• Write simple queries to retrieve data.
• Summarize data by means of group by operation and arranging the records using order by operation
• Use database privilege operations
• Write PL/SQL programs for small applications

LIST OF PROGRAMS
Week 1:
Data Definition Language (DDL) commands in RDBMS
Data Manipulation Language (DML) and Data Control Language (DCL)

Week 2:
Simple queries: selection, projection, sorting on a simple table
Small-large number of attributes
Distinct output values
Renaming attributes
Computed attributes
Simple-complex conditions (AND, OR, NOT)

Week 3:
Partial Matching operators (LIKE, %, _, *, ?)
ASC-DESC ordering combinations
Checking for Nulls

Week 4:
Multi-table queries (JOIN OPERATIONS)
Simple joins (no INNER JOIN)
Aliasing tables – Full/Partial name qualification
Inner-joins (two and more (different) tables)
Inner-recursive-joins (joining to itself)
Outer-joins (restrictions as part of the WHERE and ON clauses)
Using where & having clauses

Week 5:

Nested queries
In, Not In
Exists, Not Exists
Dynamic relations (as part of SELECT, FROM, and WHERE clauses)

Week 6:

Set Oriented Operations
Union
Difference
Intersection
Division

Week 7:

PL/SQL Programming I
Programs using named and unnamed blocks
Programs using Cursors, Cursor loops and records

Week 8:

PL/SQL Programming II
Creating stored procedures, functions and

Week 9:

Packages
Exception handling

Week 10:

Triggers and auditing triggers

Additional
Forms design

Learning Resources:

Text Books :
CS 5052
OPERATING SYSTEMS LAB

Lecture : --  
Tutorial : -  
Practical : 3 hrs/ Week

Internal Assessment: 25  
Final Examination: 50  
Credits: 2

Objectives:
- To learn and debug the Bash shell scripts
- To learn Differences and similarities between bash, csh
- Customize and extend their user environment with Bash shell scripts
- Implement the different system calls and scheduling algorithms

Learning Outcomes:
- The students will be able to understand fundamentals of operating system concepts system calls and shell programming
- The students will be able to have practical experience of applying those fundamental concepts into program development

LIST OF PROGRAMS

Programs in B-Shell

Week 1:
1. Program to find whether a number is Prime, Perfect, Strong, Armstrong number.

Week 2:
2. Program to implement searching and sorting operations on a list.

Week 3:
3. Program to count no of ordinary and Directory files in a given Directory and append operation between two files.

Week 4:
4. Program to perform various operations on File.

Week 5:
5. Program to wish the user based on System Time

Programs in C-shell

Week 6:
6. Program to print Multiplication table of a number.
7. Program to Print * in Equilateral Triangle format.

Programs in System calls

Week 7:
8. Program to implement FORK system call in C.
9. Program to implement EXECL system call in C.
Programs in Operating System.

Week 8:

Week 9:
  11. Program to implement SJF scheduling algorithm.

Week 10:

Extra programs

  13. Program to implement Dining Philosophers Problem using Semaphores.
  15. Program to implement for shared variables using Monitors.
  16. Program to implement Page Replacement algorithms.
    a) FIFO   b)LRU   c)Optimal

Learning Resources:

Text Books :
  1. N.B.Venkateswarulu, Advanced Unix Programming. BS Publications
  2. N.B.Venkateswarulu, Linux Programming tools Unveiled. BS Publications
CS 6001
OBJECT ORIENTED ANALYSIS AND DESIGN

**Lecture:** 4 hrs/ Week  
**Internal Assessment:** 30  
**Tutorial:** -  
**Final Examination:** 70  
**Practical:** -  
**Credits:** 4

**Objectives:**
- To understand the value of object-oriented analysis and design (OOAD), it helps to understand how software development has evolved.
- To provide a clear description of the concepts underlying Object oriented system development.
- The course uses Object management group’s Unified Modeling Language (UML) for modeling, Describing, Analyzing and designing an application.

**Learning Outcomes:**
- Understands the benefits of Object Oriented Software Engineering
- Design their own projects with aids of UML Diagrams
- Know how to use inheritance in an effective way – in particular – in how they are espoused in design patterns
- Be able to identify classes in their problem domain with a technique much better than finding nouns and verbs.
- Understand coding qualities are essential for writing maintainable code.

**UNIT I:**
Object oriented Methodologies: Methodologies - Shaler / Meller, Coad / Yourdon, RumBaugh et al.’s Object Modeling Technique; The Booch Methodology; The Jacobson et al. Methodologies; Patterns; Frameworks; The Unified Approach;  
Object Oriented Analysis Process: Identifying use cases: Introduction; Why Analysis is a Difficult Activity; Business Object Analysis: Understanding the Business Layer; Use-Case Driven Object-Oriented Analysis: The Unified Approach; Business Process Modeling; Use-Case Model; Developing Effective Documentation

**UNIT II:**
Unified Modeling Language (UML): Introduction; Static and Dynamic Models; Why Modeling? ; Introduction to the Unified Modeling Language; UML Diagrams;  
Static Modeling: UML Use Case Diagram- Use case descriptions- Actors and actor descriptions - Use case relationships: communication association, include, extend and Generalization, System Boundary; case study ViaNet Bank ATM.  
Object Analysis (Classification): Introduction; classifications Theory; Approaches for Identifying Classes; Naming Classes; Identifying Object Relationships, Attributes and Methods: Introduction; Associations; Super-Sub Class Relationships; A-Part-of Relationships-Aggregation; Class Responsibility: Identifying Attributes and Methods; Class Responsibility: Defining Attributes by Analyzing Use Cases and Other UML Diagrams; Object Responsibility: Methods and Messages;
Static Modeling: UML Class Diagram: Class, interface, package, Relationships between classes and other Notations of Class Diagram; case study ViaNet Bank ATM.

UNIT III:
Dynamic Modeling (Behavioral Diagram):- UML Interaction Diagrams –
UML Sequence Diagram: object, life line, Activation Bar, Types of Messages;
UML Collaboration Diagram: object, object Connection, Message with sequence numbers, case study ViaNet Bank ATM;
UML State-Chart Diagram: object State, Initial/Final State, Simple/Complex Transitions;
UML Activity Diagram: Activity State, Transition, Swim Lane, Initial state, Final State, Synchronization Bar, Branching, case study ViaNet Bank ATM

UNIT – IV
Implementation Diagrams – Component Diagram: Component, Dependency and Interface; Deployment Diagram: Node, Communication Association, case study ViaNet Bank ATM; Model Management: Packages and Model Organization; UML Extensibility; UML Meta-Model.
Object Oriented Design Process and Design Axioms: Introduction; The Object-Oriented Design Process; Object-Oriented Design Axioms; Corollaries.
Designing Classes: Introduction; The Object-Oriented Design Philosophy; UML Object Constraint Language; Designing Classes: The Process; Class Visibility: Designing Well-Defined Public, Private, and Protected Protocols; Designing Classes: Refining Attributes; Designing Methods and Protocols; Packages and Managing Classes, case study ViaNet Bank ATM;
View Layer: Designing Interface Objects: Introduction; User Interface Design as a Creative Process; Designing View Layer Classes; Macro-Level Process: Identifying View Classes by Analyzing Use Cases; Micro-Level Process

Learning Resources:

Text Book:

Reference Books:
CS 6002
DATA MINING

Lecture : 4 hrs/ Week
Tutorial : -
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 4

Objectives:
• Giving the basic concepts to Data Mining and Data Warehousing.
• Provide the basic data preprocessing concepts.
• Provide the students with a complete background on Data warehousing, and Data mining basic algorithms, essential concepts, and popular techniques.
• Equip the students with sufficient knowledge so that future projects may be identified.
• Students will learn how to analyze the data, identify the problems, and choose the relevant algorithms to apply. Then, they will be able to assess the strengths and weaknesses of the algorithms and analyze their behavior on real datasets.

Learning Outcomes:
After completion of this course, the student shall be able to:
• Understand different methods of preprocessing data.
• Design and implement simple data warehouse applications.
• Design and implement simple data cubes and OLAP operations for business applications.
• Identify the problems, and choose the relevant Data Mining algorithms to apply for them.

UNIT I:
Data Warehouse – Introduction, A Multi-dimensional data model, Data Warehouse Architecture, Data Warehouse Implementation.
Data Mining – Introduction, Data Mining, on what kind of Data, Data Mining Functionalities, Classification of Data Mining Systems, Major issues in Data Mining.

UNIT II:
Data Preprocessing – Data cleaning, Data Integration & Transformation, Data Reduction, Discretization & Concept Hierarchy Generation, Data Mining Primitives.
Mining Association rules in large databases – Association rule mining, mining single-dimensional Boolean Association rules from Transactional Databases, Mining Multi-dimensional Association rules from relational databases & Data Warehouses.

UNIT III:
Classification & Prediction – Introduction, Classification by Decision tree induction, Bayesian Classification, Classification by Back propagation, Other Classification Methods, Prediction, Classifier accuracy

UNIT – IV
Learning Resources:

Text Book:
1. Jiawei Han and Micheline Kamber, *Data Mining Concepts and Techniques*, 2 ed, Elsevier publishers.

Reference Books:
1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, *Introduction to Data Mining*. PEA.
2. Margaret H Dunham, *Data Mining Introductory and Advanced Topics*. Pearson Education
CS 6003
ENGINEERING ECONOMICS AND MANAGEMENT

Lecture : 3 hrs/ Week       Internal Assessment: 30
Tutorial : 1 hr/ Week       Final Examination: 70
Practical : -                Credits: 3

Objectives: At the end of the course the students should be able to understand different types of business organizations and the various scientific principles used in different departments like Personnel department, Financial Department, Marketing Department etc. The student should also be able to understand basic engineering economic principles and strategies.

Learning Outcomes: The student will be ready to apply the different scientific methods used in various departments of any organization like Finance department, marketing department, and Personnel department. He will also be aware of the basic economic concepts.

UNIT I:
General Management: Principles of scientific management, Henri Fayol's principles of management. Brief treatment of managerial functions: planning, organizing, staffing, directing, coordinating and controlling etc.
Forms of Business Organization: Salient features of sole proprietorship, partnership, Joint Stock Company: private limited and public limited companies.
Personnel Management: The personnel function, functions of a personnel management, Job Evaluation – Methods.

UNIT II:

UNIT III:
Work Study: Introduction, Management techniques to reduce work content and ineffective time.
Method Study: Procedure, Tools for recording information: charts and diagrams, use of fundamental hand motions (Therbligs), principles of motion economy, SIMO chart, cycle graph and chrono cycle graph.
Work Measurement: Objectives and techniques, time study methods and rating systems. Allowances: Standard time.

UNIT – IV
Marketing Management: Concept of selling and marketing – differences, functions of marketing, market research, advertising and sales promotion, break-even analysis, distribution channels – types, product life cycle.
Learning Resources:

Text Book:
1. ILO, *Introduction to work study*.

Reference Books:

CS 6004
COMPUTER NETWORKS

Lecture : 4 hrs/ Week
Tutorial : 1 hr/ Week
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 4

Objectives: Student will be able to:
• Learn basic network design problems, and standard computer network architectures.
• Learn simple local area network, metropolitan area network, and wide area network technologies.
• Study the basic flow control, and error control protocols
• Study the standard Ethernet LAN technologies
• Study the basic network routing, control and transport protocols

Learning Outcomes: Upon the completion of the course the students will be able to:
• Understand various standard network models.
• Implement the basic data flow and error control methods
• Implement the routing protocols
• Understand different applications in Application layer

UNIT I:
Introduction: Uses of Computer Networks, Network Hardware, LANs, MANs, WANs, Network Software.
The Physical Layer: Guided transmission media: Magnetic Media, Twisted Pair, Coaxial Cable, and Fiber Optics.

UNIT II:
The Data Link Layer: Data link layer design issues, Error detection and correction, Elementary data link protocols, and Sliding window protocols.
The Medium Access Control Sub layer: The channel allocation problem, Multiple access protocols, ETHERNET, and Wireless LANs.

UNIT III:

UNIT – IV
The Transport Layer: The Transport Service, Elements of Transport Protocols, and the Internet Transport Protocols TCP and UDP.
Application Layer: The Domain Name System (DNS), and E-Mail.
Learning Resources:

Text Book:

Reference Books

CS 6005
WEB TECHNOLOGIES

Objectives: The main objective behind introduction of this course is to develop web sites which are secure and dynamic in nature and writing scripts which get executed on server as well

• This course enables students to understand web site planning, management and maintenance.
• This course teaches students how to develop Java applications. Topics covered include OO programming using Java, exception handling, file input/output, threads, Graphical User Interfaces.
• The course explains the concept of developing web pages with the help of frames, scripting languages, and evolving technology like DHTML, XML.
• The course explains the concept of designing secure web pages using java based technologies like Servlets and JSP.

Learning Outcomes: Upon completion of this course the student will be able to

• Write programs using the Java language. Basic topics considered are programs and program structure in general, classes, methods, objects, arrays, exception handling, and graphical user interfaces (GUIs).
• Understand how applets may access enterprise data bases.
• Design web pages using standard web designing tools like HTML, DHTML,XML and server based technologies like Servlets and JSP.
• Understand the use of APIs in robust, enterprise three level application developments.
• Understand the Java features for secure communications over the internet.
• Select a project which will allow writing and testing applets for potential inclusion in web pages.

UNIT I:
OOPS Concepts in JAVA: Introduction to java, Features of java, Comparison with C++, Classes and Objects, Inheritance, Interfaces and Packages, Strings, String tokenizer, Exception Handling, Multithreading.
I/O Streams: Streams, byte streams, character streams, file class, file streams

UNIT II:
Applets: Concepts of applets, life cycle of an applet, creating applets, passing parameters to applets, color class and graphics class, handling image, animation.
Swing: Swing introduction, J Applet, J Frame and J Component, Icons and Labels, text fields, buttons – the J Button Class, check boxes, Radio buttons, combo boxes, tabbed panes, scroll panes, trees, and tables.
**JDBC Connectivity:** JDBC Connectivity, types of JDBC drivers, connecting to the database, JDBC statements, JDBC exceptions, Manipulations on the database, metadata.

**UNIT III:**
**HTML Common Tags** - List, Tables, images, forms, Frames, Cascading Style sheets, Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

**XML:** Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX Web Servers: Tomcat Server installation & Testing

**UNIT – IV**
**Servlets and Application Development:** Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading initialization parameters, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues, accessing a database from a Servlet application.

**Introduction to JSP:** The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC architecture, Using Scripting Elements, Implicit JSP Objects, Conditional Processing, Declaring Variables and Methods, Sharing Data between JSP pages, Sharing Session and Application data, accessing a Database from a JSP Page Application.

**Learning Resources:**

**Text Book:**
1. Patrick Naughton and Herbert Schildt., *The Complete Reference Java 2. 5 ed*, TMH (UNITS 1,2)

**Reference Books:**
CS 6051
SOFTWARE ENGINEERING LAB

Lecture : --        Internal Assessment: 25
Tutorial : -         Final Examination: 50
Practical : 3 hrs/ Week        Credits: 2

Objectives:
• To make the student learn about the different systems their analysis and design using objects.
• The purpose of UML, or Unified Modeling Language, is communication; to be specific, it is to provide a comprehensive notation for communicating the requirements, architecture, implementation, deployment, and states of a system.
• Unified modeling language (UML) will be covered to model static and dynamic behaviors of software systems.
• Students will participate in a group project on software development

Learning Outcomes:
Students are made familiar with designing unified modeling language diagrams (UML), Use case, Class, Sequence, Collaboration, State, Activity, Component and Deployment diagrams for real time Applications using the Software Design Tool Rational Rose for IBM Corp

LIST OF PROGRAMS
WEEK – 1 : STUDY OF UNIFIED MODELING LANGUAGE DIAGRAMS.
WEEK – 2: ATM APPLICATION SYSTEM.
WEEK – 3 : SCHOOL MANAGEMENT APPLICATION SOFTWARE
WEEK – 4: HEALTH CLINIC MANAGEMENT SYSTEM
WEEK – 5: INVENTORY CONTROL SYSTEM
WEEK – 6: RAILWAY RESERVATION SYSTEM.
WEEK – 7: INSURANCE CORPORATION MANAGEMENT SYSTEM
WEEK – 8: RECRITMENT PROCEDURE FOR SOFTWARE INDUSTRY
WEEK – 9 : PASSPORT ISSUING APPLICATION.
WEEK – 10 : GATE (GRADUATE APTITUDE TEST FOR ENGINEERS) COUNSULING APPLICATION.

Note: The application systems considered above can be changed frequently.
Like Following Systems

Ex.1: QUIZ APPLICATION.

Ex.2: BANKING SYSTEM.

Ex.3: LIBRARY MANAGEMENT SYSTEM.

Ex.4: HOTEL MANAGEMENT SYSTEM

Ex.5: UNIVERSITY MANAGEMENT SYSTEM.

Ex.6: ONLINE BOOKSHOP MANAGEMENT

Ex.7: A MULTI-THREADED AIRPORT SIMULATION

Ex.8: AN AUCTION APPLICATION

Ex.9: FILE MANAGEMENT SYST

Ex.10: EMPLOYEE MANAGEMENT SYSTEM

Learning Resources:

CS 6052
COMPUTER NETWORKS LAB

Lecture : --  Internal Assessment: 25
Tutorial : -  Final Examination: 50
Practical : 3 hrs/ Week  Credits: 2

Objectives: Students will implement:
- Different framing methods in data link layer
- Different error detection and correction mechanisms
- Flow control algorithms
- Various routing algorithms
- Client server applications

Learning Outcomes: Upon successful completion of the course the student acquires the following skills:
- Demonstrate techniques to correct and detect errors during transmission.
- Demonstrate understanding of how computers communicate with each other and the routing algorithms employed to assure that the communication is reliable.
- Implementation of client server applications with protocols TCP and UDP.

LIST OF PROGRAMS

Week 1:
Implement the data link layer framing methods: character stuffing and bit stuffing.

Week 2:
Write a program to implement stop and wait protocol.
Write a program to implement go-back-n sliding window protocol.

Week 3:
Implement on a data set of characters the three CRC polynomials- CRC12, CRC16.

Week 4: Implement error detection method using checksum algorithm
Week 5:
Implement error correction method using **Hamming distance** method

Week 6:
Compute shortest route using Dijkstra’s algorithm.

Week 7:
**Implement distance vector** routing algorithm.

Week 8:
Construct a routing table at each node using link state routing algorithm.

Week 9:
Construct broadcast tree for a subnet of hosts.

Week 10:
Implement Client Server application using UDP
Implement socket programming for chat application using TCP

**Learning Resources:**

**Text Books :**
1. Tanenbaum, *Computer Networks*. 4 ed, PHI/ Pearson Education

**Reference Books:**
CS 6053
WEB TECHNOLOGIES LAB

Lecture : --  Internal Assessment: 25
Tutorial : -  Final Examination: 50
Practical : 3 hrs/ Week  Credits: 2

Objectives:

• This course teaches students how to develop Java applications including OOP Concepts, exception handling, file input/output concepts, multi threading and GUI components.
• The course explains the concept of developing web pages with the help of frames, scripting languages, and evolving technology like DHTML, XML.
• The course explains the concept of designing secure web pages using java based technologies like Servlets and JSP.
• The main objective behind introduction of this course is also to develop web sites which are secure and dynamic in nature and writing scripts which get executed on server as well.

Learning Outcomes:

• Write programs using the Java language. Basic topics considered are programs and program structure in general, classes, methods, objects, arrays, exception handling, and graphical user interfaces (GUIs).
• Understanding how such applets may access enterprise data bases.
• Designing web pages using standard web designing tools like HTML, DHTML,XML and server based technologies like Servlets and JSP.
• Understanding the use of APIs in robust, enterprise three level application developments.
• Understanding the Java features for secure communications over the internet.

LIST OF PROGRAMS

1  Design a Java application that reflects the inheritance concepts of Java.
2  Design a Java application to copy the contents of one file to other using sequential files and random access files.
3  Design a user registration form using Java Applets.
4  Develop a menu based swing application for designing a note pad.
5  Design an applet application that implements JDBC to interact with Database.
6  Design a web application using different types of CSS.
7  Design a student database using XML and display the content using XSL by validating through XML schema.
8  Design a simple java servlet application to retrieve the data from a client form and
display the data.

9  Design a web application for user management using Java servlets.
10 Design a simple JSP application to perform simple operations.
11 Design a web application for user management using JSP.
12 Design a web application to share the data between multiple pages using sessions and cookies.

Learning Resources:

Text Books:
2. Patrick Naughton and Herbert Schildt, *The complete Reference Java 2*. 5 ed, TMH.
CS 6054
TERM PAPER

Lecture : --  Internal Assessment: 75
Tutorial : 1 hrs/ Week  Final Examination: 
Practical : -  Credits: 1

Objectives:

- A term paper is a research based paper written by students over an academic term or semester which accounts for a large amount of a grade and makes up much of the course.
- Term papers are generally intended to describe an event, a concept, or argue a point.
- A term paper is a written original work discussing a topic in detail, usually several typed pages in length and is often due at the end of a semester.
- A major goal of this course is the development of effective technical writing skills. To help you become an accomplished writer, you will prepare several research papers based upon the studies completed in lab.
- A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

Learning Outcomes:
After taking this course, students will be able to

- Understand and analyze a problem
- Write a technical document for a particular problem

Guide Lines
Title Page
Abstract
Introduction
Materials and Methods
Results
Literature Cited
CS 7001
CRYPTOGRAPHY AND NETWORK SECURITY

Objectives: Students Learn:
- Principles and practice of network security.
- Techniques of network security
- Fundamental aspects of security in a modern networked environment
- Basic cryptographic techniques, algorithms, and protocols
- Computational issues in implementing cryptographic protocols and algorithms

Learning Outcomes: By the end of this course, students will be able to:
- Understand the basic principles and terminology in network security
- Identify the possible threats to each mechanism and ways to protect against these threats.
- Understand the requirements of real-time communication security.
- Implement cryptographic protocols and algorithms.

UNIT I:
Security attacks, A model for network security; Classical techniques: Encryption, Steganography; Modern techniques: simple DES, Block cipher principles, Differential and linear cryptanalysis; Triple DES, RC5, Blowfish, CAST-128, RC2; Characteristics of Advanced Symmetric block ciphers.

UNIT II:

UNIT III:
Number Theory: Prime and relative prime numbers, modular arithmetic: theorems, testing for primality, Euclid’s algorithm, Chinese remainder theorem, discrete logarithms.

UNIT – IV
Learning Resources:

Text Book:

Reference Books:

CS 7002
EMBEDDED SYSTEMS

Lecture : 4 hrs/ Week  
Internal Assessment: 30  
Tutorial : 1 hr/ Week  
Final Examination: 70  
Practical : -  
Credits: 4

Objectives: The objective of this course is to equip the students with 8051 microcontroller programming concepts and tools needed for embedded system design. Embedded systems have become the next inevitable wave of technology, finding application in diverse fields of engineering.

- Study the Architecture of microcontroller.
- Programming the microcontroller.
- To understand the meaning of embedded system and applications in which they are used.
- To study various aspects of embedded system design from Hardware and Software points of view.
- To study various embedded design methodologies and tools

Learning Outcomes: Students will be able to

- Differentiate between microprocessor and microcontroller
- Develop microcontroller programming
- Design hardware and software for minimum microcontroller based system
- Select best suited microcontroller for specified application
- State difference between general purpose computer system and ES
- State application of ES in various fields.
- Draw hardware and software architecture of ES
- Design and implement simple embedded systems

UNIT I:  
Introduction: Introduction to microcontrollers, comparing microprocessors and microcontrollers,

The 8051 Architecture: Over view of the 8051 family, 8051 microcontroller hardware, inputs/ outputs pins, ports and circuits, external memory, counters and timers, serial data input/output and interrupts

UNIT II:  
Programming The 8051 Microcontroller: Introduction, addressing modes of 8051, external data moves, code memory read only data moves, PUSH and POP op codes, data exchanges, byte level and bit level logical operations, rotate and swap operations Arithmetic operations, Incrementing, Decrementing, addition, subtraction, multiplication and division, jump and call program range, jumps, calls & subroutines Interrupts & returns. Simple programs using 8051

UNIT III:  
Introduction To Embedded Systems: Embedded systems, Embedded processors, hardware
units, software. Examples of embedded systems, Systems on chip, complex systems design and processors, design process in embedded systems, formalization of system design, design process and design examples, classification of embedded systems, skills required for an embedded system designer, processor selection, memory selection

UNIT – IV
Real Time Operating Systems: Introduction to real time operating systems, Basic design using real time operating systems.


Learning Resources:

Text Book:
2. Raj Kamal, Embedded Systems Architecture, Programming and Design. 2 ed, TMH. (Unit 3, 4)

Reference Books:
1. David E.Simon, An Embedded Software Primer. Pearson Education Asia
CS 7003
COMPILER DESIGN

Lecture : 3 hrs/ Week  Internal Assessment: 30
Tutorial : 1 hr/ Week  Final Examination: 70
Practical : -  Credits: 3

Objectives:

- Learn various phases of the compiling process.
- To understand lexical analysis, grammars and parsing.
- To understand type-checking, intermediate representations, static analysis.
- To understand the common optimizations techniques, instruction selection, register allocation, code generation, and runtime organization.

Learning Outcomes:

Based upon above objectives the course goals / learning outcomes are defined below:

- Understand the theoretical limits and complexity of the various phases.
- Able to describe the behavior of the various compiling phases.
- Able to read write finite automata and grammars for programming language constructs.
- Able to perform lexical analysis and use lexical analyzer generators.
- Understand the concepts of top-down parsing, bottom-up parsing and use parser generators.
- Understand the concepts of semantic analysis including static checking, intermediate representations and attribute grammars.
- Understand the concepts of run-time storage allocation schemes.
- Understand the concepts of code generation and able to generate the optimal code.

UNIT I:
Lexical Analysis: The role of lexical analyzer, A simple approach to the design of lexical analyzer, Lex tool

UNIT II:

UNIT III:
Symbol Tables: The contents of a symbol table, Data structures for symbol tables, Representing scope information.

UNIT – IV


Code Generation: A simple code generator, code Generation using DAG’s.

Learning Resources:

Text Book:

Reference Books:
CS 7004
MOBILE COMPUTING

Lecture : 4 hrs/ Week  
Tutorial : 1 hr/ Week  
Practical : -  

Internal Assessment: 30  
Final Examination: 70  
Credits: 4  

Objectives:
• Learn the basics principles of wireless transmission and its standards
• Learn various techniques in Mobile Computing and telecommunication systems
• Learn various platforms, tools and techniques to develop mobile applications
• Learn mobility, data and service management, and security issues in mobile computing environments.

Learning Outcomes:
At the end of the course, students will have acquired the following knowledge and skills

• Understand the concept of radio propagation and interference in multipath propagation and channel model description
• Understand the digital transmission systems which are used for the mobile telephony and wireless computer networks applications
• Understand various techniques to develop mobile applications

UNIT I:
Introduction: A short history of wireless communication-A market for mobile communications-A simplified reference model

Wireless Transmission: Frequencies for radio transmission-Signals-Signal propagation-Multiplexing-Modulation-Spread spectrum-Cellular system

Multiple access Procedures: TDMA- FDMA-CDMA-SDMA-Comparison of TDMA, FDMA, CDMA and SDMA.

UNIT II:
Bluetooth: Bluetooth protocol-Bluetooth protocol stack-Bluetooth security-Application models


WiMAX: Introduction- Physical layer- 802.16 medium access control-broadband applications-broadband cellular system

UNIT III:
Mobile Computing Architecture: Mobile Computing-Architecture for mobile computing-Three tier architecture-Design considerations for mobile computing-Mobile computing through internet-Making the existing applications Mobile-Enabled

GSM :Global System for Mobile Communications- GSM system architecture-GSM entities-Call routing in GSM,PLMN interface-GSM addresses and Identifiers-Network Aspects in
GSM- GSM frequency allocation-Authentication and security
SMS: Mobile Computing over SMS-Short Message Services-Value added services through SMS-Accessing the SMS Bearer
GPRS: Introduction- GPRS and Packet Data Network-GPRS network architecture-Network operations-Data services in GPRS-Applications for GPRS-Limitations of GPRS-Billing and Charging in GPRS.
UNIT – IV
Mobile IP and IPV6: Introduction- How does Mobile IP works?-Discovery-Registration-Tunneling
IPV6 address space-IPV6 security-Packet payload-mobile IP with IPV6

Learning Resources:

Text Books:
1. J. Schiller, Mobile Communications. Pearson Education. (Unit 1)
2. Asoke K Talukder and Roopa R.Yavagal, Mobile Computing – Technology Applications and Service Creation. TMH, 2006. (Unit 2,3,4)

Reference Books:
1. Deitel, et al., Wireless Internet and Mobile Business-How to Program. Prentice Hall India.
CS 7005 A
HUMAN COMPUTER INTERACTION

Lecture: 3 hrs/ Week
Internal Assessment: 30
Tutorial: -
Final Examination: 70
Practical: -
Credits: 3

Objectives:
- Design, implement and evaluate effective and usable graphical computer interfaces.
- Describe and apply core theories, models and methodologies from the field of HCI.
- Describe and discuss current research in the field of HCI.
- Describe special considerations in designing user interfaces.

Learning Outcomes:
- Understands the user-centered design cycle and how to practice this approach to design your own website or other interactive software systems
- Critique existing website and other interactive software using guidelines from human factor theories
- Analyze one after another the main features of a GUI: the use of colors, organization and layout of content, filling the interface with useful and relevant information, and communication techniques; and to critique designs in order to provide better solutions
- Evaluate a GUI prototype using a questionnaire

UNIT I:
Introduction: Importance of user interface, definition, importance of good design, A brief history of Screen Design
Graphical User Interface: Popularity of graphics, the concept of direct manipulation, graphical system, characteristics, Web user – interface popularity, characteristics- principles of user interface.

UNIT II:
Design Process: Human interaction with computers, importance of human characteristics, human considerations, human interaction speeds
Screen designing: Interface design goals, screen meaning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, visually pleasing composition, amount of information, focus and emphasis, presenting information simply and meaningfully, technological considerations in interface design.

UNIT III:
Windows: Characteristics, components, operations. Selection of device based and screen based controls.
Components: Icons and images, Multimedia, choosing proper colors

UNIT – IV
Software Tools: Specification methods, interface, Building tools
Interaction devices: Keyboard and function keys, pointing devices, speech recognition, digitization and generation, image and video displays, drivers.
Learning Resources:

Text Books:
2. Ben Shneidermann, *Designing the User Interface*. 3 ed, Pearson Education Asia

Reference Books:
2. Prece, Rogers, Sharps *Interaction Design*. Wiley Dreamatech,
CS 7005 B
DIGITAL SIGNAL PROCESSING

Lecture : 3 hrs/ Week  
Tutorial : -  
Practical : -  

Internal Assessment: 30  
Final Examination: 70  
Credits: 3

Objectives: Students Learn

- Basic concepts and techniques for processing signals.
- Methods in DSP, including digital filter design and transform-domain processing.
- Practical implementations of the theoretical concepts.
- Theory of statistical signal processing methods and application developments as related to signal processing

Learning Outcomes:

- This course introduces students to the fundamental techniques and applications of digital signal processing. Through lectures and homework students should be able to do the following upon completion of this course:
  - Analyze signals using the discrete Fourier transform (DFT).
  - Understand the Decimation in time and frequency FFT algorithms for efficient computation of the DFT.
  - Design digital IIR filters by designing prototypical analog filters and then applying analog to digital conversion techniques such as the bilinear transformation.
  - Design digital FIR filters using the window method.
  - Implement digital filters in a variety of forms: direct form I and II, parallel, and cascade

UNIT I:

UNIT II:

UNIT III:
Realization of Digital Filters: Direct, canonic, cascade, parallel and ladder realizations.
UNIT – IV


**Learning Resources:**

**Text Book:**

**Reference Books:**
1. Salivahanan and Vallavaraj, *Digital Signal Processing*. TMH
CS 7005 C
SOFTWARE PROJECT MANAGEMENT

Lecture : 3 hrs/ Week
Tutorial : -
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 3

Objectives: Students Learn:

- Project planning and management.
- Managing risks and quality assurance & configuration management.
- Tracking defects and controlling them
- Project Development life cycle.

Learning Outcomes:
Upon completion of the syllabus the student can be able to:

- Understand how to manage projects
- Select appropriate techniques for use in the stages of a project
- Justify the appropriateness of these techniques, and apply them to practical situations
- Understand the limitations of the project approach in developing information/software systems

UNIT I:
Conventional Software Management: The waterfall model, conventional software

UNIT II:
The old way and the New: The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process.
Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction, transition phases.
Artifacts of the Process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

UNIT III:
Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Interactive

**UNIT – IV**

**Project Control and Process Instrumentation:** The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. **Tailoring the Process:** Process discriminants, Example.

**Future Software Project Management:** Modern Project Profiles Next generation Software economics, modern Process transitions. Case Study: The Command Center Processing and Display System-Replacement (CCPDS-R)

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**Learning Resources:**

**Text Book:**


**Reference Books:**

CS 7005 D
ADVANCED COMPUTER ARCHITECTURE

Lecture: 3 hrs/ Week  Internal Assessment: 30
Tutorial: -  Final Examination: 70
Practical: -  Credits: 3

Objectives: Students learn
- Fundamental aspects of computer architecture design and analysis.
- Processor design, pipelining, superscalar, out-of-order execution, caches (memory hierarchies), virtual memory, storage systems, and simulation techniques.
- Models of Parallel computers and the fundamentals of parallelism concepts and network properties.
- Massively parallel computers, scalar processors.
- Design principles and operation of new (multi-)processor architectures, and evaluate them both qualitatively and quantitatively.
- Principles of multithreading.

Learning Outcomes: Upon completion of this course the students will be able to Understand
- Principles of parallel processing.
- Issues in high performance processor design.
- Advanced processors, cache and memory technology and data dependencies.
- Parallel program development and Environments.
- Theory of parallelism, various hardware technologies, software for parallel programming.
- Pipelining techniques, parallel and scalable architectures

UNIT I:
Introduction to Parallel Processing: Trends towards parallel processing, Parallelism in uniprocessor systems, Parallel computer structures, Architectural classification schemes, Parallel processing applications, memory hierarchy in parallel processing systems, addressing schemes.
Principles of Pipelining And Vector Processing: Pipelining, principles of linear pipelining, classification of pipeline processors, general principles and Reservation tables, interleaved memory organization, Instruction & arithmetic pipelines, Principles of designing pipeline processors, Vector processing Requirements.

UNIT II:
SIMD array processors, organization, masking and routing mechanisms, inter PE communications, SIMD interconnection networks, single stage and multi stage networks, mesh connected Iliac networks, parallel shifter, shuffle exchange and omega networks, parallel algorithms for array processors, matrix multiplication, parallel sorting, fast Fourier transform computation, associative array processor.
UNIT III:
**Multiprocessor Architecture:** Loosely coupled and tightly coupled multiprocessor systems, processor characteristics, interconnection networks, crossbar switch and multi port memories, multi stage networks, banyan and delta networks parallel memory organization, multiprocessing operating systems, classification and requirements, software requirements for MPS, language features to exploit parallelism, multi processor scheduling strategies, parallel algorithms.

UNIT – IV
**Data Flow Computers:** Control flow versus data flow, data flow computer architectures, data flow graphs, data flow languages, Dennis and Irvine machines, dataflow design alternatives, dependence driven and multi level event driven approaches, VLSI computing structures, systolic array architecture, VLSI matrix arithmetic processor.

**Learning Resources:**

**Text Book:**

**Reference Books:**
CS 7005 E
MIDDLEWARE TECHNOLOGIES

Lecture : 3 hrs/ Week
Tutorial : -
Practical : -
Internal Assessment: 30
Final Examination: 70
Credits: 3

Objectives: Students Learn:

- Middleware and Enterprise Integration technologies.
- Technical as well as business/management aspects of modern distributed computing environments.
- Major building blocks of contemporary distributed applications, middleware services, Web Services, component-based architectures, and enterprise application integration.

Learning Outcomes: At the end of this course the students are able to

- Describe the benefits and architecture of Client Server Technology.
- Understand the concepts of middleware technologies like CORBA, RMI and .Net technologies.
- The building components of C# .Net applications.
- The architecture of CORBA and mapping the CORBA with existing Programming languages like Java.
- The integration of component based architectures with Enterprise applications.

UNIT I:
CORBA with Java: Review of Java concept like RMI, RMI API, JDBC. Client/Server CORBA-style, The object web: CORBA with Java.

UNIT II:
Introducing C# and the .NET Platform: Understanding .NET Assemblies; Object – Oriented Programming with C#; Callback Interfaces, Delegates, and Events.
Building c# applications: Type Reflection, Late Binding, and Attribute-Based Programming; Object Serialization and the .NET Remoting Layer; Data Access with ADO.NET; XML Web Services.

UNIT III:
Core CORBA / Java: Two types of Client/Server invocations-static, dynamic. The static CORBA, first CORBA program, ORBlets with Applets, Dynamic CORBA-The portable count, the dynamic count multicontrol.
Existential CORBA: CORBA initialization protocol, CORBA activation services, CORBAIDL mapping CORBA java- to- IDL mapping, The introspective CORBA/Java object.
UNIT – IV

Java Bean Component Model: Events, properties, persistency, Introspection of beans, CORBA Beans.

EJBs and CORBA: Object transaction monitors CORBA OTM’s, EJB and CORBA OTM’s, EJB container framework, Session and Entity Beans, The EJB client/server development Process The EJB container protocol, support for transaction EJB packaging EJB design Guidelines.

Learning Resources:

Text Books:

References:

4. *Introduction to C# Using .NET*. Pearson Education
### CS 7005 F
**INDUSTRY NEED BASED ELECTIVE***

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**Objectives:**

**Learning Outcomes:**

**UNIT I:**

**UNIT II:**

**UNIT III:**

**UNIT – IV**

**Learning Resources:**

**Text Book:**

**Reference Books:**

* Introduced as per the needs of Industry from time to time.
CS 7006 A
DIGITAL IMAGE PROCESSING

Lecture : 3 hrs/ Week
Internal Assessment: 30
Tutorial : -
Final Examination: 70
Practical : -
Credits: 3

Objectives:
• To introduce students to the Basic concepts and analytical methods of analysis of digital images.
• To Study fundamental concepts of Digital Image Processing and basic relations among pixels.
• To Study different Spatial and Frequency domain concepts.
• To understand Restoration process of degraded image and Multi resolution processing.
• To understand image compression and Segmentation Techniques.

Learning Outcomes:
Up on completion of this course the students can be able to understand
• Basic concepts and analytical methods of analysis of digital images.
• Fundamental concepts of Digital Image Processing and basic relations among pixels.
• Different Spatial and Frequency domain concepts.
• Restoration process of degraded image and Multi resolution processing.
• Image compression and Segmentation Techniques.

UNIT I:

UNIT II:

UNIT III:
UNIT – IV

**Image Compression**: Image Compression Models, Error-free Compression, Lossy Compression, Image Compression Standards.

**Image Segmentation**: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.

**Learning Resources:**

**Text Book:**

**Reference Books:**
CS 7006 B
REAL TIME SYSTEMS

Lecture : 3 hrs/ Week
Tutorial : -
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 3

Objectives: Students learn:
• Concepts and characteristics of real-time systems.
• Characterize, model, analyze, and design real time systems.
• Programming for real time systems, methods, tools, and the critical aspects of a modern software development life cycle.

Learning Outcomes: Upon completion of this course the students will be able to understand
• Concepts of real-time systems and recognize the characteristics of a real-time system.
• Basics of designing and/or choosing hardware and software for simple and advanced real-time systems.
• Current practical issues in real-time systems.
• Techniques and results for theoretical analysis of real-time scheduling algorithms.
• Architectural design of a real-time system.
• Software engineering principles for real-time system development.

UNIT I:
Typical Real-Time systems: Digital control, High-Level controls, Signal Processing, Other real time applications.

UNIT II:
Commonly used approaches to Real-Time scheduling: Clock-Driven approach, Weighted Round-robin approach, Priority Driven approach, Dynamic vs Static systems, Off-line vs. On-line scheduling.
Clock-Driven scheduling: General structure of cyclic schedules, Scheduling sporadic jobs, Algorithm for constructing static schedules, Pros and Cons of Clock-driven scheduling.

UNIT III:
Scheduling Periodic and sporadic jobs in Priority-Driven systems: Deferrable Servers, Sporadic Servers, Constant Utilization, Total Bandwidth and weighted Fair-Queuing Servers, Scheduling of sporadic Jobs.
UNIT – IV


Scheduling Flexible computations and tasks with temporal distance Constraints: Flexible Applications, Tasks with Temporal Distance Constraints

Learning Resources:

Text Book:

Reference Book:
CS 7006 C
ADVANCED DATABASE MANAGEMENT SYSTEMS

Lecture : 3 hrs/ Week  Internal Assessment: 30
Tutorial : -  Final Examination: 70
Practical : -  Credits: 3

Objectives: Student learn

- In depth knowledge of tree structured indexes
- Query evaluation plans and estimation of cost
- Advanced database architectures like Distributed, Object Oriented and Parallel databases
- Issues in Database systems performance tuning to improve application speed
- Advanced transaction processing techniques

Learning Outcomes: Upon completion of this course the students will be able to understand

- ISAM, B+tree indices, also understands the impact of index implementation
- Generate a good evaluation plan for a given query among many alternative plans
- Transaction management in Parallel, Distributed and Object Oriented databases
- Benchmarks to measure commercial database system performance
- Transaction processing monitors, transactional workflows

UNIT I:
Indexing: Basic Concepts- Ordered Indices- B+-Tree Index Files- B-Tree Index Files- Index Definition in SQL

UNIT II:
Object –Relational Databases: Nested Relations- Complex Types- Inheritance- Reference Types- Querying with Complex Types- Functions and Procedures- Object-Oriented versus Object-Relational
Distributed Databases: Homogeneous and Heterogeneous Databases- Distributed Data Storage- Distributed Transactions- Commit Protocols- Concurrency Control in Distributed Databases- Availability- Distributed Query Processing- Heterogeneous Distributed Databases- Directory Systems
UNIT III:
**Parallel Databases:** Introduction- I/O Parallelism- Interquery Parallelism- Intraquery Parallelism- Intraoperation Parallelism- Interoperation Parallelism- Design of Parallel Systems

**Application Development and Administration:** Web Interfaces to Databases- Performance Tuning- Performance Benchmarks- Standardization- Legacy Systems

UNIT – IV
**Advanced Data Types and New Applications:** Motivation- Time in Databases- Spatial and Geographic Data- Multimedia Databases- Mobility and Personal Databases

**Advanced Transaction Processing:** Transaction-Processing Monitors- Transactional Workflows- Main-Memory Databases- Real-Time Transaction Systems- Long-Duration Transactions- Transaction Management in Multidatabases

### Learning Resources:

**Text Book:**

**Reference Books:**

B.Tech. (CSE) Syllabus VR10

CS 7006 D
BIO-INFORMATICS

Lecture: 3 hrs/ Week
Tutorial: -
Practical: -

Internal Assessment: 30
Final Examination: 70
Credits: 3

Objectives:
Students learn

• Bioinformatics as means for computational learning.
• Basic biological databases and algorithms for proteomics and genomics analysis.
• Bioinformatics packages to solve the biological problems.

Learning Outcomes:
By the end of this course, the students will be able to

• Know the differences between genomics and proteomics.
• Understand and analyse how to solve the biological problems using computational approach
• Understand and analyse internet packages of bioinformatics.

UNIT I:
Introduction and DNA Sequence analysis:

UNIT II:
Data Bases in Bioinformatics
Protein Information Resources: Biological databases, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases.
Genome Information Resources: DNA sequence databases, specialized genomic resources

UNIT III:
Alignment Techniques
Pair wise alignment techniques: Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching.
Multiple sequence alignment: Definition and Goal, The consensus, computational complexity, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments and searching
UNIT – IV

Database Searching and Analysis Packages

Secondary database searching: Importance and need of secondary database searches, secondary database structure and building a sequence search protocol

Analysis Packages: Analysis package structure, commercial databases, commercial software, comprehensive packages, packages specializing in DNA analysis, Intranet Packages, Internet Packages.

Learning Resources:

Text Book:

Reference Books:
2. Scott Markel &Darryl Leon, Sequence Analysis in A Nutshell. O’REILLY.
CS 7006 E
ARTIFICIAL INTELLIGENCE

Lecture : 3 hrs/ Week  Internal Assessment: 30
Tutorial : -  Final Examination: 70
Practical : -  Credits: 3

Objectives: Students learn:
- The achievements of AI and the theory underlying those achievements.
- The engineering design issues of AI systems.
- Basic issues of knowledge representation and heuristic search
- Mini max, resolution, that play an important role in AI programs
- Rule based programming language
- Expert systems

Learning Outcomes: Students who have successfully completed this course will have full understanding of the following concepts
- Various Ideas in AI
- Various Types of Expert systems
- Issues of the Knowledge Representation.
- Knowledge in writing Prolog programs.

UNIT I:
Problems, Problem Spaces And Search: Defining the Problem as a State space Search, Production Systems, Problem Characteristics, Production system characteristics, Issues in the Design of Search Programs.
Heuristic Search Techniques: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

UNIT II:
Knowledge Representation Using Predicate Logic: Representing Simple Facts in logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Question answering.
Weak Slot-And-Fillers Structures: Semantic Nets, Frames.

UNIT III:

UNIT – IV
PROLOG Language:
Facts, Objects and predicates, Variables, Rules, Input and Output, Arithmetic Operations, Cut, Fail, Recursion, string operations, Dynamic databases, Lists.
Learning Resources:

Text Book:

Reference Books:
2. Russel and Norvig, *Artificial Intelligence*. Prentice Hall of India/Pearson Education
CS 7006 F
INDUSTRY NEED BASED ELECTIVE*

Lecture : 3 hrs/ Week  Internal Assessment: 30
Tutorial : -  Final Examination: 70
Practical : -  Credits: 3

Objectives:

Learning Outcomes:

UNIT I:
UNIT II:
UNIT III:
UNIT – IV

Learning Resources:

Text Book:
Reference Books:

* Introduced as per the needs of Industry from time to time.
CS 7051
.NET TECHNOLOGIES LAB

Lecture : --  Internal Assessment: 25
Tutorial : -  Final Examination: 50
Practical : 3 hrs/ Week  Credits: 2

Objectives: Students can
• Empower in .NET Technologies
• Build applications that have visually stunning user experiences, seamless and secure communication, and the ability to model a range of business processes.
• Build applications that work the way they want, in the programming language they prefer, across software, services, and devices.

Learning Outcomes: At the end of this course the students will be able to Design and Develop
• Standard Applications using C#.Net (Win Forms and Win Controls).
• Web Application with ADO.Net (Data Base Connectivity)
• Web Applications using ASP.Net (Web Forms with ASP.Net Controls)

LIST OF PROGRAMS
Design Windows Applications Using C#.NET

Week 1:
A form validates user Input.
Calendar.

Week 2:
Calculator
Alarm Clock.

Week 3:
Demonstrate basic String manipulation functions using both string builder and string classes

Week 4:
Notepad.

Week 5:
Design an application to demonstrate DML & DDL Command using ADO.NET

Week 6:
Web browser
Media player

Week 7:
Create and access Assemblies

**Design Web Applications Using ASP.NET**

**Week 8:**
Web Design a Web Form to demonstrate all ASP.Net controls.

**Week 9:**
Database application using ADO.NET.

**Week 10:**
Design a Web page that counts no of users visited and Number of users Online.
Sending an E-Mail.

**Week 11:**
Online Birthday reminder.

**Week 12:**
Using and Creating an XML document

**Learning Resources:**

**Text Books :**
CS 7052
EMBEDDED SYSTEMS LAB

Lecture : --  Internal Assessment: 25
Tutorial : -  Final Examination: 50
Practical : 3 hrs/ Week  Credits: 2

Objectives:
• Programming the microcontroller.
• To understand the meaning of embedded system and applications in which they are used.
• To study various embedded design methodologies and tools

Learning Outcomes:
• Develop microcontroller programming
• Design hardware and software for minimum microcontroller based system
• Design simple embedded systems

LIST OF PROGRAMS
On 8051 and PIC microcontrollers

Week 1:
Basic programs on microcontrollers

Week 2:
Programs on Serial Communications

Week 3:
Programs on Timer/Counter concepts
Programs on Display Interfacing

Week 4:
Programs to Traffic Light Control

Week 5:
Programs to interface stepper motor

Week 6:
Programs for small application like Data acquisition (temperature sensors)

Week 7:
Programs on task management
Week 8:
Programs on memory management

Week 9:
Programs on inter task communications

Week 10:
Programs on task synchronization

**Additional Exercises**

Programs on Interrupt Mechanism
Programs on Memory Interfacing
EPROM Flash Programming
Programs on networking using PIC microcontroller
Writing serial device driver code with an UART 8250 device.

**Learning Resources:**

**Text Books :**


**Reference Books:**

CS 7053
MINI PROJECT

Lecture : -- Internal Assessment: 50
Tutorial : 1 Final Examination: -
Practical : - Credits: 1

Objectives:
• The Mini-Projects aim to stimulate interest and provide motivation for student to get involved in enhancing the student learning experience and to promote excellence in learning and teaching in the area of engineering education
• The overall aim of the project is to educate students on taking control of their careers and directing their practices and opportunities to maximize their skills, consequently allowing them to excel in their graduate positions and their extended careers
• The mini project is designed to help students develop practical ability and knowledge about practical tools/techniques in order to solve real life problems related to the industry, academic institutions and computer science research.
• The course Mini Project is one that involves practical work for understanding and solving problems in the field of computing.

Learning Outcomes:
• Students will select individually Commercial or Technical Project based on Application Development Technologies learnt in previous semesters.
• Each student will have to prepare proper documentation consisting of Software Requirements Specification (SRS), Modeling Techniques, Development Strategies, Implementation and Testing Strategies. Student may use any Design Methodologies such as SSAD, OOAD and UML, etc.
• The project work will be presented by students using Power Point Presentation Tool to the panel of Examiners.
## CS 8001

### SOFTWARE TESTING METHODOLOGIES

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**Credits:** 4

**Objectives:**
- The students will learn
  - Basic software debugging methods.
  - White box and Black box testing methods
  - Writing the testing plans
  - Different testing procedures for testing programs

**Learning Outcomes:**
- After completion of the course the students will be able to:
  - Understand the basic testing procedures.
  - Write test plans for different console and GUI applications.
  - Test the applications manually and by automation by using different testing methods.

**UNIT I:**

**Introduction:** Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.

**Flow graphs and Path testing:** Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

**UNIT II:**

**Transaction Flow Testing:** transaction flows, transaction flow testing techniques.

**Dataflow testing:** Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

**UNIT III:**

**Domain Testing:** domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

**Paths, Path products and Regular expressions:** path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

**UNIT – IV**

**Logic Based Testing:** overview, decision tables, path expressions, kv charts, specifications.

**State, State Graphs and Transition testing:** state graphs, good and bad state graphs, state testing, Testability tips.

**Learning Resources:**

**Text Book:**

**Reference Books:**
1. *Software Testing Techniques* – SPD (Oreille)
CS 8002 A
INFORMATION RETRIEVAL SYSTEMS

Lecture : 4 hrs/ Week  Internal Assessment: 30
Tutorial : -  Final Examination: 70
Practical : -  Credits: 4

Objectives: Students will learn

- Record structures and text processing required producing basic document retrieval systems.
- Major "content-based" retrieval approaches—Boolean, vector space, and probabilistic approaches, primarily.
- Features on commercial information retrieval systems through physical inspection.
- Digital information access in several institutional settings.
- Factors affecting future information retrieval.

Learning Outcomes: Upon completion of this course students will be able to understand

- Record structures and text processing required producing basic document retrieval systems.
- Content-based retrieval approaches—Boolean, vector space, and probabilistic approaches.
- User Search techniques for commercial and digital information access and retrieval systems.

UNIT I:
Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.
Information Retrieval System Capabilities: Search, Browse, Miscellaneous

UNIT II:

UNIT III:
Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages
Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT – IV
User Search Techniques: Search statements and binding, Similarity measures and
ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext. Information Visualization: Introduction, Cognition and perception, Information visualization technologies.

**Text Search Algorithms:** Introduction, Software text search algorithms, Hardware text search systems.

**Information System Evaluation:** Introduction, Measures used in system evaluation, Measurement example – TREC results.

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**Learning Resources:**

**Text Book:**


**Reference Books:**

CS 8002 B
PRINCIPLES OF PROGRAMMING LANGUAGES

Lecture : 4 hrs/ Week
Tutorial : -
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 4

Objectives

Students will learn

- Evolution and Comparison of programming languages
- Principles of imperative, functional, object oriented and logic oriented programming languages
- Skills in describing, analyzing, and using the features of programming languages
- Syntax specification
- Central formalisms used in the description of programming languages
- Structure and design principles of programming languages

Learning Outcomes:

Upon successful completion of this course student is able to understand

- Language features and paradigms of different programming languages
- Syntax, semantics, naming, scope and binding of variables and functions
- Control flow, data types and execution of programming languages
- Professional Skill
- Appropriate languages for given applications

UNIT I:
Primitive Data Types and Variables: Names, variables, Concept of Binding, Type checking, Strong typing, Type compatibility, Named Constants, Variable Initialization

UNIT II:
Scope and Extent: Scope, Scope and Life Time, Referencing Environments.
Data Types: Primitive, character string, User-defined, Array, Associative Arrays, Record, Union, Set, Pointer.
Expression and the Assignment Statement: Arithmetic Expressions, Overloading, Type Conventions, Relational and Boolean, Short Circuit, Assignment, Mixed mode Assignment.
Statement Level Control Structures: Compound, Selection, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT III:
Subprograms: Fundamentals, Design Issue, Local Referencing Environment, Parameter Passing, Parameters that are sub-program names, Overloaded Sub-programs, Generic,
Separate and Independent Compilation, Design Issues for functions, Non-local environments, User Defined Overloaded Operators, Co routines.

**Implementing Subprograms:** FORTRAN 77, Algol-like languages, Blocks, Dynamic Scoping, and Implementing Parameters that are sub-program names. Data Abstraction: Concepts, Encapsulation, Data, Introduction, Design Issues, Examples, Parameterized Abstract Data Types.

**UNIT – IV**

**Symmetric and Concurrent Subprograms:** Support for Object Oriented Programming, Design Issues, Smalltalk, Support for Object Oriented Programming in ; C++, Java, ADA 95, Implementation

**Concurrency:** Sub-program level, Semaphores, Monitors, Message Passing, Concurrency in ADA 95, Java Threads, Statement level concurrency.

Exception handling: Introduction, Exception Handling in: PL1, ADA, C++, And Java.

**Learning Resources:**

**Text Book:**

**Reference Books:**
CS 8002 C
VIRTUAL REALITY

Lecture : 4 hrs/ Week
Tutorial : -
Practical : -
Internal Assessment: 30
Final Examination: 70
Credits: 4

Objectives: Student able to learn:
- Fundamental terminology, technology and components of virtual reality.
- Various input and output devices and types of modeling.
- Various applications of VR.
- Virtual reality systems
- Programming concepts in Virtual Reality.

Learning Outcomes:
- Understands various input and output devices (Trackers, Navigation, and Gesture Interfaces) (Graphics displays, sound displays & haptic feedback)
- Familiar with the three I’s of virtual reality, commercial VR technology and the five classic components of a VR system.
- Design virtual reality systems.
- Able to distinguish between various kinds of modeling
- Understand the basic components of a VR system.
- Implement programming in Virtual Reality.

UNIT I:
Introduction: The three I’s of Virtual Reality, early commercial VR technology and the five classic components of a VR system.

UNIT II:
Output Devices: Graphics Displays, Sound Displays & Haptic feedback.
Modeling: Geometric modeling, kinematics modeling, physical modeling, behavior modeling, model management.

UNIT III:
Human Factors: Methodology and terminology, user performance studies, VR health and safety issues.

UNIT – IV
Traditional & Emerging VR Applications: Medical applications of VR, Military VR applications, VR Applications in manufacturing, Applications of VR in Robotics.
VR Programming: Toolkits and Scene Graphs, WorldToolKit, Java3D, General Haptics Open Software Toolkit, People Shop.
Learning Resources:

Text Book:

References Books:

CS 8002 D
E-COMMERCE

Lecture : 4 hrs/ Week
Tutorial : -
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 4

Objectives:
Students learn:

- Mechanism of business transactions through electronic media.
- Payment transactions in a secured network.
- Different modes of E-Commerce like Electronic data interchange.
- Web site establishment, electronic publishing and its importance.

Learning Outcomes:
Upon completion of this course the student will be able to Understand

- Various components of e-commerce
- Dynamics of e-commerce.
- Internet technology and its utility in commercial activities.
- Methodology of online business dealings using e-commerce infrastructure.

UNIT I:

UNIT II:

UNIT III:
UNIT – IV


**Learning Resources:**

**Text Book:**


**Reference Books:**

CS 8002 E
GRID COMPUTING

Lecture : 4 hrs/ Week
Tutorial : -
Practical : -

Credits: 4

Objectives: Students will learn:
• Overview of the basic concepts of Cluster and Grid Computing;
• Integrating task parallelism with data parallelism
• Parallel programming model on CORBA.
• Design and implement a parallel computing model on Grids called Sneha-Samuham.
• Implementing Simulation algorithms
• Designing a combination of Genetic and Simulated Annealing algorithms.

Learning Outcomes: Upon completion of this course student will be able to
• Understand the basic concepts of Cluster Computing, Grid Computing and Mobile Grid Models.
• Integrating Task parallelism with Data Parallelism.
• Know about a parallel Computing Model over Grids.
• Can develop some simulation algorithms for job shop scheduling etc

UNIT I:
Parset: System Independent Parallel Programming on distributed systems:-Motivation and introduction, Semantics of the parset construct, Expressing parallelism through parsets, Implementing parsets on a loosely coupled distributed system.

UNIT II:
Integrating Task Parallelism with Data Parallelism: Introduction and motivation, A model for integrating task parallelism into data parallel programming platforms, Integration of the model into ARC, Design and implementation applications, performance analysis, guidelines for composing user programs, related work
Anonymous Remote Computing and Communication Model: Introduction, Location-independent inter task communication with DP, DP model of iterative grid computations, Design and implementation of distributed pipes, Case study, and Performance analysis.
Parallel Programming Model on CORBA:-Introduction, Existing works, notion of concurrency, system support implementation performance, stability of CORBA: introspection.

UNIT III:
Sneha-Samuham: Grid Computing Model: Introduction, Sneha-Samuham: a parallel computing model over grids, Design and implementation of the model, Performance studies, Related work.

UNIT – IV
Distributed Simulating Annealing Algorithms for Job Shop Scheduling: Introduction, overview, distributed algorithms for job shop scheduling, implementation, results and observation.
Parallel Simulated Annealing Algorithms: Introduction, Simulated Annealing (SA) Technique, Clustering algorithm for Simulated Annealing (SA), Combination of genetic algorithm and simulated annealing (SA) algorithm

Learning Resources:

Text Book:

Reference Books:
2. Joshy Joseph and Craig Fellenstein, Grid Computing, Pearson Education
CS 8003 A
SOFT COMPUTING

Lecture : 4 hrs/ Week
Tutorial : -
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 4

Objectives: Students Learn
- General concepts and techniques in soft computing
- Soft computing techniques to practical problems
- Popular tools for Soft Computing;

Learning Outcomes: Upon completion of this course the student will be able to:
- Understand the need and usage of Soft Computing in various areas
- Know the steps involved in the development of Soft Computing;
- Use popular tools for Soft Computing;
- Design and implement computing systems by using appropriate Soft Computing techniques and tools.

UNIT I:

UNIT II:


UNIT III:

UNIT – IV

Learning Resources:

Text Books:
Reference Books:

3. George J. Klir and Bo Yuan, *Fuzzy sets and Fuzzy Logic*. Prentice Hall of India/Pearson Education.
CS 8003 B
ADVANCED EMBEDDED SYSTEMS

Lecture : 4 hrs/ Week  
Internal Assessment: 30
Tutorial : -  
Final Examination: 70
Practical : -  
Credits: 4

Objectives: Students Learn:
- Designing the life cycle of Embedded Systems
- Testing of Embedded Software.
- About Co-design.
- Various port interfaces

Learning Outcomes: Upon completion of this course students will be able to
- Understand devices that are required to transfer software from host machine to Target machine.
- Understand the functions of RTOs
- Design Embedded Systems
- Test and debug Embedded Software

UNIT I:

UNIT II:

UNIT III:

UNIT IV
Learning Resources:

Text Books:

Reference Books:

CS 8003 C
PRINCIPLES OF TCP/IP

Lecture: 4 hrs/Week
Internal Assessment: 30
Tutorial: -
Final Examination: 70
Practical: -
Credits: 4

Objectives:

- Standards that define protocol TCP/IP suite and also different protocols under it.
- TCP/IP concepts, terminology and its mechanisms.
- Configure hosts and access internetworks using TCP/IP protocols
- Major TCP/IP application services and identify the role of each TCP/IP component
- Socket programming and several client/server programs.
- Troubleshoot TCP/IP networks using protocol analysis techniques

Learning Outcomes:

Upon completion of this course student will be able to understand:

- Different applications of TCP/IP and also its architecture.
- The functions of TCP/IP.
- Security issues involved with TCP/IP.
- Socket programming and many client/server applications.
- Services provided by the TCP/IP.

UNIT I:
Introduction and Overview: The Motivation for Internetworking, The TCP/IP Internet, Internet Services, History And Scope Of The Internet
The Socket Interface Introduction Adding Network I/O to UNIX, Socket Programming
Review Of Underlying Network Technologies: Introduction, Two approaches to network communication, Ethernet Technology, Switched Ethernet Asynchronous Transfer Mode

UNIT II:
Protocol Layering: The Need for Multiple Protocols, TCP/IP 5-Layer Reference Model Layering in a TCP/IP Internet Environment, Two Important Boundaries In The TCP/IP Model The Basic Idea Behind Multiplexing and demultiplexing

UNIT III:
Internet Multicasting IGMP, Multicast Routing Protocols IP Switching and MPLS

UNIT – IV
Mobile IP Mobility, Routing, and Addressing Overview Of Mobile IP Operation Foreign Agent Discovery, Agent Registration Communication With A Foreign Agent Datagram Transmission And Reception Bootstrap and Auto configuration (DHCP) Network
Management (SNMP)  Internet Security And Firewall Design (IPsec, SSL)  A Next Generation IP (IPv6)

**Learning Resources:**

**Text Book:**

**Reference Books:**
CS 8003 D
NEURAL NETWORKS

Lecture : 4 hrs/ Week
Tutorial : -
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 4

Objectives: Students Learn:

- Neural networks as means for computational learning
- Basic neural network architectures for classification and regression.
- Neural network applications on real-world tasks.

Learning Outcomes: By the end of this course, students will be able to

- Develop some mathematical competence for understanding neural networks.
- Differentiate between the supervised and unsupervised learning.
- Understand types of neural networks for various purposes
- Implement Neural networks using training algorithms such as feed forward, back-propagation.

UNIT I:
Introduction - what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks
Learning Process – Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process,

UNIT II:
Single layer perceptrons – Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perceptron – convergence theorem, Relation between perceptron and Bayes classifier for a Gaussian Environment
Multilayer Perceptron – Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, Computer experiment, feature detection

UNIT III:
Self Organization Maps – Two basic feature mapping models, Self organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive pattern classification
UNIT – IV
Neuro Dynamics – Dynamical systems, stability of equilibrium states, attractors, neurodynamical models, manipulation of attractors as a recurrent network paradigm
Hopfield Models – Hopfield models, computer experiment

Learning Resources:

Text Book:

Reference Books
CS 8003 E
PATTERN RECOGNITION

Lecture : 4 hrs/ Week
Tutorial : -
Practical : -

Internal Assessment: 30
Final Examination: 70
Credits: 4

Objectives:
• Understand the concept of patterns and the basic approach to the development of pattern recognition algorithms
• Understand and apply methods for data preprocessing, feature extraction, and feature selection to multivariate data
• Understand and apply supervised and unsupervised classification methods to detect and characterize patterns in real-world data
• Develop prototype for pattern recognition algorithms that can be used to study algorithm behavior and performance against real-world multivariate data.

Learning Outcomes:
• The students are exposed to the underlying principles of pattern recognition and on the methods used to develop and deploy applications in the real world.
• An Emphasis is placed on the pattern recognition application development process, which includes problem identification, concept development, algorithm selection.
• Understand the basic concepts and methods for the recognition of patterns in data.

UNIT I:
Introduction: Machine perception, pattern recognition systems, the design cycle, learning and adaptation.
Bayesian Decision Theory: Introduction, continuous features – two categories classifications, minimum error-rate classification- zero–one loss function, classifiers, discriminant functions, and decision surfaces.

UNIT II:
Normal density: Univariate and multivariate density, discriminant functions for the normal density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context.
Maximum likelihood and Bayesian parameter estimation: Introduction, maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case.

UNIT III:
Problems of dimensionality: Accuracy, Dimension and Training Sample size, Computational Complexity, Overfitting
Component analyses and discriminants: Principal component analysis, Fisher Linear Discriminant, Multiple Discriminant Analysis, Nonlinear component analysis; Low dimensional representations and multi dimensional scaling.
UNIT – IV

Learning Resources:

Text Book:

References:
1. Earl Gose, Richard John baugh, Steve Jost, Pattern Recognition and Image Analysis. PHI 2004
CS 8051
SOFTWARE TESTING TOOLS LAB

Lecture : -  Internal Assessment: 25
Tutorial : -  Final Examination: 50
Practical : 3 hrs/ Week  Credits: 2

Objectives:
• Gain confidence that systems can be used with acceptable risk.
• Try out features and functions under unusual conditions and situations
• Clarify system specifications and performance.
• Detect errors earlier in the process.
• Identify risks and problems and ways to avoid them in the future
• Discover defects, errors, and system deficiencies.
• Define system capabilities and limitations.
• Provide information on the quality of components, systems, and work products.

Learning Outcomes:
• Familiarize with Analysis, planning, and design
• Identify Testing is a critical element of software Quality Assurance
• Discover Post-release removal of defects is the most expensive
• Discover Testing is risk-based, Measuring and tracking coverage is essential
• Timing of test preparation matters a lot, Time and resources are important
• Identify that Motivation is important

List of Programs

LAB CYCLE I
1. Map File: Calculator
2. Logical Names & Physical Description: Flight Reservation
3. GUI SPY: Paint
4. Merge GUI Map Files
5. Record in Context Sensitive Mode – Calculator, Flight Reservation, MS-Excel
6. Record in Analog Mode – Paint, Notepad, MS-Word

LAB CYCLE – II
7. Evaluating Expression
8. Print Name, Tickets & Total Amount
9. Flight Reservation Orders from 1 to 10
10. Insert New Order and Delete Order: Flight Reservation
11. Insert Order, Update Order, Delete Order must be Disabled: Name is empty
LAB CYCLE - III
12. GUI Checkpoint: For Single Property
13. GUI Checkpoint: For Object/Window
14. GUI Checkpoint: For Multiple Objects
15. Bitmap Checkpoint: For Object/Window
16. Bitmap Checkpoint: For Screen Area
17. Bitmap Checkpoint: For Screen Area on Graphs

LAB CYCLE - IV
18. Call Functions
19. Window Functions
20. Exception Handling
21. Tickets in Flight Reservation (not >10)
22. Functionality of Date of Flight, Fly From & Fly To
23. Functionality of File -> Exit

LAB CYCLE - V
24. DataBase Checkpoint: Default Check
25. DataBase Checkpoint: Custom Check
26. DataBase Checkpoint: Runtime Record Check
27. Synchronization Point: Object/Window Property
28. Synchronization Point: Object/Window Bitmap
29. Synchronization Point: Screen Area Bitmap

LAB CYCLE – VI
30. Create & load a Function
31. Data Driver Wizard – Data Table
32. Retrieve Data from Text file
33. Write Data to Text file
34. Write Data to Data Table
35. Write Data to Text file & Data Table

Learning Resources:

CS 8052
MAJOR PROJECT

Lecture: 2 hrs / week
Tutorial: 6 hrs / week
Practical: -

Internal Assessment: 50
Final Examination: 100
Credits: 12

Objectives:
• The objective of the project is to enable the students to work in groups of not more than four members in each group on a project involving analytical, experimental, design or combination of these in the area of Computer Science and Engineering.

• The student is required to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem.

Learning Outcomes:
Each group is given a Project which will cover all the aspects (to the extent possible) like investigation, planning, designing, detailing and estimating of a Computer Science and Engineering principles in which the aspects like analysis, application of relevant codes, etc., will find a place. Alternately, a few research problems also may be identified for investigation and the use of laboratory facilities to the fullest extent may be taken as a project work. Alternately, a student is encouraged to take an industrial project with any Computer Science and engineering organization or firm. A project report is to be submitted on the topic as per the prescribed format.

Learning Resources:

Text Books:

Reference Books: