

# **Mahakaushal University, Jabalpur (M.P.)**



## **Scheme & Syllabus**

**For**

**B.Tech**

**in**

**Computer Science Engineering**

**2021-2022 onwards**

**Duration of Course: 4 Years**

**Examination Mode: Semester**

**Examination System: CBCS**

**Mahakaushal University  
Village-Aithakheda, Mukunwara Road, Post- Tilwara Jabalpur (M.P.) 482003**

## Engineering Chemistry

### Course Contents:

- (i) **Water – Analysis, Treatments and Industrial Applications (4 Lectures)**  
Sources, Impurities, Hardness & its units, Determination of hardness by EDTA method, Alkalinity & Its determination and related numerical problems.
- (ii) **Boiler problem & softening methods (4 Lectures)**  
Boiler troubles (Sludge & Scale, Priming & Foaming, Boiler Corrosion, Caustic Embrittlement), Softening methods (Lime-Soda, Zeolite and Ion Exchange Methods) and related numerical problems.
- (iii) **Lubricants and Lubrication (4 Lectures)**  
Introduction, Mechanism of lubrication, Classification of lubricants, significance & determination of Viscosity and Viscosity Index, Flash & Fire Points, Cloud & Pour Points, Aniline Point, Acid Number, Saponification Number, Steam Emulsification Number and related numerical problems.
- (iv) **Polymer & polymerization (4 Lectures)**  
Introduction, types of polymerisation, Classification, mechanism of polymerisation (Free radical & Ionic polymerization). Thermoplastic & Thermosetting polymers Elementary idea of Biodegradable polymers, preparation, properties & uses of the following polymers- PVC, PMMA, Teflon, Nylon 6, Nylon 6:6, Polyester phenol formaldehyde, Urea- Formaldehyde, Buna N, Buna S, Vulcanization of Rubber.
- (v) **Phase equilibrium and Corrosion (5 Lectures)**  
Phase diagram of single component system (Water) Phase diagram of binary Eutectic System (Cu-Ag.) Corrosion: Types, Mechanisms & prevention.
- (vi) **Spectroscopic techniques and application (6 Lectures)**  
Principle, Instrumentation & Applications, electronics spectroscopy, Vibrational & Rotational Spectroscopy of diatomic molecules.
- (vii) **Periodic properties (4 Lectures)**  
Effective Nuclear Charge, Variations: S, P, d & f Orbital energies of atoms in periodic table, Electronics Configuration, atomic & Ionic sizes, electron affinity & electro negativity, Polarizability & Oxidation States.

### Course Outcomes

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular

- energy levels in various spectroscopic techniques
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

#### Practical List

NOTE: At least 8 of the following core experiments must be performed during the session.

- 1. Water testing**
  - (i) Determination of Total hardness by Complexometric titration method.
  - (ii) Determination of mixed alkalinity
    - a) OH & CO<sub>3</sub>
    - b) CO<sub>3</sub> & HCO<sub>3</sub>
  - (iii) Chloride ion estimation by Argentometric method.
- 2. Fuels & Lubricant testing:**
  - (i) Flash & fire points determination by
    - a) Pensky Martin Apparatus,
    - b) Abel's Apparatus
    - c) Cleveland's open cup Apparatus
    - d) Calorific value by bomb calorimeter.
  - (ii) Viscosity and Viscosity index determination by
    - a) Redwood viscometer No.1
    - b) Redwood viscometer No.2
  - (iii) Proximate analysis of coal
    - a) Moisture content
    - b) Ash content
    - c) Volatile matter content
    - d) Carbon residue
  - (iv) Steam emulsification No & Anline point determination
  - (v) Cloud and Pour point determination of lubricating oil
- 3. Alloy Analysis**
  - (i) Determination of percentage of Fe in an iron alloy by redox titration using N-Phenyl anthranilic acid as internal indicator.
  - (ii) Determination of Cu and or Cr in alloy by Iodometric Titration.
  - (iii) Determination of % purity of Ferrous Ammonium Sulphate & Copper Sulphate.

#### Reference Books :

- 1 Chemistry in Engineering and Technology - Vol.1 &2 Kuriacose and Rajaram , McGraw Hill Education
- 2 Fundamental of Molecular Spectroscopy C.N. Banwell , McGraw Hill Education
- 3 Engineering Chemistry – B.K. Sharma, Krishna Prakashan Media (P) Ltd., Meerut.
- 4 Basics of Engineering Chemistry – S.S. Dara & A.K. Singh, S. Chand &Company Ltd., Delhi.
- 5 Applied Chemistry – Theory and Practice, O.P. Viramani, A.K. Narula, New Age International Pvt. Ltd. Publishers, New Delhi.
- 6 Elementary Spectroscopy ,Y .R. Sharma , S. Chand Publishing
- 7 Polymer Science, Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar, New Age International Pvt. Ltd
- 8 Advanced Inorganic Chemistry, G.R. Chatwal, Goal Publishing house
- 9: ~~Engineering Chemistry~~ Engineering Chemistry (NPTEL Web-book ) B.L. Tembe, Kamaluddin and M.S. Krishna

## ENGG. MATHEMATICS-I

**OBJECTIVES:** The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. More precisely, the objectives are:

To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.

To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.

To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.

To familiarize the student with functions of several variables that is essential in most branches of engineering.

To develop the essential tool of matrices and linear algebra in a comprehensive manner.

### Course Contents:

**Module 1: Calculus: (10 hours):** Rolle's theorem, Mean Value theorems, Expansion of functions by Mc. Laurin's and Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Maxima & Minima (two and three variables), Method of Lagranges Multipliers.

**Module 2: Calculus: (8 hours):** Definite Integral as a limit of a sum and Its application in summation of series; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Multiple Integral, Change the order of the integration, Applications of multiple integral for calculating area and volumes of the curves.

**Module 3: Sequences and series: (6 hours):** Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

**Module 4: Vector Spaces (8hours):** Vector Space, Vector Sub Space, Linear Combination of Vectors, Linearly Dependent, Linearly Independent, Basis of a Vector Space, Linear Transformations.

**Module 5: Matrices (8 hours):** Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find inverse.

### Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

## Communication Skills

### COURSE CONTENTS:

#### Unit-I

**Identifying Common errors in writing:** Articles, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure.

#### Unit-II

##### **Vocabulary building and Comprehension:**

Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, synonyms, antonyms, Reading comprehension.

#### Unit-III

##### **Communication:**

Introduction, Meaning and Significance, Process of Communication, Oral and Written Communication, 7 c's of Communication, Barriers to Communication and Ways to overcome them, Importance of Communication for Technical students, nonverbal communication.

#### Unit-IV

##### **Developing Writing Skills:**

Planning, Drafting and Editing, Precise Writing, Précis, Technical definition and Technical description. Report Writing: Features of writing a good Report, Structure of a Formal Report, Report of Trouble, Laboratory Report, Progress Report.

#### Unit-V

##### **Business Correspondence:**

Importance of Business Letters, Parts and Layout; Application, Contents of good Resume, guidelines for writing Resume, Calling/ Sending Quotation, Order, Complaint, E-mail and Tender.

##### **Books Recommended:**

1. 'Technical Communication : Principles and practice', Meenakshi Raman and Sangeeta Sharma (Oxford)
2. 'Effective Business Communication', Krizan and merrier (Cengage learning)
3. 'Communication Skill, Sanjay Kumar and pushlata, OUP2011
4. "Practical English Usage Michael Swan OUP, 1995.
5. "Exercises in spoken English Parts I-III CIEFL, Hyderabad, Oxford University Press
6. On writing well, William Zinsser, Harper Resource Book 2001.
7. Remedial English Grammar, F.T. Wood, Macmillan2007.

##### **Course Outcomes:**

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

##### **Communicative Language Laboratory:**

**Course objective:** The language laboratory focuses on the practice of English through audio-visual aids and Computer software. It intends to enable the students to speak English correctly with confidence and intends to help them to overcome their inhibitions and self –consciousness while speaking in English.

Topics to be covered in the Language laboratory sessions:

1. Listening Comprehension.
2. Pronunciation, Intonation, Rhythm
3. Practising everyday dialogues in English
4. Interviews.
5. Formal Presentation

Final Assessment should be based on assignment, assessment, presentation and interview of each candidate.

## Basic Electrical & Electronics Engineering

### Course Contents:

#### Unit- I :

**D.C. Circuits:** Voltage and current sources, dependent and independent sources, Units and dimensions, Source Conversion, Ohm's Law, Kirchhoff's Law, Superposition theorem, Thevenin's theorem and their application for analysis of series and parallel resistive circuits excited by independent voltage sources, Power & Energy in such circuits. Mesh & nodal analysis, Star Delta transformation & circuits.

#### Unit – II :

**1- phase AC Circuits:** Generation of sinusoidal AC voltage, definition of average value, R.M.S. value, form factor and peak factor of AC quantity , Concept of phasor, Concept of Power factor, Concept of impedance and admittance, Active, reactive and apparent power, analysis of R-L, R-C, R-L-C series & parallel circuit

**3-phase AC Circuits:** Necessity and advantages of three phase systems, Meaning of Phase sequence, balanced and unbalanced supply and loads. Relationship between line and phase values for balanced star and delta connections. Power in balanced & unbalanced three-phase system and their measurements

**Unit – III : Magnetic Circuits:** Basic definitions, magnetization characteristics of Ferro magnetic materials, self inductance and mutual inductance, energy in linear magnetic systems, coils connected in series, AC excitation in magnetic circuits, magnetic field produced by current carrying conductor, Force on a current carrying conductor. Induced voltage, laws of electromagnetic Induction, direction of induced E.M.F.

**Single phase transformer-** General construction, working principle, e.m.f. equation, equivalent circuits, phasor diagram, voltage regulation, losses and efficiency, open circuit and short circuit test

#### Unit IV:

**Electrical Machines:** Construction, Classification & Working Principle of DC machine, induction machine and synchronous machine. Working principle of 3-Phase induction motor, Concept of slip in 3- Phase induction motor, Explanation of Torque-slip characteristics of 3-Phase induction motor. Types of losses occurring in electrical machines. Applications of DC machine, induction machine and synchronous machine.

#### Unit V :

**Basic Electronics:** Number systems & Their conversion used in digital electronics, De Morgan's theorem, Logic Gates, half and full adder circuits, R-S flip flop, J-K flip flop. Introduction to Semiconductors, Diodes, V-I characteristics, Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CE transistor configurations, different configurations and modes of operation of BJT

#### Course outcomes:

The final outcome of the subject will result into an enhancement in understanding the basic concepts of Core Electrical Engineering subjects. The topics covered under this subject will help to enhance the basic understanding of Electrical machines and power systems and basic electronics.

**Evaluation:** Evaluation will be continuous and integral part of the class followed by final examination.

#### List of experiments/demonstrations:

- Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
- Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
- Transformers: Observation of the no-load current waveform on an oscilloscope (non- sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.

Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions and

verification by load test.

- Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winding - slip ring arrangement) and single-phase induction machine.
- Torque Speed Characteristic of separately excited dc motor.
- Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super- synchronous speed.
- Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
- Study of V-I Characteristics of Diodes.
- Applications of Diodes and their verification.
- Transistor applications as amplifier and switch.
- Verification of truth table for various gates, Flip-Flops.
- Realizations of Various gates, Flip-Flops etc.
- Verification of De Morgan's theorems.

#### References

1. D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, latest edition.
2. S.N. Singh, Basic Electrical Engineering, P.H.I.,2013
3. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice Hall,2014
4. M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and electronics engineering, Oxford University press,2012
5. C.L. Wadhwa, Basic Electrical Engineering. New Age International.
6. B.L. Theraja & A.K Theraja Textbook of Electrical Technology - Vol. 1, S. Chand Publication
7. E. Hughes & I.M. Smith Hughes Electrical Technology Pearson
8. Vincent Del Toro Electrical Engineering Fundamentals

## Engineering Graphics

### Course Objective:

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

- to prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- to prepare you to communicate effectively
- to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice

### Course Contents:

**Traditional Engineering Graphics:** Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

**Computer Graphics:** Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modelling; Solid Modelling; Introduction to Building Information Modelling (BIM)

(Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory)

**Module 1:** Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

**Module 2:** Orthographic Projections covering, Principles of Orthographic Projections- Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

**Module 3:** Projections of Regular Solids covering, those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

**Module 4:** Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

**Module 5:** Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids;

Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

**Module 6:** Overview of Computer Graphics covering, listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids]

**Module 7:** Customisation & CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

**Module 8:** Annotations, layering & other functions covering applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;

**Module 9:** Demonstration of a simple team design project that illustrates Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

#### Goals & Outcomes:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

#### Text/Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5. (Corresponding set of) CAD Software Theory and User Manuals

### **Workshop Practice:**

1. Machine shop (**10 hours**)
2. Fitting shop (**8 hours**)
3. Carpentry (**6 hours**)
4. Electrical & Electronics(**8 hours**)
5. Welding shop ( **8 hours** (**Arc welding 4 hrs + gas welding 4 hrs**))
6. Casting (**8 hours**)
7. Smithy (**6 hours**)
8. Plastic moulding & Glass Cutting (6 hours)

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

### *Laboratory Outcomes*

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

## Engineering Physics

### Course Contents:

#### Module 1: Wave nature of particles and the Schrodinger equation (8 lectures)

Introduction to Quantum mechanics, Wave nature of Particles, operators, Time-dependent and time-independent Schrodinger equation for wavefunction, Application: Particle in a One dimensional Box, Born interpretation, Free-particle wavefunction and wave-packets,  $v_g$  and  $v_p$  relation Uncertainty principle.

#### Module 2: Wave optics (8 lectures)

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer.

Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

#### Module 3: Introduction to solids (8 lectures)

Free electron theory of metals, Fermi level of Intrinsic and extrinsic, density of states, Bloch's theorem for particles in a periodic potential, Kronig-Penney model(no derivation) and origin of energy bands. V-I characteristics of PN junction, Zener diode, Solar Cell, Hall Effect .

#### Module 4: Lasers (8 lectures)

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers ( He-Ne, CO<sub>2</sub>), solid-state lasers(ruby, Neodymium), Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine. Introduction to Optical fiber, acceptance angle and cone, Numerical aperture, V number, attenuation.

#### Module 5: Electrostatics in vacuum (8 lectures)

Calculation of electric field and electrostatic potential for a charge distribution; Electric displacement, Basic Introduction to Dielectrics, Gradient, Divergence and curl, Stokes' theorem, Gauss Theorem, Continuity equation for current densities; Maxwell's equation in vacuum and non-conducting medium; Poynting vector.

### List of Experiment

1. To determine the dispersive power of prism.
2. To determine the  $\lambda$  of sodium light with the help of newton's Ring.
3. Resolving Power of Telescope.
4. YDSE (Young's double slit Experiment).
5. To determine the frequency of AC mains supply.
6. V-I Characteristics of P-N junction diode.
7. To determine the  $\lambda$  of diode loses by single slit diffraction.
8. To determine the plank's constant with the help of photocell.
9. Hall's effect experiment.
10. Calibration of ammeter by using reference zener diode.

11. To study the effect of temperature on reverse saturation current in P-N junction diode and to determine the energy band gap.
12. To determine the  $\lambda$  of sodium by using plane diffraction grating.
13. To determine the prominent lines of mercury source by plane diffraction grating.
14. To determine the numerical aperture of an optical fiber.
15. To determine  $\lambda$  of given laser by plane diffraction grating.

#### **Suggested Reference Books**

1. A. Ghatak, Optics.
2. O. Svelto, Principles of Lasers.
3. David Griffiths, Introduction to Electrodynamics.
4. D.J. Griffiths, Quantum Mechanics.
5. Halliday & Resnick, Physics.



**UNIT-1**

**Sources of Energy : Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydro, nuclear sources.**

**UNIT-2**

**Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem – Water, Carbon, Nitrogen. Biodiversity: Threats and conservation**

**UNIT-3**

**Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, photochemical, Green house effect, ozone layer depletion, acid Rain. Sound Pollution: Causes, controlling measures, measurement of sound pollution (deciblage), Industrial and non – industrial.**

**UNIT-4**

**Water Pollution– Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent. Soil Pollution – Soil Profile, Pollutants in soil, their adverse effects, controlling measures.**

**UNIT-5**

**Society, Ethics & Human values– Impact of waste on society. Solid waste management Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study . Preliminary studies regarding Environmental Protection Acts , introduction to value education, self exploration, sanyam & swasthya.**

**References:-**

1. Harris, CE, Prichard MS, Rabin's MJ, "Engineering Ethics"; Cengage Pub.
2. Rana SVS ; "Essentials of Ecology and Environment"; PHI Pub.
3. Raynold, GW "Ethics in information Technology"; Cengage.
4. Svakumar; Energy Environment & Ethics in society; TMH
5. AK De "Environmental Chemistry"; New Age Int. Publ.
6. BK Sharma, "Environmental Chemistry" ; Goel Publ. House.
7. Bala Krishnamoorthy; "Environmental management"; PHI
8. Gerard Kiely, "Environmental Engineering" ; TMH
9. Miller GT JR; living in the Environment Thomson/cengage
10. Cunningham WP and MA; principles of Environment Sc; TMH
11. Gandhiji M.K.- My experiments with truth

## **Basic Mechanical Engineering**

### **Course Contents:**

#### **Unit I :**

**Materials :** Classification of engineering material, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy steels their applications. Mechanical properties like strength, hardness, toughness , ductility, brittleness , malleability etc. of materials , Tensile test- Stress-strain diagram of ductile and brittle materials , Hooks law and modulus of elasticity, Hardness and Impact testing of materials, BHN etc.

#### **Unit II:**

**Measurement:** Concept of measurements, errors in measurement, Temperature, Pressure, Velocity, Flow strain, Force and torque measurement, Vernier caliper, Micrometer, Dial gauge, Slip gauge, Sine-bar and Combination set.

**Production Engineering:** Elementary theoretical aspects of production processes like casting, carpentry, welding etc Introduction to Lathe and Drilling machines and their various operations.

#### **Unit III :**

**Fluids :** Fluid properties pressure, density and viscosity etc. Types of fluids , Newton's law of viscosity , Pascal's law , Bernoulli's equation for incompressible fluids, Only working principle of Hydraulic machines, pumps, turbines, Reciprocating pumps .

#### **Unit IV:**

**Thermodynamics :** Thermodynamic system, properties, state, process, Zeroth, First and second law of thermodynamics, thermodynamic processes at constant pressure, volume, enthalpy & entropy.

**Steam Engineering :** Classification and working of boilers, mountings and accessories of boilers, Efficiency and performance analysis, natural and artificial draught, steam properties, use of steam tables.

#### **Unit V:**

##### **Reciprocating Machines :**

Working principle of steam Engine, Carnot, Otto, Diesel and Dual cycles P-V & T-S diagrams and its efficiency, working of Two stroke & Four stroke Petrol & Diesel engines. Working principle of compressor.

### **Reference Books:**

- 1- Kothandaraman & Rudramoorthy, Fluid Mechanics & Machinery, New Age .
- 2- Nakra & Chaudhary , Instrumentation and Measurements, TMH.
- 3- Nag P.K, Engineering Thermodynamics , TMH .
- 4- Ganesan , Internal Combustion Engines, TMH .
- 5- Agrawal C M, Basic Mechanical Engineering , Wiley Publication.
- 6- Achuthan M , , Engineering Thermodynamics ,PHI.

### **List of Suggestive Core Experiments:**

Theory related Eight to Ten experiments including core experiments as follows:

- 1- Study of Universal Testing machines.
- 2- Linear and Angular measurement using, Micrometer, Slip Gauges, Dial Gauge and Sine-bar.
- 3- Study of Lathe Machine.
- 4- Study of Drilling Machines.
- 5- Verification of Bernoulli's Theorem.
- 6- Study of various types of Boilers.
- 7- Study of different IC Engines.
- 8- Study of different types of Boilers Mountings and accessories.

## Basic Civil Engineering & Engg. Mechanics

### Course Contents:

#### Unit I Building Materials & Construction

Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing.

Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability

#### Unit II Surveying & Positioning:

Introduction to surveying Instruments – levels, theodolites, plane tables and related devices.

Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal leveling.

#### Unit III Mapping & sensing:

Mapping details and contouring, Profile Cross sectioning and measurement of areas, volumes, application of measurements in quantity computations, Survey stations, Introduction of remote sensing and its applications.

#### Engineering Mechanics

##### Unit IV

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non-concurrent Co- planner forces, free Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses: Method of joints, Method of Sections. Frictional force in equilibrium problems

##### Unit – V

Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment Inertia of Area and Mass, Radius of Gyration, Introduction to product of Inertia and Principle Axes.

Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple.

### Reference Books:

1. S. Ramamrutam & R.Narayanan; Basic Civil Engineering, Dhanpat Rai Pub.
2. Prasad I.B., Applied Mechanics, Khanna Publication.
3. Punmia, B.C., Surveying, Standard book depot.
4. Shesha Prakash and Mogaveer; Elements of Civil Engg & Engg. Mechanics; PHI
5. S.P, Timoshenko, Mechanics of structure, East West press Pvt.Ltd.
6. Surveying by Duggal – Tata McGraw Hill New Delhi.
7. Building Construction by S.C. Rangwala- Charotar publications House, Anand.
8. Building Construction by Grucharan Singh- Standard Book House, New Delhi
9. Global Positioning System Principles and application- Gopi, TMH
10. R.C. Hibbler – Engineering Mechanics: Statics & Dynamics.
11. A. Boresi & Schmidt- Engineering Mechanics- statics dynamics, Thomson' Books
12. R.K. Rajput, Engineering Mechanics, Chand & Co.

### **List of suggestive core Experiments:**

Students are expected to perform minimum ten experiments from the list suggested below by preferably selecting experiments from each unit of syllabus.

1. To perform traverse surveying with prismatic compass, check for local attraction and determine corrected bearings and to balance the traverse by Bowditch's rule.
2. To perform leveling exercise by height of instrument of Rise and fall method.
3. To measure horizontal and vertical angles in the field by using Theodolite.
4. To determine (a) normal consistency (b) Initial and Final Setting time of a cement Sample.
5. To determine the workability of fresh concrete of given proportions by slump test or compaction factor test.
6. To determine the Compressive Strength of brick.
7. To determine particle size distribution and fineness modulus of coarse and fine Aggregate.
8. To verify the law of Triangle of forces and Lami's theorem.
9. To verify the law of parallelogram of forces.
10. To verify law of polygon of forces
11. To find the support reactions of a given truss and verify analytically.
12. To determine support reaction and shear force at a given section of a simply Supported beam and verify in analytically using parallel beam apparatus.
13. To determine the moment of inertia of fly wheel by falling weight method.
14. To verify bending moment at a given section of a simply supported beam.

## **Basic Computer Engineering**

### **Course Contents:**

#### **UNIT I**

**Computer:** Definition, Classification, Organization i.e. CPU, register, Bus architecture, Instruction set, Memory & Storage Systems, I/O Devices, and System & Application Software. Computer Application in e-Business, Bio-Informatics, health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc.

**Operating System:** Definition, Function, Types, Management of File, Process & Memory. Introduction to MS word, MS powerpoint, MS Excel

#### **UNIT II**

Introduction to Algorithms, Complexities and Flowchart, Introduction to Programming, Categories of Programming Languages, Program Design, Programming Paradigms, Characteristics or Concepts of OOP, Procedure Oriented Programming VS object oriented Programming. Introduction to C++: Character Set, Tokens, Precedence and Associativity, Program Structure, Data Types, Variables, Operators, Expressions, Statements and control structures, I/O operations, Array, Functions,

#### **UNIT III**

Object & Classes, Scope Resolution Operator, Constructors & Destructors, Friend Functions, Inheritance, Polymorphism, Overloading Functions & Operators, Types of Inheritance, Virtual functions. Introduction to Data Structures.

#### **UNIT IV**

**Computer Networking:** Introduction, Goals, ISO-OSI Model, Functions of Different Layers. Internetworking Concepts, Devices, TCP/IP Model. Introduction to Internet, World Wide Web, E-commerce

**Computer Security Basics:** Introduction to viruses, worms, malware, Trojans, Spyware and Anti-Spyware Software, Different types of attacks like Money Laundering, Information Theft, Cyber Pornography, Email spoofing, Denial of Service (DoS), Cyber Stalking, Logic bombs, Hacking Spamming, Cyber Defamation, pharming Security measures Firewall, Computer Ethics & Good Practices, Introduction of Cyber Laws about Internet Fraud, Good Computer Security Habits,

#### **UNIT V**

**Data base Management System:** Introduction, File oriented approach and Database approach, Data Models, Architecture of Database System, Data independence, Data dictionary, DBA, Primary Key, Data definition language and Manipulation Languages.

**Cloud computing:** definition, cloud infrastructure, cloud segments or service delivery models (IaaS, PaaS and SaaS), cloud deployment models/ types of cloud (public, private, community and hybrid clouds), Pros and Cons of cloud computing

#### **List of Experiment**

01. Study and practice of Internal & External DOS commands.
02. Study and practice of Basic linux Commands – ls, cp, mv, rm, chmod, kill, ps etc.
03. Study and Practice of MS windows – Folder related operations, My-Computer, window explorer, Control Panel,
04. Creation and editing of Text files using MS- word.
05. Creation and operating of spreadsheet using MS-Excel.
06. Creation and editing power-point slides using MS- power point
07. Creation and manipulation of database table using SQL in MS-Access.
08. WAP to illustrate Arithmetic expressions
09. WAP to illustrate Arrays.
10. WAP to illustrate functions.
11. WAP to illustrate constructor & Destructor
12. WAP to illustrate Object and classes.

13. WAP to illustrate Operator overloading
14. WAP to illustrate Function overloading
15. WAP to illustrate Derived classes & Inheritance
16. WAP to insert and delete an element from the Stack
17. WAP to insert and delete an element from the Queue
18. WAP to insert and delete an element from the Linked List

**Recommended Text Books:**

1. Fundamentals of Computers : E Balagurusamy, TMH
2. Basic Computer Engineering: Silakari and Shukla, Wiley India
3. Fundamentals of Computers : V Rajaraman, PHI
4. Information Technology Principles and Application: Ajoy Kumar Ray & Tinku Acharya PHI.

**Recommended Reference Books:**

1. Introduction of Computers : Peter Norton, TMH
2. Object Oriented Programming with C++ :E.Balagurusamy, TMH
3. Object Oriented Programming in C++: Rajesh K.Shukla, Wiley India
4. Concepts in Computing: Kenneth Hoganson, Jones & Bartlett.
5. Operating Systems – Silberschatz and Galvin - Wiley India
6. Computer Networks:Andrew Tananbaum, PHI
7. Data Base Management Systems, Korth, TMH
8. Cloud Computing. Kumar. Wiley India

## **Language Lab and Seminars**

**Course objective:** This course intends to impart practical training in the use of English Language for Communicative purposes and aims to develop students' personality through language Laboratory.

Topics to be covered in the Language laboratory sessions:

1. Introducing oneself, family, social roles.
2. Public Speaking and oral skills with emphasis on conversational practice, extempore speech, JAM(Just a minute sessions), describing objects and situations, giving directions, debate, telephonic etiquette.
3. Reading Comprehension: Intensive reading skills, rapid reading, and reading aloud (Reading material to be selected by the teacher).
4. To write a book review. Standard text must be selected by the teacher.
5. Role plays: preparation and delivery topic to be selected by teacher/faculty.



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## MATHEMATICS II

### Unit I

Fourier Series: Introduction of Fourier series , Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series Fourier Transform: Definition and properties of Fourier transform, Sine and Cosine transform.

### Unit II

Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations.

### Unit III

Second Order linear differential equation with variable coefficients: Methods one integral is known, removal of first derivative, changing of independent variable and variation of parameter, Solution by Series Method.

### Unit IV

Linear and Non Linear partial differential equation of first order: Formulation of partial differential equations, solution of equation by direct integration, Lagrange's Linear equation, charpit's method. Linear partial differential equation of second and higher order: Linear homogeneous and Non homogeneous partial diff. equation of nth order with constant coefficients. Separation of variable method for the solution of wave and heat equations

### Unit V

Vector Calculus: Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem.

### References:

- (i) Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
- (ii) Higher Engineering Mathematics by BS Grewal, Khanna Publication
- (iii) Advance Engineering Mathematics by D.G.Guffy
- (iv) Mathematics for Engineers by S.Arumungam, SCITECH Publuication
- (v) ~~Engineering~~ Mathematics by S S Sastri. P.H.I.



## DISCRETE STRUCTURES

### Unit-I

Set Theory, Relation, Function, Theorem Proving Techniques : Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, Equivalence relation, Partial ordering relation, Job-Scheduling problem Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions, pigeonhole principle. Theorem proving Techniques: Mathematical induction, Proof by contradiction.

### Unit-II

Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

### Unit-III

Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Normal Forms, Universal and existential quantifiers. Introduction to finite state machine Finite state machines as models of physical system equivalence machines, Finite state machines as language recognizers

### Unit-IV

Graph Theory: Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs.

### Unit V

Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hass diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices. Combinatorics: Introduction, Permutation and combination, Binomial Theorem, Multinomial Coefficients Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms , Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions , Generating functions , Solution by method of generating functions,

### References:

1. C.L.Liu, "Elements of Discrete Mathematics" Tata Mc Graw-Hill Edition.
2. Trembley, J.P & Manohar; "Discrete Mathematical Structure with Application cs", McGraw Hill.
3. Kenneth H. Rosen, "Discrete Mathematics and its applications", McGraw Hill.
4. Lipschutz; Discrete mathematics (Schaum); TMH
5. Deo, Narsingh, "Graph Theory With application to Engineering and Computer.Science.", PHI.
6. Krishnamurthy V; "Combinatorics Theory & Application". East-West Press Pvt. Ltd.. New Delhi.
7. S k Sarkar " Discrete Mathematics", S. Chand Pub

## DIGITAL CIRCUIT & SYSTEM

### UNIT I

Number systems & codes, Binary arithmetic, Boolean algebra and switching function. Minimization of switching function, Concept of prime implicant, Karnaugh map method, Quine & McCluskey's method, Cases with don't care terms, Multiple output switching function.

### Unit II

Introduction to logic gates, Universal gate, Half adder, Half subtractor, Full adder, Full subtractor circuits, Series & parallel addition, BCD adders, Look-ahead carry generator.

### Unit III

Linear wave shaping circuits, Bistable, Monostable & Astable multivibrator, Schmitt trigger circuits & Schmitt-NAND gates. Logic families: RTL, DTL, All types of TTL circuits, ECL, I<sup>2</sup>L, PMOS, NMOS & CMOS logic, Gated flip-flops and gated multivibrator, Interfacing between TTL to MOS.

### Unit IV

Decoders, Encoders, Multiplexers, Demultiplexers, Introduction to various semiconductor memories & designing with ROM and PLA. Introduction to Shift Registers, Counters, Synchronous & asynchronous counters, Designing of Combinational circuits like code converters.

### Unit V

Introduction of Analog to Digital & Digital to Analog converters, sample & hold circuits and V-F converters.

### References:

1. M. Mano; "Digital Logic & Computer Design"; PHI.
2. Malvino & Leach; "Digital Principles & Applications"; TMH
3. W.H. Gothman; "Digital Electronics"; PHI.
4. Millman & Taub; "Pulse, Digital & Switching Waveforms"; TMH
5. Jain RP; Modern digital Electronics; TMH
6. R.J. Tocci, "Digital Systems Principles & Applications".

### List of experiment (Expandable)

1. To study and test of operation of all logic gates for various IC's (IC#7400, IC#7403, IC#7408, IC#74332, IC#7486).
2. Verification of Demorgan's theorem.
3. To construct of half adder and full adder
4. To construct of half subtractor and full subtractor circuits
5. Verification of versatility of NAND gate.
6. Verification of versatility of NOR gate.
7. Designing and verification of property of full adder.
8. Design a BCD to excess-3 code converter.
9. Design a Multiplexer/ Demultiplexer.

## ELECTRONICS DEVICES & CIRCUITS

### UNIT I

Semiconductor device, theory of P-N junction, temperature dependence and break down characteristics, junction capacitances. Zener diode, Varactor diode, PIN diode, LED, Photo diode, Transistors BJT, FET, MOSFET, types, working principle, characteristics, and region of operation, load line biasing method. Transistor as an amplifier, gain, bandwidth, frequency response, h- parameters equivalent, type of amplifier.

### Unit II

Feedback amplifier, negative feedback, voltage-series, voltage shunt, current series and current shunt feedback, Sinusoidal oscillators, L-C (Hartley-Colpitts) oscillators, RC phase shift, Wien bridge, and Crystal oscillators. Power amplifiers, class A, class B, class A B, C amplifiers, their efficiency and power Dissipation.

**Unit III** Switching characteristics of diode and transistor, turn ON, OFF time, reverse recovery time, transistor as switch, Multivibrators, Bistable, Monostable, Astable multivibrators. Clippers and clampers, Differential amplifier, calculation of differential, common mode gain and CMRR using hparameters, Darlington pair, Boot strapping technique. Cascade and cascode amplifier.

### Unit IV

Operational amplifier characteristics, slew rate, full power bandwidth, offset voltage, bias current, application, inverting, non inverting amplifier, summer, averager, differentiator, integrator, differential amplifier, instrumentation amplifier, log and antilog amplifier, voltage to current and current to voltage converters, comparators Schmitt trigger, active filters, 555 timer and its application.

### Unit V

Regulated power supplies, Series and shunt regulators, current limiting circuits, Introduction to IC voltage regulators, fixed and adjustable switching regulators, SMPS, UPS

### References:

1. Milliman Hallkias - Integrated Electronics; TMH Pub.
2. Gayakwad; OP-amp and linear Integrated Circuits; Pearson Education
3. Salivahanan; Electronic devices and circuits; TMH
4. Salivahanan; Linear Integrated Circuits; TMH-
5. Miliman Grabel; Micro electronics, TMH
6. RobertBoylestad & Nashetsky; Electronics Devices and circuit Theory; Pearson Ed.

### List of Experiments (Expandable):

1. Diode and Transistor characteristics
2. Transistor Applications (Amplifier and switching)
3. OP-Amp and its Applications
4. 555 timer and its Applications



## DATA STRUCTURES

### Unit I

Introduction: Basic Terminology, Data types and its classification, Algorithm complexity notations like big Array Definition, Representation and Analysis of Arrays, Single and Multidimensional Arrays, Address calculation, Array as Parameters, Ordered List and operations, Sparse Matrices, Storage pools, Garbage collection. Recursion-definition and processes, simulating recursion, Backtracking, Recursive algorithms, Tail recursion, Removal of recursion. Tower of Hanoi Problem.

### UNIT II

Stack, Array Implementation of stack, Linked Representation of Stack, Application of stack: Conversion of Infix to Prefix and Postfix Expressions and Expression evaluation, Queue, Array and linked implementation of queues, Circular queues, D-queues and Priority Queues. Linked list, Implementation of Singly Linked List, Two-way Header List, Doubly linked list, Linked List in Array. Generalized linked list, Application: Garbage collection and compaction, Polynomial Arithmetic.

### UNIT III

Trees: Basic terminology, Binary Trees, , algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Binary Search Tree (BST ), AVL Trees, B-trees. Application: Algebraic Expression, Huffman coding Algorithm.

### UNIT IV

Internal and External sorting ,Insertion Sort, Bubble Sort, selection sort Quick Sort, Merge Sort, Heap Sort, Radix sort, Searching & Hashing: Sequential search, binary search, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation. Symbol Table, Static tree table, Dynamic Tree table.

### Unit V

Graphs: Introduction, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

### Reference:

1. R. Kruse et al, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002
2. ISRD Group; Data structures using C; TMH
3. Lipschutz; Data structure (Schaum); TMH
4. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., N Delhi. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.
5. Data Structures Trembley and Sorenson, TMH Publications
6. Pai; Data structure and algorithm; TMH
7. Introduction to Algorithm- Corman, AWL

### List of Experiments (expandable):

Programs in C relating to different theory units.

## Computer Programming (JAVA)

### UNIT-I

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

### UNIT-II

Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector. Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

### UNIT-III

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

### UNIT-IV

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

### UNIT-V

Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

### References:

1. Deitel & Deitel, "JAVA, How to Program"; PHI, Pearson.
2. E. Balaguruswamy, "Programming In Java"; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, "Peter Norton Guide To Java Programming", Techmedia.
5. Merlin Hughes, et al; Java Network Programming , Manning Publications/Prentice Hall
6. Cay Horstmann, Big JAVA, Wiley India.

### List of Program to be perform (Expandable)

1. Installation of J2SDK
2. Write a program to show Scope of Variables
3. Write a program to show Concept of CLASS in JAVA
4. Write a program to show Type Casting in JAVA
5. Write a program to show How Exception Handling is in JAVA
6. Write a Program to show Inheritance
7. Write a program to show Polymorphism
8. Write a program to show Access Specifiers (Public, Private, Protected) in JAVA
9. Write a program to show use and Advantages of CONTRUCTOR



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10. Write a program to show Interfacing between two classes
11. Write a program to Add a Class to a Package
12. Write a program to show Life Cycle of a Thread
13. Write a program to demonstrate AWT.
14. Write a program to Hide a Class
15. Write a Program to show Data Base Connectivity Using JAVA
16. Write a Program to show "HELLO JAVA " in Explorer using Applet
17. Write a Program to show Connectivity using JDBC
18. Write a program to demonstrate multithreading using Java.
19. Write a program to demonstrate applet life cycle.
20. Write a program to demonstrate concept of servlet.



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## SELF STUDY (INTERNAL ASSESSMENT)

**Objective of Self Study:** is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

**Evaluation** will be done by assigned faculty based on report/seminar presentation and viva.



## SEMINAR / GROUP DISCUSSION (INTERNAL ASSESSMENT)

**Objective of GD and seminar** is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

**Evaluation** will be done by assigned faculty based on group discussion and power point presentation.

## MATHEMATICS III

### Unit I

Functions of complex variables : Analytic functions, Harmonic Conjugate, Cauchy-Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem , Application of Residues theorem for evaluation of real integrals

### Unit II

Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi , Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equatins by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods

### Unit III

Difference Operators, Interpolation (Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae), Numerical Differentiation and Numerical Integration.

### Unit IV

Solution of Ordinary Differential Equations(Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method),Correlation and Regression, Curve Fitting (Method of Least Square).

### Unit V

Concept of Probability : Probability Mass function, Probability density function. Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution ,Gamma Distribution ,Beta Distribution, Testing of Hypothesis :Students t-test, Fisher's z-test, Chi-Square Method

### Reference:

- (i) Numerical Methods using Matlab by J.H.Mathews and K.D.Fink, P.H.I.
- (ii) Numerical Methods for Scientific and Engg. Computation by MKJain, Iyengar and RK Jain, New Age International Publication
- (iii) Mathematical Methods by KV Suryanarayan Rao, SCITECH Publuication
- (iv) Numerical Methods using Matlab by Yang,Wiley India
- (v) Pobability and Statistics by Ravichandran ,Wiley Indja
- (vi) Mathematical Statistics by George R., Springer

## Computer System Organization

### Unit I

**Computer Basics and CPU:** Von Newman model, various subsystems, CPU, Memory, I/O, System Bus, CPU and Memory registers, Program Counter, Accumulator, Instruction register, Micro operations, Register Transfer Language, Instruction Fetch, decode and execution, data movement and manipulation, Instruction formats and addressing modes of basic computer. 8085 microprocessor organization

### Unit-II

**Control Unit Organization:** Hardwired control unit, Micro and nano programmed control unit, Control Memory, Address Sequencing, Micro Instruction formats, Micro program sequencer, Microprogramming, Arithmetic and Logic Unit: Arithmetic Processor, Addition, subtraction, multiplication and division, Floating point and decimal arithmetic and arithmetic units, design of arithmetic unit.

### Unit-III

**Input Output Organization:** Modes of data transfer – program controlled, interrupt driven and direct memory access, Interrupt structures, I/O Interface, Asynchronous data transfer, I/O processor, 8085 I/O structure, 8085 instruction set and basic programming. Data transfer – Serial / parallel, synchronous/asynchronous, simplex/half duplex and full duplex.

### Unit-IV

**Memory organization:** Memory Maps, Memory Hierarchy, Cache Memory - Organization and mappings. Associative memory, Virtual memory, Memory Management Hardware.

**Unit V Multiprocessors:** Pipeline and Vector processing, Instruction and arithmetic pipelines, Vector and array processors, Interconnection structure and inter-processor communication.

### References:

1. Morris Mano: Computer System Architecture, PHI.
2. Tanenbaum: Structured Computer Organization, Pearson Education
3. J P Hayes, Computer Architecture and Organisations, Mc- Graw Hills, New Delhi
4. Gaonkar: Microprocessor Architecture, Programming, Applications with 8085; Penram Int.
5. William Stallings: Computer Organization and Architecture, PHI
6. ISRD group; Computer orgOrganization; TMH
7. Carter; Computer Architecture (Schaum); TMH
8. Carl Hamacher: Computer Organization, TMH

## Object Oriented Technology

### Unit I

Abstract data types, Objects and classes, Attributes and Methods, Objects as software units, Encapsulation and Information hiding, Objects instantiations and interactions, Object lifetime, Static and dynamic objects, global and local objects, Metaclass, Modeling the real world objects.

### Unit II

Relationships between classes, Association of objects, Types of Association, Recursive Association, Multiplicities, Navigability, Named association, Aggregation of objects. Types of Aggregation, Delegation, Modeling Association and Aggregation.

### Unit III

Inheritance and Polymorphism, Types of polymorphism, Static and dynamic polymorphism, Operator and Method overloading, Inherited methods, Redefined methods, the protected interface, Abstract methods and classes, Public and protected properties, Private operations, Disinheritance, Multiple inheritance.

### Unit IV

Container Classes, Container types, typical functions and iterator methods, Heterogeneous containers, Persistent objects, stream, and files, Object oriented programming languages,

### Unit V

Study of C++/Java as Object-oriented programming language.

#### References:

1. David Parsons; Object oriented programming with C++; BPB publication
2. Object oriented programming in C++ by Robert Lafore; Galgotia
3. Balagurusamy; Object oriented programming with C++; TMH
4. Java Complete Reference: Herbert Schildt, Mc Graw Hill
5. Hubbard; Programming in C++ (Schaum); TMH
6. Mastering C++ by Venugopal, TMH

#### List of experiments (Expandable):

Programming assignments may be given to students so that they can better understand the concepts of object oriented programming such as objects, classes, class-relationships, association, aggregation, inheritance, polymorphism etc.

## Analysis & Design of Algorithm

### Unit I

Algorithms, Designing algorithms, analyzing algorithms, asymptotic notations, heap and heap sort. Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, strassen's matrix multiplication.

### Unit II

Study of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm

### Unit III

Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm

### Unit IV

Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph coloring problem etc. Introduction to branch & bound method, examples of branch and bound method like traveling salesman problem etc. Meaning of lower bound theory and its use in solving algebraic problem, introduction to parallel algorithms.

### Unit V

Binary search trees, height balanced trees, 2-3 trees, B-trees, basic search and traversal techniques for trees and graphs (In order, preorder, postorder, DFS, BFS), NP-completeness.

### References:

1. Cormen Thomas, Leiserson CE, Rivest RL; Introduction to Algorithms; PHI.
2. Horowitz & Sahani; Analysis & Design of Algorithm
3. Dasgupta; algorithms; TMH
4. Ullmann; Analysis & Design of Algorithm;
5. Michael T Goodrich, Roberto Tamassia, Algorithm Design, Wiley India

### List of Experiments( expandable):

1. Write a program for Iterative and Recursive Binary Search.
2. Write a program for Merge Sort.
3. Write a program for Quick Sort.
4. Write a program for Strassen's Matrix Multiplication.
5. Write a program for optimal merge patterns.
6. Write a program for Huffman coding.
7. Write a program for minimum spanning trees using Kruskal's algorithm.
8. Write a program for minimum spanning trees using Prim's algorithm.
9. Write a program for single sources shortest path algorithm
10. Write a program for Floyd-Warshall algorithm.
11. Write a program for traveling salesman problem.
12. Write a program for Hamiltonian cycle problem.

## Analog & Digital Communication

### Unit-I

Time domain and frequency domain representation of signal, Fourier Transform and its properties, Transform of Gate, Periodic gate, Impulse periodic impulse sine and cosine wave, Concept of energy density and power density (Parseval's theorem), Power density of periodic gate and impulse function, impulse response of a system, convolutions, convolution with impulse function, causal and non causal system impulse response of ideal low pass filter, Correlation & Auto correlation.

### Unit-II

Base band signal, need of modulation, Introduction of modulations techniques, Amplitude modulation, Equation and its frequency domain representation, Bandwidth, Power distribution. AM suppressed carrier waveform equation and frequency domain representation Generation (Balance/Chopper modulator) and synchronous detection technique, errors in synchronous detection, Introduction to SSB and VSB Transmission Angle modulation, Frequency and phase modulation equation and their relative phase and frequency deviations, modulation index frequency spectrum, NBFM and WBFM, Bandwidth comparison of modulation techniques.

### Unit-III

Sampling of signal, sampling theorem for low pass and Band pass signal, Pulse amplitude modulation (PAM), Time division, multiplexing (TDM). Channel Bandwidth for PAM-TDM signal Type of sampling instantaneous, Natural and flat top, Aperture effect, Introduction to pulse position and pulse duration modulations, Digital signal, Quantization, Quantization error, Pulse code modulation, signal to noise ratio, Companding, Data rate and Baud rate, Bit rate, multiplexed PCM signal, Differential PCM (DPCM), Delta Modulation (DM) and Adaptive Delta Modulation (ADM), comparison of various systems.

### Unit-IV

Digital modulations techniques, Generation, detection, equation and Bandwidth of amplitude shift keying (ASK) Binary Phase Shift keying (BPSK), Differential phase shift keying (DPSK), offset and non offset quadrature phase shift keying (QPSK), M-Ary PSK, Binary frequency Shift Keying (BFSK), M-Ary FSK Quadrature Amplitude modulation (QAM), MODEM, Introduction to probability of error.

**Unit-V** Information theory and coding- Information, entropies (Marginal and conditional), Model of a communication system, Mathematical representation of source, channel and receiver characteristics, Mutual information, channel capacity efficiency of noise free channel Binary symmetric channel (BSC) Binary erasure channel (BEC), Repetition of signal, NM symmetric Binary channel, Shannon theorem, Shannon-Hartley theorem (S/N-BW trade off) Source encoding code properties; Shannon, Fano and Huffman coding methods and their efficiency error control coding, Minimum Hamming distance, Linear Block Code, Cyclic code and convolution codes. Line Encoding: Manchester coding, RZ, NRZ coding.

### References:

1. Singh & Sapre, Communication System, TMH
2. Taub & shilling, Communication System, TMH
3. Hsu; Analog and digital communication(Schaum); TMH
4. B.P. Lathi, Modern Digital and analog communication system.

5. Simon Haykins, Communication System. John Willy
6. Wayne Tomasi, Electronic Communication system.
7. Martin S. Roden, Analog & Digital Communication System; Discovery Press.
8. Frank R. Dungan, Electronic Communication System, Thomson/Vikas.

### **List of Experiments(Expandable)**

1. Study of sampling process and signal reconstruction and aliasing.
2. Study of PAM PPM and PDM
3. Study of PCM transmitter and receiver.
4. Time division multiplexing (TDM) and De multiplexing
5. Study of ASK PSK and FSK transmitter and receiver.
6. Study of AM modulation and Demodulation techniques (Transmitter and Receiver) Calculate of parameters
7. Study of FM modulation and demodulation (Transmitter and Receiver) & Calculation of parameters
8. To construct and verify pre emphasis and de-emphasis and plot the wave forms.
9. Study of super hetrodyne receiver and characteristics of ratio radio receiver.
10. To construct frequency multiplier circuit and to observe the waveform
11. Study of AVC and AFC.



## Computer Programming (.Net Technologies)

### UNIT I

**Introduction** .NET framework, features of .Net framework, architecture and component of .Net, elements of .Net.

### UNIT II

**Basic Features Of C#** Fundamentals, Classes and Objects, Inheritance and Polymorphism, Operator Overloading, Structures. **Advanced Features Of C#** Interfaces, Arrays, Indexers and Collections; Strings and Regular Expressions, Handling Exceptions, Delegates and Events.

**UNIT III Installing ASP.NET** framework, overview of the ASP .net framework, overview of CLR, class library, overview of ASP.net control, understanding HTML controls, study of standard controls, validations controls, rich controls. **Windows Forms:** All about windows form, MDI form, creating windows applications, adding controls to forms, handling Events, and using various Tolls

### UNIT IV

Understanding and handling controls events, **ADO.NET-** Component object model, ODBC, OLEDB, and SQL connected mode, disconnected mode, dataset, data-reader Data base controls: Overview of data access data control, using grid view controls, using details view and frame view controls, ado .net data readers, SQL data source control, object data source control, site map data source.

### UNIT V

**XML:** Introducing XML, Structure, and syntax of XML, document type definition (DTD), XML Schema, Document object model, Presenting and Handling XML. xml data source, using navigation controls, introduction of web parts, using java script, Web Services

### References:

1. C# for Programmers by Harvey Deitel, Paul Deitel, Pearson Education
2. Balagurusamy; Programming in C#; TMH
3. **Web Commerce Technology Handbook** by Daniel Minoli, Emma Minoli , TMH
4. Web Programming by Chris Bates, Wiley
5. XML Bible by Elliotte Rusty Harold ,
6. ASP .Net Complete Reference by McDonald, TMH.
7. ADO .Net Complete Reference by Odey, TMH

### List of Experiments/ program (Expandable):

1. Working with call backs and delegates in C#
2. Code access security with C#.
3. Creating a COM+ component with C#.
4. Creating a Windows Service with C#
5. Interacting with a Windows Service with C#
6. Using Reflection in C#
7. Sending Mail and SMTP Mail and C#
8. Perform String Manipulation with the String Builder and String Classes and C#:
9. Using the System .Net Web Client to Retrieve or Upload Data with C#
10. Reading and Writing XML Documents with the XML Text-Reader/-Writer Class and C#
11. Working with Page using ASP .Net.
12. Working with Forms using ASP .Net



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# MAHAKAUSHAL UNIVERSITY JABALPUR

## SEMINAR / GROUP DISCUSSION (INTERNAL ASSESSMENT)

**Objective of GD and seminar** is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

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# MAHAKAUSHAL UNIVERSITY JABALPUR

## Data Communication

### RATIONALE:

The purpose of this subject is to cover the underlying concepts and techniques used in Data Communication. In this subject we discuss various principles, standards for communication over different type of Communication Media.

### PREREQUISITE :-

The students should have general idea about the analog and digital communication.

### UNIT :- I

Introduction to data communication: Components , data representation ,data flow and basic model ,data representation ,Serial & Parallel transmission , Modes of data transmission, Encoding:Unipolar,Polar ,Bipolar line & block codes ,Data compression ,Frequency dependant codes, Run length encoding ,Relative encoding ,LZ Compression ,Image and multimedia compression. Review of analog & digital transmission methods, Nyquist Theorem .

### UNIT:-2

Multiplexing: FDM, TDM, WDM, Synchronous & Statistical TDM, North American digital multiplexing hierarchy, European TDM, Spread spectrum: Frequency Hopping & Direct Sequence spread spectrum. Terminal handling & polling. Switched Communication Networks: Circuit, Message, Packet & Hybrid Switching, Softswitch Architecture with their comparative study, X.25, ISDN.

### UNIT:-3

Physical Layer: Introduction, Interface, Standards, EIA-232-D, RJ-45, RJ-11, BNC connector & EIA-449 digital Interface: Connection, specifications & configuration, X.21 Modem: Types, features, signal constellation, block schematic, limited distance, dial up, baseband,line driver, Group Band and Null modems etc., ITU-T V-series modem standards Connecting Devices: Active and Passive Hubs, Repeaters, Bridges, Two & Three layer switches & Gateway. Study of various types of topology and their comparative study and introduction to queuing theory.

### UNIT:-4

Transmission Media: Transmission line characteristics, distortions, Crosstalk, Guided Media: Twisted Pair, Baseband & Broadband Coaxial.Optical Fibre : Physics and velocity of propagation of light , Advantages & Disadvantages ,Block diagram ,Nodes and classification ,Comparision,losses , light source and detectors , Construction, Unguided media : Electromagnetic polarization ,Rays and wavesfront ,electromagnetic spectrum and radiation ,spherical wavefront and inverse square law , wave attenuation and absorption, optical properties of Radio waves , Terrestrial Propagation of electromagnetic waves , skip distance , free - space path loss ,Radio waves , Microwave , Infrared & Satellite Communication system . Telephone Network: Components, LATAs, signaling and Services, Digital Subscriber Line: ADSL, HDSL, SDSL, VDSL, Cable TV network for data transfer.

### UNIT:-5

Transmission Errors : Content Error , flow integrity error , methods of error control ,Error detection ,Error correction ,Bit error rate , Error detection methods: Parity checking , Checksum Error Detection ,Cyclic Redudancy Check ,Hamming code , Interleaved codes , Block Parity , Convolution code, Hardware Implementation, Checksum .



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## **Suggested Reading:**

1. Gupta Prakash C., "Data communication", PHI Learning
2. Tomasi, "Introduction to Data Communication & Networking, Pearson Education
3. Forouzan, "Data communication", TATA McGraw
4. Godbole, "Data Communication & Network", TMH
5. Miller, "Data Network and Communication", Cengage Delmar Learning
6. William Stallings, "Data & Computer Communication", Pearson Education
7. A.S Tanenbum, "Computer Network", Pearson Education.



# MAHAKAUSHAL UNIVERSITY JABALPUR

## Operating System

### **RATIONALE:**

The purpose of this subject is to cover the underlying concepts Operating System. This syllabus provides a comprehensive introduction of Operating System, Process Management, Memory Management, File Management and I/O management.

### **PREREQUISITE:-**

The students should have general idea about Operating System Concept, types of Operating System and their functionality.

### **Unit I**

Introduction to System Programs & Operating Systems, Evolution of Operating System (mainframe, desktop, multiprocessor, Distributed, Network Operating System, Clustered & Handheld System), Operating system services, Operating system structure, System Call & System Boots, Operating system design & Implementations, System protection, Buffering & Spooling . Types of Operating System: Bare machine, Batch Processing, Real Time, Multitasking & Multiprogramming, time-sharing system.

### **Unit II**

File: concepts, access methods, free space managements, allocation methods, directory systems, protection, organization ,sharing & implementation issues, Disk & Drum Scheduling, I/O devices organization, I/O devices organization, I/O buffering, I/O Hardware, Kernel I/O subsystem, Transforming I/O request to hardware operations. Device Driver: Path managements, Sub module, Procedure, Scheduler, Handler, Interrupt Service Routine. File system in Linux & Windows

### **Unit III**

Process: Concept, Process Control Blocks(PCB), Scheduling criteria Preemptive & non Preemptive process scheduling, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling, operations on processes, threads, inter process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock: Characterization, Methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Process Management in Linux.

### **Unit IV**

Memory Hierarchy, Concepts of memory management, MFT & MVT, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, and paging combined with segmentation. Structure & implementation of Page table. Concepts of virtual memory, Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation.

### **Unit V**

Distributed operating system:-Types, Design issues, File system, Remote file access, RPC, RMI, Distributed Shared Memory(DSM), Basic Concept of Parallel Processing & Concurrent Programming Security & threats protection: Security violation through Parameter, Computer Worms & Virus, Security Design Principle, Authentications, Protection Mechanisms. introduction to Sensor network and parallel operating system. Case study of Unix, Linux & Windows,



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## List of Experiment

1. Write a program to implement FCFS CPU scheduling algorithm.
2. Write a program to implement SJF CPU scheduling algorithm.
3. Write a program to implement Priority CPU Scheduling algorithm.
4. Write a program to implement Round Robin CPU scheduling algorithm.
5. Write a program to compare various CPU Scheduling Algorithms over different Scheduling Criteria.
6. Write a program to implement classical inter process communication problem(producer consumer).
7. Write a program to implement classical inter process communication problem(Reader Writers).
8. Write a program to implement classical inter process communication problem(Dining Philosophers).
9. Write a program to implement & Compare various page replacement algorithm.
10. Write a program to implement & Compare various Disk & Drum scheduling Algorithms
11. Write a program to implement Banker's algorithms.
12. Write a program to implement Remote Procedure Call(RPC).
13. Write a Devices Drivers for any Device or pheriperal.

## Suggested Reading:

1. Silberschatz, "Operating system", Willey Pub.
2. Stuart, "Operating System Principles, Design & Applications", Cengage Learning
3. Tannanbaum, "Modern operating system", PHI Learning
4. Dhamdhere, "Operating System", TMH.
5. Achyut S Godbole, "Operating System", TMH.
6. William stalling, "operating system" Pearson Edu.
7. Deitel & Deitel, "Operating Systems", Pearson Edu.
8. Flynn & Mchoes, "Operating Systems", Cengage Learning
9. Haldar, "Operating System", Pearson Edu.



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## Database Management

### RATIONALE:

The purpose of this subject is to cover the underlying concepts and techniques used in creating a Data Base System. These techniques can be used in Software Developments.

### PREREQUISITE

The students should have a general idea about data base concept, data models and sql statements.

### Unit I

DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach, Advantages, of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Overall Database Structure, Functions of DBA and designer, ER data model: Entities and attributes, Entity types, Defining the E-R diagram, Concept of Generalization, Aggregation and Specialization. transforming ER diagram into the tables. Various other data models object oriented data Model, Network data model, and Relational data model, Comparison between the three types of models.

### Unit II

Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Intension and Extension, Relational Query languages: SQL-DDL, DML, integrity constraints, Complex queries, various joins, indexing, triggers, assertions, Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union. Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations.

### Unit III

Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalve dependencies. Query Optimization: Introduction, steps of optimization, various algorithms to implement select, project and join operations of relational algebra, optimization methods: heuristic based, cost estimation based.

### Unit IV

Transaction Processing Concepts: - Transaction System, Testing of Serializability, Serializability of schedules, conflict & view serialisable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: - Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction. Introduction to Distributed databases, data mining, data warehousing, Object Technology and DBMS, Comparative study of OODBMS Vs DBMS . Temporal, Deductive, Multimedia, Web & Mobile database .

### Unit V

Study of Relational Database Management Systems through Oracle/Postgres SQL/MySQL: Architecture, physical files, memory structures, background process. Concept of table



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spaces, segments, extents and block. Dedicated server, multi threaded server. Distributed database, database links, and snapshot. Data dictionary, dynamic performance view. Security, role management, privilege management, profiles, invoker defined security model. SQL queries, Data extraction from single, multiple tables equi-join, non equi-join, self-join, outer join. Usage of like, any, all, exists, in Special operators. Hierarchical queries, inline queries, flashback queries. Introduction of ANSI SQL, anonymous block, nested anonymous block, branching and looping constructs in ANSI SQL. Cursor management: nested and parameterized cursors, Oracle exception handling mechanism. Stored procedures, in, out, in out type parameters, usage of parameters in procedures. User defined functions their limitations. Triggers, mutating errors, instead of triggers.

## **Suggested list of experiments: - Lab Assignments:**

1. Delete duplicate row from the table.
2. Display the alternate row from table.
3. Delete alternate row from table.
4. Update multiple rows in using single update statement.
5. Find the third highest paid and third lowest paid salary.
6. Display the 3rd, 4th, 9th rows from table.
7. Display the ename, which is start with j, k, l or m.
8. Show all employees who were hired the first half of the month.
9. Display the three record in the first row and two records in the second row and one record in the third row in a single sql statements.
10. Write a sql statements for rollback commit and save points.
11. Write a pl/sql for select, insert, update and delete statements.
12. Write a pl/sql block to delete a record. If delete operation is successful return 1 else return 0.
13. Display name, hire date of all employees using cursors.
14. Display details of first 5 highly paid employees using cursors.
15. Write a database trigger which fires if you try to insert, update, or delete after 7'o' clock.
16. Write a data base trigger, which acts just like primary key and does not allow duplicate values.
17. Create a data base trigger, which performs the action of the on delete cascade.
18. Write a data base trigger, which should not delete from emp table if the day is Sunday.
19. In this subject the students are supposed to prepare a small database application in complete semester like financial accounting system, Railway reservation system, institute timetable management system. Student record system, library management system, hospital management system etc. **in RDBMS** as follows:

### **Section A:**

Solving the case studies using ER datamodel (design of the database)

### **Section B:**

Implement a miniproject for the problem taken in section A.

### **Suggested Reading:-**

1. Date C J, "An Introduction To Database System", Pearson Educations
2. Korth, Silbertz, Sudarshan, "Fundamental of Database System", McGraw Hill
3. Rob, "Data Base System: Design Implementation & Management", Cengage Learning
4. Elmasri, Navathe, "Fundamentals Of Database Systems", Pearson Educations
5. Atul Kahate, "Introduction to Database Management System", Pearson Educations
6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press, TMH.
7. Paneerselvam, "Data Base Management System", PHI Learning
8. dev.mysql.com 9. www.postgresql.org



## Computer Graphics & Multimedia

### RATIONALE:

The purpose of this subject is to cover the underlying concepts and techniques used in Computer Graphics, Animations & Multimedia.

### PREREQUISITE :-

The students should have general Idea about input/output devices, graphics, text, audio, video and animation. In addition, a familiarity with general mathematical transformations is required.

**Unit-I** Introduction to raster scan displays, Pixels, frame buffer, Vector & Character generation, random scan systems, Graphics Primitives, Display devices, Display file structure, ScanConversion techniques, line drawing: simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms. Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms

**Unit-II** 2D transformation: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogenous coordinate system, Matrices Transformation, Composite Transformation. Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping, Cohen Sutherland, Midpoint Line clipping algorithms, Polygon Clipping: Sutherland –Hodgeman, Weiler-Atherton algorithms.

**Unit-III** 3D transformations: translation, rotation, scaling. Parallel & Perspective Projection, Types of Parallel & Perspective Projection. Hidden Surface elimination: Depth comparison, Back face detection algorithm, Painters algorithm, Z-buffer algorithm. Curve generation, Bezier and B-spline methods.

**Unit-IV** Basic Illumination Model, Diffuse reflection, Specular reflection, Phong Shading Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV.

**Unit –V** Multimedia System: An Introduction, Multimedia hardware, Multimedia System Architecture. Data & File Format standards. i.e RTF, TIFF, MIDI, JPEG, DIB, MPEG, Audio: digital audio, MIDI, processing sound, sampling, compression. Video: Avi, 3GP, MOV, MPEG, compression standards, compression through spatial and temporal redundancy. Multimedia Authoring .

### LIST OF PRACTICAL

1. A BRIEF STUDY OF VARIOUS TYPES OF INPUT AND OUTPUT DEVICES.
2. PROGRAM TO IMPLEMENT A LINE USING SLOPE INTERCEPT FORMULA.
3. PROGRAM TO IMPLEMENT LINE USING DDA ALGORITHM.
4. PROGRAM TO IMPLEMENT LINE USING BRESENHAM'S ALGORITHM.
5. PROGRAM TO IMPLEMENT CIRCLE USING MID POINT ALGORITHM.
6. PROGRAM TO IMPLEMENT TRANSLATION OF A LINE AND TRIANGLE
7. PROGRAM TO IMPLEMENT ROTATION OF A LINE AND TRIANGLE
8. PROGRAM TO IMPLEMENT SCALING TRANSFORMATION.
9. PROGRAM TO IMPLEMENT 3D ROTATION ABOUT AN ARBITRARY AXIS .
10. PROGRAM TO IMPLEMENT COHEN SUTHERLAND LINE CLIPPING .
11. PROGRAM TO IMPLEMENT SUTHERLAND HODGMAN POLYGON CLIPPING .



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12. PROGRAM TO DRAW BEZIER CURVE.

13. PROGRAM TO DRAW B-SPLINE CURVE .

**Suggested Reading:**

1. Donald Hearn and M.P. Becker "Computer Graphics" Pearson Pub.
2. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill
3. Foley Vandam, Feiner, Hughes "Computer Graphics Principle & Practice" , Pearson Pub.
4. Parekh "Principles of Multimedia" Tata McGraw Hill
5. Prabhat k Andleigh, Kiran Thakral , "Multimedia System Design " PHI Pub.
6. Shuman "Multimedia in Action", Cengage Learning

## Theory of Computation

### RATIONALE:

The purpose of this subject is to cover the underlying concepts and techniques used in Theory of Computation. In this syllabus we cover finite automata, pushdown automata, Context free grammars and Turing machines.

### PREREQUISITE:-

The students should have general idea about computing and mathematical concepts , Transition graph, Transition matrix.

### UNIT 1: Automata:

Basic machine, FSM , Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and N DFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata.

### Regular Sets and Regular Grammars:

Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Myhill- Nerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

### UNIT 2:Context –Free Grammars:

Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

### UNIT 3:Pushdown Automata:

Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA.

### Context Free Languages:

The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

### UNIT 4:Turing Machines:

Introduction, TM model, representation and languages acceptability of TM Design of TM,Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing machine as enumerators.Properties of recursive & recursively enumerable languages,Universal Turing machine

### UNIT 5:Tractable and Untractable Problems:

P, NP, NP complete and NP hard problems, examples of these problems like satisfy ability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc.

### Suggested Reading:

1. John E. Hopcroft, Jeffery Ullman,"Introduction to Automata theory, Languages & computation" Narosa Publishers.
2. K.L.P Mishra & N.Chandrasekaran,"Theory of Computer Science", PHI Learning
3. Michael Sipsev,"Theory of Computation",Cenage Learning
4. John C Martin, "Introduction to languages and theory of computation", McGraw Hill
5. Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India.
6. Kohavi,"Switching & Finite Automata Theory",TMH



## Computer Programming V (Unix/Linux-Lab.)

### **RATIONALE:**

The purpose of this subject is to cover the concepts, Installation Process, Hardware Requirements and features of Unix/Linux. Basic Commands & Shell Programming.

### **PREREQUISITE**

The students should have general Idea about computing fundamentals & operating system and at least one year of experience in programming .

### **Overview of Unix/Linux: -**

Concepts, Unix/Linux Installation Process, Hardware Requirements for Unix/Linux, Advantages of Unix/Linux, Reasons for Popularity and Success of Linux/Unix Operating System, Features of Linux/Unix Operating System, Kernel, Kernel Functions, The Shell Basic Commands, Shell Programming:-Shell Variables, Branching Control Structures, Loop-Control Structure, Continue and break Statements, Sleep Command, Debugging Script. Use of Linux as web-server, file server, directory server, application server, DNS server, SMTP server, Firewall, Proxy server.

### **File System: -**

Definition of File System, Defining Geometry, Disk Controller, Solaris File System, Disk Based File Systems, Network-Based File Systems, Virtual File systems, UFS File System, The Boot Block, The Super Block, The Inode, Tuning File System, Repairing File System.

### **Process Control: -**

Viewing a Process, Command to display Process, Process Attributes, Process States, Process Fields, PS Commands options, PGREP, PRSTAT, CDE Process Manager, Scheduling Process, Scheduling Priorities, Changing the Priority of a time-sharing process, Killing Process.

### **System Security: -**

Physical Security, Controlling System Access, Restricted Shells Controlling File Access, File Access Commands, Access Control List(ACLs), Setting ACL Entries, Modifying ACL entries on a file, Deleting ACL entries on a file, Restricting FTP, Securing Super User Access, Restricting Root Access, Monitoring super user Access, TCP Wrappers.

### **Dynamic Host Configuration Protocol: -**

Introduction, DHCP Leased Time, DHCP Scopes, DHCP IP Address, Allocation Types, Planning DHCP Deployment, DHCP Configuration files, Automatic Startup of DHCP Server, Configuration of DHCP Clients, Manually Configuring the DHCP.

### **Case Study: -**

Installation of Linux, Customization of Linux, Installation of SAMBA, APACHE, TOMCAT, Send MAIL, Postfix, Implementation of DNS, LDAP services, Firewall, Proxy server

### **List of Experiments:-**

1. To Study basic & User status Unix/Linux Commands.
2. Study & use of commands for performing arithmetic operations with Unix/Linux.



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3. Create a file called wlcc.txt with some lines and display how many lines, words and characters are present in that file.
4. Append ten more simple lines to the wlcc.txt file created above and split the appended file into 3 parts. What will be the names of these split files? Display the contents of each of these files.  
How many lines will be there on the last file?
5. Given two files each of which contains names of students. Create a program to display only those names that are found on both the files.
6. Create a program to find out the inode number of any desired file.
7. Study & use of the Command for changing file permissions.
8. Write a pipeline of commands, which displays on the monitor as well as saves the information about the number of users using the system at present on a file called usere.ux.
9. Execute shell commands through vi editor.
10. Installation, Configuration & Customizations of Unix/Linux.
11. Write a shell script that accepts any number of arguments and prints them in the reverse order.
12. Write a shell script to find the smallest of three numbers that are read from the keyboard.
13. Write a shell script that reports the logging in of a specified user within one minute after he/she logs in. The script automatically terminates if the specified user does not login during a specified period of time.
14. Installation of SAMBA, APACHE, TOMCAT.
15. Implementation of DNS, LDAP services,
16. Study & installation of Firewall & Proxy server

## **Suggested Reading:**

1. Venkatesh Murthy, "Introduction to Unix & Shell", Pearson Edu
2. Forouzan, "Unix & Shell Programming", Cengage Learning
3. Sumitab Das, "Unix Concept & Application", TMH
4. Gopalan, Shivaselvan, "Beginners Guide to Unix " PHI Learning
5. Venkateshwavle, "Linux Programming Tools Unveil'ed", BS Publication.
6. Richard Peterson, "Linux Complete Reference", TMH
7. Richard Peterson, "Unix Complete Reference", TMH



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**Objective of Self Study:** is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

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## SEMINAR / GROUP DISCUSSION (INTERNAL ASSESSMENT)

**Objective of GD and seminar** is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

**Evaluation** will be done by assigned faculty based on group discussion and power point presentation.

## Micro Processor and Interfacing

### RATIONALE:

The purpose of this subject is to cover the underlying concepts and techniques used in Micro Processor and Interfacing. In this subject we cover the unique issues associated with designing, testing, integrating, and implementing microcontroller/microprocessor-based embedded systems.

### PREREQUISITE

The students should have acquired fundamental microcontroller-associated programming skills using both the C programming language and assembly language

### UNIT –I

Evolution of microprocessor, single chip micro computers, Micro processor Application, Microprocessor and its architecture, addressing modes, instruction, Instruction sets, Arithmetic and Logic Instruction, Program control instruction, Introduction – 8086 family, procedure and macros, connection , Timing and Troubles hooting interrupt, 80286, 80836 and 80486 micro processor system concept.

### UNIT – II

Microprocessor Cycle, AIU, Timing and control Unit, Register data, Address bus, Pin Configuration, Intel 8086 instruction, Opcode and operands, limitation word size. Programming the microprocessor Assembly language, The Pentium and Pentium Pro Micro Processor with features, Pentium II, Pentium III and Pentium – IV Microprocessor with software changes. Instruction set for Intel 8086, Introduction Intimation and data formats, Addressing modes, Status flags, Symbols and abbreviations, programming of microprocessors, Assembly language, high level language, areas of application of various languages, Stacks, Sub routines system, software, commands in assembly language, software Development, Debugging program, Modular programming, Structured programming, Top-down, Bottom- up design , MACRO microprogramming

### UNIT-III

Assembly language programming with Examples like Addition of 8/16-bit Binary number, subtraction of 8/16 bit binary number, Address partitioning, addressing mode, type of addressing mode, memory and I/o interfacing, Data transfer schemes, Interfacing device and I/o devices I/o ports, Basic I/o Interfacing MDS, Micro controllers, I/o processor and co- processors ,Microcomputer Development system, Single chip micro computers, intel 8748 intel 8051, inter 8096, intel 8049intel 2920/2921, I/o processor UPI-425,UPI-41,42, Co-processor, math processor math co-processor – 8087, 80287, 80387DX 803875x.

### UNIT –IV

Bus Interface I/o port Addressing, decoding 8279, Programmable key board/display interface, 8254 Internal Timer, 16550 programmable communications interface A/D, 8259A Programmable Interrupt Controller, 8237 DMA Controller, Shared bus operation, disk Memory system Video display. ISA Bus, Extended ISA ( EISA) and VESA Local Buses, Peripheral Component Inter Connect (Pc I) Bus, Parallel Printer interface (LPT) Universal serial Bus (USB) Accelerated graphics port (AGP),Programmable Communication interfere 8251 VSART CRT Controller 8275, 6854, Floppy disk Controller 8272, I/o processor 8089,

## UNIT – V

Memory Unit, RAM,SRAM, DRAM,ROM, PROM EPROM, EEPROM Nonvolatile RAM semiconductor Technology for memory, Shift register, Magnetic Memory, Tap, disc, main memory and secondary memory cache memory, program memory and Data Memory, Real and virtual memory Buses, memory Addressing capacity of CPU, processing speed of computer.

### List of Experiments

1. Add a data byte located at offset 0500H in 2000H segment to another data byte available at 06000H in same segment and store the resulting 0700H in same segment?
2. Add the contents of memory location 2000H, offset 0500H to the contained of accumulator.
3. Write a program to find the average to two temperature name HI-TEMP and LO-TEMP and puts the result in the memory location AV-TEMP.
4. Find out the largest number from an unordered array of sixteen 8-bit numbers stored sequentially in the memory locations starting at offset 0500H in the segment 2000H
5. Move a byte string, 16 bytes long, from the offset 0200H to 0300H in the segment 7000H.
6. Write a program to add a profit factor to each element in a cost array and puts the result in a PRICES array, where profit factor is 15H and COST =20H, 28H, 15H, 26H, 19H, 27H, 16H, 29H.
7. Write a program to find out the number of positive numbers and negative numbers from a given series of signed numbers.
8. Write a program that performs the addition, subtraction, multiplications, division of the given operands. Perform BCD operation for addition and subtraction.
9. A Program to find out the number of even and odd numbers from a given series of 16 bit hexad4ecimal numbers.

### Suggested Reading:

1. Douglas V Hall, "Microprocessors and interfacing – Programming & Hardware" TMH
2. Barry B. Brey, "The intel Microprocessor – 8086", Pearson Education
3. Kenneth J.Ayala,"The 8086 Microprocessor: Programming & Interfacing The PC",Cengage Learning
4. Krishna Kant,"Microprocessors and Microcontrollers", PHI Learning
5. A.K.Ray KM Bhurchandi, "Advanced Microprocessor and peripherals" McGraw Hill
6. R.S. Gaonkar ,"Microprocessors and interfacing". TMHrence".TMH

## Principles Of Programming Languages

### **RATIONALE:-**

The purpose of this subject is to cover the underlying concepts and techniques used in Programming Languages. It provides general idea related to operating & Programming environment.

### **PREREQUISITE:-**

The students should have general idea about programming language . In addition, a familiarity with Elementary and Structured Data Types is needed for better understanding.

### **UNIT-I**

Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming , Logic Programming. Programming Language Implementation – Compilation and Virtual Machines, programming environments. Issues in Language Translation: Syntax, Semantics, Stages, analysis and synthesis, Parse Tree, CFG and BNF grammar.

### **UNIT-II**

Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names , Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization. Sequence control with Expressions, Conditional Statements, Loops, Exception handling.

### **UNIT-III**

Subprograms and Blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static and dynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, design issues for functions overloaded operators, co routines.

### **UNIT-IV**

Abstract Data types: Abstractions and encapsulation, introductions to data abstraction, Static and Stack-Based Storage management. heap based storage management. Garbage Collection. object oriented programming in small talk, C++, Java, C#, PHP, Perl . Concurrency: Subprogram level concurrency, semaphores, monitors, message passing, Java threads, C# threads.

### **UNIT – V**

Exception handling, Exceptions, exception Propagation, Exception handler in C++ and Java. Logic Programming Language: Introduction and overview of logic programming, basic elements of prolog, application of logic programming. Functional Programming Languages: Introduction, fundamentals. Introduction to 4GL.

### **Suggested Reading:**

1. Sebesta, "Concept of programming Language", Pearson Edu.
2. Loudon, "Programming Languages: Principles & Practices" , Cengage Learning
3. Tucker, " Programming Languages: Principles and paradigms ", Tata McGraw –Hill
4. Terrance W Pratt, "Programming Languages: Design and Implementation" Pearson Edu.
5. Cavlo Ghezzi & Mehdi Jazayeri " Programming Languages Concepts", Willey India.
6. E Horowitz, "Programming Languages", 2nd Edition, Addison Wesley

## Software Engineering & Project Management

### **RATIONALE:**

The purpose of this subject is to cover the underlying concepts and techniques used in Software Engineering & Project Management. Some of these techniques can be used in software design & its implementation.

### **PREREQUISITE:-**

The students should have at least one year of experience in programming a high-level language and databases. In addition, a familiarity with software development life cycle will be useful in studying this subject..

### **Unit I: The Software Product and Software Process:**

Software Product and Process Characteristics, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model, Spiral Model, Component Assembly Model, RUP and Agile processes. Software Process customization and improvement, CMM, Product and Process Metrics

### **Unit II: Requirement Elicitation, Analysis, and Specification**

Functional and Non-functional requirements, Requirement Sources and Elicitation Techniques, Analysis Modeling for Function-oriented and Object-oriented software development, Use case Modeling, System and Software Requirement Specifications, Requirement Validation, Traceability

### **Unit III: Software Design**

The Software Design Process, Design Concepts and Principles, Software Modeling and UML, Architectural Design, Architectural Views and Styles, User Interface Design, Function-oriented Design, SA/SD Component Based Design, Design Metrics

### **Unit IV: Software Analysis and Testing**

Software Static and Dynamic analysis, Code inspections, Software Testing Fundamentals, Software Test Process, Testing Levels, Test Criteria, Test Case Design, Test Oracles, Test Techniques, Black-Box Testing, White-Box Unit Testing and Unit Testing Frameworks, Integration Testing, System Testing and other Specialized Testing, Test Plan, Test Metrics, Testing Tools. , Introduction to Object-oriented analysis, design and comparison with structured software engg.

### **Unit V: Software Maintenance & Software Project Measurement**

Need and Types of Maintenance, Software Configuration Management (SCM), Software Change Management, Version Control, Change control and Reporting, Program Comprehension Techniques, Re-engineering, Reverse Engineering, Tool Support.

Project Management Concepts, Feasibility Analysis, Project and Process Planning, Resources Allocations, Software efforts, Schedule, and Cost estimations. Project Scheduling and Tracking, Risk Assessment and Mitigation, Software ~~Quality~~ Assurance (SQA). Project Plan, Project Metrics.

## **Practical and Lab work**

Lab work should include a running case study problem for which different deliverables at the end of each phase of a software development life cycle are to be developed. This will include modeling the requirements, architecture and detailed design. Subsequently the design models will be coded and tested. For modeling, tools like Rational Rose products. For coding and testing, IDE like Eclipse, NetBeans, and Visual Studio can be used.

## **Suggested Reading:**

1. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa Pub, 2005
2. Rajib Mall, "Fundamentals of Software Engineering" Second Edition, PHI Learning
3. R S. Pressman, "Software Engineering: A Practitioner's Approach", Sixth edition 2006, McGraw-Hill.
4. Sommerville, "Software Engineering", Pearson Education.
5. Richard H. Thayer, "Software Engineering & Project Management", Wiley India
6. Waman S. Jawadkar, "Software Engineering", TMH
7. Schwalbe, "IT Project Management", Cengage Learning.

## Computer Networking

### **RATIONALE:-**

The purpose of this subject is to cover the underlying concepts and techniques used in Computer Networking. This syllabus provides a comprehensive introduction to computer network, network architecture and protocols.

### **PREREQUISITE:-**

The students should have thorough exposure in Analog and Digital Communication and Data Communications. Knowledge of Topology and protocol will help in better understanding

### **Unit I**

Computer Network: Definitions, goals, components, structure, Architecture, Classifications & types, Growth, Complexity and applications etc. Layered Architecture: Protocol hierarchy, Connection Oriented & Connectionless Services, Service permissive Design issues & its functionality. ISO-OSI Reference Model: Principle, Model, Descriptions of various layers and its comparison with TCP/IP. Network standardization.

Examples of Networks: Telecommunication Network, Corporate Networks, Connection oriented network i.e., X.25, Frame relay & ATM, Wireless LAN 802.11, internet, Intranet, Extranet, SNA & DNA etc.

### **Unit II**

Data Link Layer: Need, Services Provided, Framing & its methods, Flow Control, Error control. DLL Protocol: Elementary & Sliding Window. Piggybacking & Pipelining. Protocol verification: Finite State Machine Models & Petri net models. Example in Data Link Layers: HDLC & Internet. Comparison of BISYNC and HDLC Features. Bridges and layer-2 switches

### **Unit III**

MAC Sub layer: Static & Dynamic channel allocation, Media access control for LAN & WAN. Classification of MAC Sub layer protocol, Study of various collision, Collision free & limited contention protocol i.e., ALOHA : pure, slotted, CSMA, CSMA/CD, CSMA/CA, Bit Map, Binary count down, BRAP, MLMA, Adaptive tree walk & urn protocol etc. IEEE 802 standards for LAN & MAN & their comparison. Ethernet: Cabling, Binary exponentials algorithms, performance fast Ethernet, Gigabit Ethernet, FDDI. Wireless LANs, Broadband Wireless, Bluetooth: Architecture, Application & Layering.

### **UNIT - IV**

Network Layer: Need, Services Provided, Design issues, Routing algorithms: Least Cost Routing algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for mobile hosts, Routing in Ad Hoc Networks Routing Strategies, Congestion Control Algorithms: General Principles of Congestion control, Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram subnets. IP protocol, IP Addresses, Comparative study of IPv4 & IPv6, Mobile IP.

### **Unit V**

Processes to Processes Delivery – Transmission Control Protocol (TCP) - User Datagram Protocol, Data Traffic, Congestion Control and Quality of Service, Techniques to improve QOS, Integrated Services, and Differentiated Services. Network Security: Cryptography,

Message Security, Digital Signature, User Authentication, Key Management, Security Protocols in Internet ,DNS,SMTP, FTP, HTTP, WWW, Virtual Terminal Protocol, VoIP: Basic IP Telephone System,H.323 Characteristic & Layering, SIP Characteristics, Method & Sessions.

### **List of Experiments**

1. To study Communication Guiding system
2. To study various types of connectors.
3. To study of different type of LAN equipments.
4. Study and verification of standard Network topologies i.e. Star, Bus, Ring etc
5. LAN installations and their Configurations.
6. To implement various types of error correcting techniques.
7. To implement various types of framing methods.
8. To implement various types of DLL protocols.
9. To study & configure various types of router & Bridges.
10. To implement various types of routing algorithm.
11. To study of Tool Command Language(TCL).
12. Study and Installation of Standard Network Simulator, N.S-2.
13. Study & Simulation of MAC Protocols like Aloha, CSMA, CSMA/CD and CSMA/CA using Standard Network Simulator.
14. Study & Simulation of Routing Protocols using Standard Network Simulator.
15. Study & implementations of VoIP Concepts.
16. Implementation & Comparisons of various types of Cryptographic algorithms.

### **Suggested Reading:**

1. Tanenbaum A. S ,”Computer Networks “Pearson Education.
2. Stalling W, “Computer Networks”, Pearson Education
3. Douglas E. Comer & M.S Narayanan,”Computer Network & Internet”, Pearson Education
4. Behraj A Forouzan,”Data Communication & Networking”, McGraw-Hill.
5. Natalia Olifar & Victor Olifer,”Computer Networks”, Willey Pub.
6. Prakash C. Gupta, “Data Communications and Computer Networks”, PHI
7. Bertsekas & Gallager “Data Network” , PHI
- 8 Gallo,”Computer Communication & Networking Technologies”,Cengage Learning

## Advance Computer Architecture (ACA)

### RATIONALE:

The purpose of this subject is to cover the underlying concepts and techniques used in Advance Computer Architecture. The Syllabus discusses principles of parallel algorithms design and different parallel programming models

### PREREQUISITE

The students should have general Idea of Computer Organization. In addition, a familiarity with Memory organization, Computational models is required.

### Unit-I

Flynn's Classification, System Attributes to Performance, Parallel computer models - Multiprocessors and multicomputers, Multivector and SIMD Computers. Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Control flow, data flow and Demand driven mechanisms. Static interconnection networks, Dynamic interconnection Networks: Bus Systems, Crossbar Switch, Multiport Memory, Multistage and Combining Networks

### Unit- II

Instruction set architecture, CISC Scalar Processors , RISC Scalar Processors, VLIW architecture, Memory Hierarchy, Inclusion, Coherence and Locality, Memory capacity planning. Interleaved memory organization- memory interleaving, pipelined memory access, Bandwidth and Fault Tolerance. Backplane Bus System: Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt.

### Unit-III

Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, pipeline hazards, Dynamic instruction scheduling - score boarding and Tomosulo's algorithm, Branch handling techniques, Arithmetic Pipeline Design, Static arithmetic pipeline, Multifunctional arithmetic pipelines. Superscalar pipeline design, Super pipeline processor design.

### Unit-IV

Cache coherence, Snoopy protocols, Directory based protocols. Message routing schemes in multicomputer network, deadlock and virtual channel. Vector Processing Principles, Vector instruction types, Vector-access memory schemes. Vector supercomputer architecture, SIMD organization: distributed memory model and shared memory model. Principles of Multithreading: Multithreading Issues and Solutions, Multiple-Context Processors

### Unit-V

Parallel Programming Models, Shared-Variable Model, Message-Passing Model, Data-Parallel Model, Object-Oriented Model, Functional and Logic Models, Parallel Languages and Compilers, Language Features for Parallelism, Parallel Programming Environment, Software Tools and Environments.

### Suggested Reading:

1. Kai Hwang, "Advanced computer architecture", TMH.
2. J.P.Hayes, "computer Architecture and organization"; MGH.
3. V.Rajaraman & C.S.R.Murthy, "Parallel computer"; PHI Learning.
4. Kai Hwang, "Advance Computer Architecture: - A System Design Approach", PHI Learning



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5. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing.
6. Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH.
7. David E. Callav & Jaswinder Pal Singh Marge Kaufmann "Advance Computer Architecture", EIS India.
8. Saiian G. Shiva. Tavlár & Francis. "Advance Computer Architecture"



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## SELF STUDY (INTERNAL ASSESSMENT)

**Objective of Self Study:** is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

**Evaluation** will be done by assigned faculty based on report/seminar presentation and viva.



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## SEMINAR / GROUP DISCUSSION (INTERNAL ASSESSMENT)

**Objective of GD and seminar** is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

**Evaluation** will be done by assigned faculty based on group discussion and power point presentation.



## Compiler Design

### Unit-I Introduction to compiling & Lexical Analysis

Introduction of Compiler, Major data Structure in compiler, BOOT Strapping & Porting, Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, Lexical analysis: Input buffering , Specification & Recognition of Tokens, LEX.

### Unit-II Syntax Analysis & Syntax Directed Translation

Syntax analysis: CFGs, Top down parsing, Brute force approach, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence parsing, LR parsers (SLR,LALR, LR),Parser generation. Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attributed definition, L-attribute definition, Top down translation, Bottom Up evaluation of inherited attributes Recursive Evaluation, Analysis of Syntax directed definition.

### Unit-III Type Checking & Run Time Environment

Type checking: type system, specification of simple type checker, equivalence of expression, types, type conversion, overloading of functions and operations, polymorphic functions. Run time Environment: storage organization, Storage allocation strategies, parameter passing, dynamic storage allocation , Symbol table

### Unit –IV Code Generation

Intermediate code generation: Declarations, Assignment statements, Boolean expressions, Case statements, Back patching, Procedure calls Code Generation: Issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks, peephole optimization, generating code from DAG.

### Unit –V Code Optimization

Introduction to Code optimization: sources of optimization of basic blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations ,Data flow analysis of structure flow graph Symbolic debugging of optimized code.

### List of Experiments:

- Develop a lexical analyzer to recognize a few patterns.
- Write a programme to parse using Brute force technique of Topdown parsing.
- Develop LL (1) parser (Construct parse table also).
- Develop an operator precedence parser (Construct parse table also)
- Develop a recursive descent parser
- Write a program for generating for various intermediate code forms i) Three address code  
ii) Polish notation
- Write a program to simulate Heap storage allocation strategy
- Generate Lexical analyzer using LEX
- Generate YACC specification for a few syntactic categories.
- Given any intermediate code form implement code optimization techniques
- Study of an Object Oriented Compiler.



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## References:

1. A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools , Pearson Education
- 2 Raghavan, Compiler Design, TMH Pub.
3. Louden. Compiler Construction: Principles and Practice, Cengage Learning
4. A. C. Holub. Compiler Design in C , Prentice-Hall Inc., 1993.
5. Mak, writing compiler & Interpreters, Willey Pub.



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## Distributed System

### Unit-I

#### Introduction to distributed systems

Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Issues in designing Distributed System,

### Unit-II

#### Distributed Share Memory And Distributed File System

Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing. Desirable features of good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault tolerance. Naming: - Features, System Oriented Names, Object Locating Mechanism, Human Oriented Name.

### Unit-III

#### Inter Process Communication And Synchronization

API for Internet Protocol, Data Representation & Marshaling, Group Communication, Client Server Communication, RPC- Implementing RPC Mechanism, Stub Generation, RPC Messages. Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms:- Bully & Ring Algorithms.

### Unit-IV

#### Distributed Scheduling And Deadlock

Distributed Scheduling-Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues. Deadlock-Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms,

### Unit-V

#### Distributed Multimedia & Database system

Distributed Data Base Management System(DDBMS), Types of Distributed Database, Distributed Multimedia:- Characteristics of multimedia Data, Quality of Service Managements. Case Study of Distributed System:- Amoeba, Mach, Chorus

### References:

Sinha, Distributed Operating System Concept & Design, PHI  
Coulouris & Dollimore, Distributed System Concepts and Design, Pearson Pub  
Singhal & Shivratri, Advance Concept in Operating System, McGraw Hill  
Attiya & Welch, Distributed Computing, Wiley Pub.

## Cloud Computing

### Unit-I

**Introduction:** Historical development ,Vision of Cloud Computing, Characteristics of cloud computing as per NIST , Cloud computing reference model ,Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments. Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis ,Satellite Image Processing ,CRM and ERP ,Social networking .

### Unit-II

**Cloud Computing Architecture:** Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance,

**Cloud Solutions:** Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management.

**Cloud Offerings:** Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure.

### Unit –III

**Cloud Management & Virtualization Technology:** Resiliency, Provisioning, Asset management, Concepts of Map reduce , Cloud Governance, High Availability and Disaster Recovery.

**Virtualization:** Fundamental concepts of compute ,storage, networking, desktop and application virtualization .Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Infrastructure Requirements , Virtual LAN(VLAN) and Virtual SAN(VSAN) and their benefits .

### Unit-IV

**Cloud Security:** Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture .

### Unit-V

Market Based Management of Clouds , Federated Clouds/Inter Cloud: Characterization & Definition ,Cloud Federation Stack , Third Party Cloud Services .

Case study : Google App Engine, Microsoft Azure , Hadoop , Amazon , Aneka

### List of Experiments:

1. Installation and configuration of Hadoop/Euceliptus etc.
2. Service deployment & Usage over cloud.
3. Management of cloud resources.
4. Using existing cloud characteristics & Service models .
5. Cloud Security Management.
6. Performance evaluation of services over cloud .

### Recommended Text:

1. Buyya, Selvi ,” Mastering Cloud Computing “,TMH Pub
2. Kumar Saurabh, “Cloud Computing” , Wiley Pub
3. Krutz , Vines, “Cloud Security “ , Wiley Pub
4. Velte, “Cloud Computing- A Practical Approach” ,TMH Pub
5. Sosinsky, “ Cloud Computing” , Wiley Pub

## Information Storage & Management

### Unit-I

Introduction to Storage Technology: Data proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Information Lifecycle Management, Data categorization.

### Unit-II

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

### Unit-III

Introduction to Networked Storage: JBOD, DAS, NAS, SAN & CAS evolution and comparison. Applications, Elements, connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

### Unit -IV

Hybrid Storage solutions; Virtualization: Memory, network, server, storage & appliances. Data center concepts & requirements, Backup & Disaster Recovery: Principles Managing & Monitoring: Industry management standards (SNMP, SMI-S, CIM), standard framework applications, Key management metrics (Thresholds, availability, capacity, security, performance).

### Unit-V

Information storage on cloud :Concept of Cloud, Cloud Computing, storage on Cloud, Cloud Vocabulary, Architectural Framework, Cloud benefits, Cloud computing Evolution, Applications & services on cloud, Cloud service providers and Models, Essential characteristics of cloud computing, Cloud Security and integration.

### References:

1. G. Somasundaram & Alok Shrivastava (EMC Education Services) editors; Information Storage and Management: Storing, Managing, and Protecting Digital Information; Wiley India.
2. Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Hausteine; Storage Network explained : Basic and application of fiber channels, SAN, NAS, iSER, INFINIBAND and FCOE, Wiley India.
3. John W. Rittinghouse and James F. Ransome; Cloud Computing : Implementation ,Management and Security, CRC Press, Taylor Frances Pub.
4. Nick Antonopoulos, Lee Gillam; Cloud Computing : Principles, System & Application, Springer.
5. Anthony T. Velete, Toby J. Velk, and Robert Eltenpeter, Cloud Computing : A practical Approach, TMH Pub.
6. Saurabh , Cloud Computing : Insight into New Era

## Network & Web Security

### UNIT I

Introduction to Network Security, Computer Security and Cyber Security. Security Terminologies and Principle, Security Threats, Types of attacks (Operating System, application level, Shrink Wrap code, Misconfiguration attacks etc.). Introduction to Intrusion, Terminologies, Intrusion Detection System (IDS), Types of Intrusion Detection Systems, System Integrity Verifiers (SIVS). Indication of Intrusion: System Indications, File System Indications Network Indications. Intrusion Detection Tools, Post attack IDS Measures & Evading IDS Systems. Penetration Testing, Categories of security assessments, Vulnerability Assessment, Types of Penetration Testing. Risk Management.

### UNIT II

Cryptography, Classical Cryptographic Techniques, Encryption, Decryption, Code Breaking: Methodologies, Cryptanalysis, Cryptography Attacks, Brute-Force Attack, Use of Cryptography. Public key cryptography, Principles of Public key Cryptosystems, Cryptographic Algorithms RSA, Data Encryption Standard (DES), RC4, RC5, RC6, Blowfish, Key Management, Diffie-Hellman key exchange, elliptic curve cryptography.

### UNIT III

Hash Functions, One-way Hash Functions, SHA (Secure Hash Algorithm), Authentication Requirements, Authentication Functions, Kerberos. Message Authentication codes, Message Digest Functions, MD5, SSL (Secure Sockets Layer), SSH (Secure Shell), Algorithms and Security, Disk Encryption, Government Access to Keys (GAK) **Digital Signature:** Analysis, Components, Method, Applications, Standard, Algorithm: Signature Generation/Verification, ECDSA, ElGamal Signature Scheme, Digital Certificates.

### UNIT IV

**Trojans and Backdoors:** Overt and Covert Channels, Working, Types (Remote Access Trojans, Data-Sending Trojans, Destructive Trojans, Trojans, Proxy Trojans, FTP Trojans, Security Software Disablers).

**Viruses and Worms:** Characteristics, Working, Infection Phase, Attack Phase. Sniffers: Definition, spoofing, Sniffing, Vulnerable Protocols, Types.

**Phishing:** Methods, Process, Attacks Types (Man-in-the-Middle Attacks, URL Obfuscation Attacks, Hidden Attacks, Client-side Vulnerabilities, Deceptive Phishing, Malware-Based Phishing, DNSBased Phishing, Content-Injection Phishing, Search Engine Phishing). **Web Application Security-** Secured authentication mechanism, secured session management, Cross-site Scripting, SQL Injection and other vulnerabilities

**Denial-of Service Attacks:** Types of Attacks (Smurf Attack, Buffer Overflow Attack, Ping of Death Attack, Teardrop Attack, SYN Attack, SYN Flooding), DDoS Attack (Distributed DoS Attack.), Session Hijacking, Spoofing v Hijacking, TCP/IP hijacking, CAPTCHA Protection



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## UNIT V

IP Security, Web Security, Firewalls: Types, Operation, Design Principles, Trusted Systems. Computer Forensics, Need, Objectives, Stages & Steps of Forensic Investigation in Tracking Cyber Criminals, Incident Handling. Hacking, Classes of Hacker (Black hats, grey hats, white hats, suicide hackers), Footprinting, Scanning (Types-Port, Network, Vulnerability), E-Mail Spiders, Overview of System Hacking Cycle.

### List of Experiments:

1. Footprinting using footprinting tools (Open Source & Free) (ex-nslookup, ARIN, Whois, Google Earth etc..)
2. Scanning for vulnerabilities using (Angry IP, HPing2, IPScanner, Global Network Inventory Scanner, Net Tools Suite Pack.)
3. NetBIOS Enumeration Using NetView Tool, Nbtstat Enumeration Tool (Open Source).
4. Steganography using tools: Tool: Merge Streams, Image Hide, Stealth Files, Blindside, STools, Steghide, Steganos, Pretty Good Envelop, Stegdetect.
5. Steganalysis - Stego Watch- Stego Detection Tool, StegSpy.
6. How to Detect Trojans by using – Netstat, fPort, TCPView, CurrPorts Tool, Process Viewer.
7. Lan Scanner using look@LAN, Wireshark.
8. Understanding DoS Attack Tools- Jolt2, Bubonic.c, Land and LaTierra, Targa, Nemesy Blast, Panther2, Crazy Pinger, Some Trouble, UDP Flood, FSMax.

### Suggested Reading:

1. William Stallings, "Cryptography and Network Security: Principles and Practice" Pearson
2. Charlie Kaufman, Radia Perlman, Mike Speciner, Michael Speciner, "Network Security - Private communication in a public world" TMH
3. Fourozon, "Cryptography & Network Security" TMH
4. Joseph Migga Kizza, Computer Network Security, , Springer International Edition
5. Atul Kahate, "Cryptography and Network Security" Mc Graw Hill
6. Carl Endorf, Eugene Schultz, Jim Mellander "INTRUSION DETECTION & PREVENTION" TMH
7. Neal, Krawetz, Introduction to Network Security, Cengage Learning

## Simulation & Modeling

### Unit-I

#### Introduction to Modeling and Simulation

Nature of Simulation. Systems , Models and Simulation, Continuous and Discrete Systems, system modeling, concept of simulation, Components of a simulation study, Principles used in modeling Static and Dynamic physical models, Static and Dynamic Mathematical models Introduction to Static and Dynamic System simulation , Advantages ,Disadvantages and pitfalls of Simulation.

### Unit-II

#### System Simulation and Continuous System Simulation

Types of System Simulation, Monte Carlo Method, Comparison of analytical and Simulation methods, Numerical Computation techniques for Continuous and Discrete Models, Distributed Lag Models, Cobweb Model. Continuous System models, Analog and Hybrid computers, Digital- Analog Simulators, Continuous system simulation languages ,Hybrid simulation ,Real Time simulations.

### Unit -III

#### System Dynamics & Probability concepts in Simulation

Exponential growth and decay models, logistic curves ,Generalization of growth models , System dynamics diagrams, Multi segment models , Representation of Time Delays. Discrete and Continuous probability functions, Continuous Uniformly Distributed Random Numbers, Generation of a Random numbers, Generating Discrete distributions, Non-Uniform Continuously Distributed Random Numbers, Rejection Method.

### Unit-IV

#### Simulation of Queuing Systems and Discrete System Simulation

Poisson arrival patterns, Exponential distribution, Service times, Normal Distribution Queuing Disciplines, Simulation of single and two server queue. Application of queuing theory in computer system. Discrete Events ,Generation of arrival patterns, Simulation programming tasks, Gathering statistics, Measuring occupancy and Utilization, Recording Distributions and Transit times .

### Unit-V

#### Introduction to Simulation languages and Analysis of Simulation output

GPSS: Action times, Succession of events, Choice of paths, Conditional transfers, program control statements. SIMSCRIPT: Organization of SIMSCRIPT Program, Names & Labels, SIMSCRIPT statements. Estimation methods , Relocation of Runs, Batch Means , Regenerative techniques , Time Series Analysis , Spectral Analysis and Autoregressive Processes.

#### List of Experiments:-

1. Simulate CPU scheduling algorithm using queuing system a) FCFS b) SJF c) Priority Algo
2. Simulate multiplexer/concentrator using queuing system
3. Simulate congestion control algorithms.
4. Simulate disk scheduling algorithms.
5. Simulate a Manufacturing shop and write a program in GPSS.
6. Simulate Telephone system model and write a program in SIMSCRIPT.



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## References:

- Gorden G., System simulation, Prentice Hall.
- Seila, Simulation Modeling, Cengage Learning
- Law .,Simulation Modeling And Analysis, McGraw Hill
- Deo, System Simulation with Digital Computer, PHI
- Harrington, Simulation Modeling methods, McGraw Hill
- Severance, " System Modeling & Simulation, Willey Pub

## Embedded Computer System

### Unit – I

#### Introduction to Embedded systems

Embedded Systems Vs General Computing Systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Purpose of Embedded systems, Core of the Embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, PCB and Passive Components, Characteristics and Quality attributes of a Embedded System .

### Unit – II

#### Design of Embedded Systems with 8bit Microcontrollers-8051

Factors for considering in selecting a Controller, Designing with 8051 microcontroller Different addressing modes supported by 8051, Instruction set for 8051 microcontroller. Fundamental issues in Hardware Software Co-Design, Computational models in Embedded Design .

### Unit – III

#### Embedded Hardware & Firmware Design and Development

Analog & Digital Electronic components, VLSI & Integrated circuit design, Electronic Design Automation tools , PCB layout Design and its fabrication .Embedded firmware design approaches , Embedded firmware Development Languages , Programming in Embedded C . Integration and testing of Embedded Hardware and Firmware , Safe & robust Design, Reliability, Faults, errors & Failure, Functional Design, Architecture Design, Prototyping.

### Unit -IV

#### Embedded System Development Environment

Integrated Development Environment (IDE) , Types of files Generated on Cross- Compilation , Disassembler / Decompiler, Simulators, Emulators and Debugging, Boundary Scan.

### Unit – V

#### Embedded Product Development Lifecycle (EDLC) and Trends in Embedded Industry

What is EDLC, Objectives of EDLC, Different phases of EDLC, EDLC Approaches-Linear or waterfall model , Iterative Model , Prototyping/Evolutionary Model, Spiral Model . Processor trends in Industry, Embedded OS Trends, Development Language trends Open Standards, Frameworks and Alliances, Bottlenecks.

#### References:

1. Shibu, Introduction to Embedded System;, TMH
2. Barrett ,Embedded Systems :Design and Applications ,Pearson Education
3. Rajkamal, Embedded System, TMH
4. Vahid ,Givargis ,Embedded System Design ,Wiley
5. Balbno, Embedded Micro Computer System Cengage Learning
6. Siewert, Real Time Embedded System &
7. Peckol, Embedded System, Willey Indi

## Real Time Fault Tolerant Systems

### Unit-I

Structure of Real Time System, Performance Measure for real time system, Task Assignments, Fault Tolerant Scheduling, Real Time Vs General purpose Data Bases, Data Bases for Hard Real Time System, Real Time Communication

### Unit-II

Fault Tolerance, Fault-Error-Failure. Redundancy, Error Detection, Damage Confinement, Error Recovery, Fault Treatment, Fault Prevention, anticipated and unanticipated Faults. Error models: General coding scheme Error detection techniques: Watchdog processors, Heartbeats, consistency and capability checking, Data audits, Assertions, Control-flow checking, Error control coding. Application: DHCP

### Unit-III

Fault tolerance: Coding technique-fault tolerant self checking and fail safe circuits-fault tolerance in combinatorial and sequential circuits- synchronous and asynchronous fail safe circuits. Software fault tolerance: Process pairs, robust data structures, N version programming, Recovery blocks, Replica consistency & reintegration, multithreaded programs Application: VAX. **Network fault tolerance:** Reliable communication protocols, Agreement protocols, Database commit protocols -Application: Distributed SQL server Check pointing & Recovery - Application: Micro check pointing, IRIX Checkpoints

### Unit-IV

Experimental Evaluation: Modeling and simulation based, Fault injection based - Application: NFTAPE fault injector. Modeling for performance, dependability and perform ability: dependability-specific methods (fault trees, reliability block diagrams), queues, stochastic Petri nets and stochastic activity networks - Application: Ultra SAN

### Unit-V

Practical Systems for Fault Tolerance: - Application: Ad-hoc wireless network - Application: NASA Remote Exploration & Experimentation System Architecture: Fault tolerant computers - general purpose commercial systems-fault tolerant multiprocessor and VLSI based communication architecture. Fault tolerant software: Design-N-version programming recovery block - acceptance tests-fault trees- validation of fault tolerant systems.

### REFERENCES :-

1. K.K.Pradhan, "Fault Tolerant computing theory and techniques" volume III. Prentice Hall,1989.
2. Krishna, Real Time System, TMH
3. Anderson and Lee, "Fault Tolerant principles and practice" ,PHI 1989.
4. Siewert, Real Time Embeded System, Cengage Learning.
5. Rajiv Mall, Real Time System, Pearson Edu.
6. Parag K. Lala, "Fault Tolerant and Fault Testable, Hardware design" PHI 1985.
7. Shem , toy Levei , Ashok K.Agarwala , "Fault Tolerant System design", Tata McGraw Hill



# MAHAKAUSHAL UNIVERSITY JABALPUR

## Industrial Training

### SCHEME OF STUDIES

Duration: 6 weeks after the VI semester in the summer break, Assessment in VII Semester.

### SCHEME OF EXAMINATION

For the assessment of industrial training undertaken by the students, following components are considered with their weightage.

#### (a) Term work

In Industry Marks allotted

1. Attendance and General Discipline 10
2. Daily diary Maintenance 10
3. Initiative and participative attitude during training 10
4. Assessment of training by Industrial Supervisor 20

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TOTAL 50

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#### (b) Practical/Oral Examination (Viva-Voce) In Institution Marks allotted

1. Training Report 25
2. Seminar and cross questioning (defense) 25

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TOTAL 50

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Marks of various components in industry should be awarded to the students, in consultations with the Training and Placement Officer/Faculty of Institute and I/c of training from Industry. During training students will prepare a first draft of training report in consultation with section in-charge. After training they will prepare final draft with the help of T.P.O./Faculty of the institute. Then they will present a seminar on their training and they will face viva-voce on training in the institute.

### 1.1 OBJECTIVE OF INDUSTRIAL TRAINING

The objective of undertaking industrial training is to provide work experience so that student's engineering knowledge is enhanced and employment prospects are improved. The student should take this course as a window to the real World of Work and should try to learn as much as possible from real life experiences by involving and interacting with industry staff. Industrial training also provides an opportunity to students to select an engineering problem and possibly an industry guide for their Major Project in final semester.

Industrial training of the students is essential to bridge the wide gap between the classroom and industrial environment. This will enrich their practical learning and they will be better equipped to integrate the practical experiences with the classroom learning process.

## 1.2 LEARNING THROUGH INDUSTRIAL TRAINING

During industrial training students must observe following to enrich their learning:

- Industrial environment and work culture.
- Organizational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.
- Quality control and assurance.
- Maintenance system.
- Costing system.
- Stores and purchase systems.
- Layout of Computer/ EDP/MIS centers.
- Roles and responsibilities of different categories of personnel.
- Customer services.
- Problems related to various areas of Work etc.

Faculty and TPO are supposed to plan industrial training in such a manner that students get exposure on most of the above arena in the field (world of work). Students are supposed to acquire the knowledge on above by -

1. Observation,
2. Interaction with officials at the workplace
3. Study of Literature at the workplace (e.g. User Manual, standards, maintenance schedules, etc.)
4. "Hand's on" experience
5. Undertaking / assisting project work.
6. Solving problems at the work place.
7. Presenting a seminar.
8. Participating in-group meeting/ discussion.
9. Gathering primary and secondary data/ information through various sources, Storage, retrieval and analysis of the gathered data.
10. Assisting officials and managers in their working.
11. Undertaking a short action research work.
12. Consulting current technical journals and periodicals in the library.
13. Discussions with peers.

## 1.2 GUIDANCE TO THE FACULTY/TPO FOR PLANNING AND IMPLEMENTING THE INDUSTRIAL TRAINING

The industrial training program, which is spread to 6 weeks' duration, has to be designed in consultation with the authorities of the work place, keeping in view the need of the contents. Following are some of the salient points: Spelling out the objectives of the industrial training in behavioral terms and same is informed in advance to the

- 1) Students,
- 2) Authorities of the work place and
- 3) Supervising faculty members.

Discussing and preparing students for the training for which meetings with the students has to be planned. Meeting with industrial personnel and orienting them regarding the objective of the training and the expectations of the program. Correspondence with the authorities of the work place. Orientation classes for students on how to make the training most beneficial -monitoring daily diary, writing weekly reports, how to interact with various categories of industrial personnel, how to behave and undertake responsibilities, how to gather information from the workplace, ethics etc. Guiding students to make individual plans (week wise/ day wise) to undertake industrial training Developing a system of maintaining training records, by teachers for every batch of students for convenient retrieval. Inviting industrial personnel to deliver lectures on some aspects of training.



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## 1.4 ACTION PLAN FOR PLANNING STAGES AT THE INSTITUTION LEVEL

S.No. Activity Commencing Week Finishing week Remarks

1. Meeting with Principal
2. Meeting with Colleagues
3. Correspondence with work place (Industries concerned)
4. Meeting with authorities of work place
5. Orientation of students for industrial training
6. Scrutinizing individual training plan of students
7. Commencement of industrial training
8. First monitoring of industrial training
9. Second monitoring of industrial training
10. Finalization of Training report
11. Evaluation of performance at Industry level
12. Evaluation of industrial program in the institution



# MAHAKAUSHAL UNIVERSITY JABALPUR

## Major Project - I

The student should prepare a working system or some design or understanding of a complex system that he has selected from the previous semesters using system analysis tools and submit the same in the form of a write-up i.e. detail project report. The student should maintain proper documentation of different stages of project such as need analysis, market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan wherever applicable. Each student is required to prepare a project report based on the above points and present the same at the final examination with a demonstration of the working system.



# MAHAKAUSHAL UNIVERSITY JABALPUR

## SELF STUDY (INTERNAL ASSESSMENT)

**Objective of Self Study:** is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

**Evaluation** will be done by assigned faculty based on report/seminar presentation and viva.



# MAHAKAUSHAL UNIVERSITY JABALPUR

## SEMINAR / GROUP DISCUSSION (INTERNAL ASSESSMENT)

**Objective of GD and seminar** is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

**Evaluation** will be done by assigned faculty based on group discussion and power point presentation.

## Soft Computing

### Unit – I

Soft Computing : Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A\* algorithm, AO\* Algorithms and various types of control strategies. Knowledge representation issues, Propositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.

### Unit – II

Neural Network : Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb's learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA,

### Unit – III

Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.

### Unit – IV

Fuzzy Logic: Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

### Unit – V

Genetic algorithm : Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

### References :

1. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication.
2. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
3. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
4. Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
5. Kosko: Neural Network & Fuzzy System, PHI Publication
6. Klir & Yuan ,Fuzzy sets & Fuzzy Logic: Theory & Appli.,PHI Pub.
7. Hagen, Neural Network Design, Cengage Learning



# MAHAKAUSHAL UNIVERSITY JABALPUR

## Web Engineering

### UNIT-1

**Web Engineering:** Introduction, History, Evolution and Need, Time line, Motivation, Categories & Characteristics of Web Applications, Web Engineering Models, Software Engineering v/s Web Engineering. World Wide Web: Introduction to TCP/IP and WAP, DNS, Email, TelNet, HTTP and FTP.

**Browser and search engines:** Introduction, Search fundamentals, Search strategies, Directories search engines and Meta search engines, Working of the search engines.

**Web Servers:** Introduction, Features, caching, case study-IIS, Apache.

### UNIT- 2

**Information Architecture:** Role, Collaboration and Communication, Organizing Information, Organizational Challenges, Organizing Web sites parameters and Intranets

**Website Design:** Development, Development phases, Design issues, Conceptual Design, High-Level Design, Indexing the Right Stuff, Grouping Content. Architectural Page Mockups, Design Sketches, Navigation Systems. Searching Systems, Good & bad web design, Process of Web Publishing. Web-site enhancement, submission of website to search engines.

**Web security:** issues, security audit. Web effort estimation, Productivity Measurement, Quality usability and reliability. **Requirements Engineering for Web Applications:** Introduction, Fundamentals, Requirement Source, Type, Notations Tools. Principles Requirements Engineering Activities, Adapting RE Methods to Web Application.

### UNIT- 3

#### Technologies for Web Applications I:

**HTML and DHTML:** Introduction, Structure of documents, Elements, Linking, Anchor Attributes, Image Maps, Meta Information, Image Preliminaries, Layouts, Backgrounds, Colors and Text, Fonts, Tables, Frames and layers, Audio and Video Support with HTML Database integration, CSS, Positioning with Style sheets, Forms Control, Form Elements. Introduction to CGI, PERL, JAVA SCRIPT, JSP, PHP, ASP & AJAX. Cookies: Creating and Reading

### UNIT-4

#### Technologies for Web Applications II:

**XML:** Introduction, HTML Vs XML, Validation of documents, DTD, Ways to use, XML for data files, Embedding XML into HTML documents, Converting XML to HTML for Display, Displaying XML using CSS and XSL, Rewriting HTML as XML, Relationship between HTML, SGML and XML, web personalization, Semantic web, Semantic Web Services, Ontology.

### UNIT- 5

**E- Commerce:** Business Models, Infrastructure, Creating an E-commerce Web Site, Environment and Opportunities. Modes & Approaches, Marketing & Advertising Concepts. Electronic Publishing issues, approaches, legalities and technologies,

Secure Web document, Digital Signatures and Firewalls, Cyber crime and laws, IT Act. Electronic Cash, **Electronic Payment Systems:** RTGS, ~~NEFT~~, Internet Banking, Credit/Debit Card. **Security:** Digital Certificates & Signatures, SSL, ~~SET~~, 3D Secure Protocol.



# MAHAKAUSHAL UNIVERSITY JABALPUR

## Suggested Experiments:

At least ten practical experiments based on above syllabus and a mini project is desirable to be completed by a group of three that cover following.

1. HTML/ DHTML
2. PHP
3. XML
4. Java Script, CGI, PERL
5. ASP
6. Configuration of Web Servers.

## Recommended Books:

1. Roger S.Pressman, David Lowe, "Web Engineering", Tata Mc Graw Hill Publication, 2007
2. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill
3. Gopalan N P , Akilandeswari, "Web Technology: A Developer s Perspective" , PHI
4. Neil Gray, "Web server Programming" Wiley
5. Chris Bates, "Web Programming: Building Internet applications" Wiley
6. Moller, "An Introduction to XML and Web Technologies", Pearson Education New Delhi, 2009
7. "Web Technologies: Black Book", Kogent, Dreamtech
8. Internet & World Wide Web How to Program, Pearson education, 3rd edition, by: H.M. Deitel, P.J. Deitel, A.B. Goldberg.
9. C. Xavier, "Web Technology & Design ", Tata McGraw Hill.
- 10 Ivan Bay Ross, "HTML,DHTML,Java script,Perl CGI" , BPB



# MAHAKAUSHAL UNIVERSITY JABALPUR

## Network Management

### Unit-I

Introduction to Network Managements, Network Management Framework, Network Based Managements, Evolution of Network Management: SGMP, CMIP, SNMP. Network Implementation and Management Strategies, Network Management Categories: Performance Management, Fault Management, Configuration Management, Security Managements, Accounting Managements. Network Management Configuration: Centralized Configuration, Distributed Configuration. Selected Management Strategy.

### Unit –II

Management Information Base (MIB), Structure of Management Information, NMS Presentation of the SMI, NMS Meter-ware Network View. Remote Monitoring (RMON), RMON Group. Desktop Management: Desktop Management Interface(DMI), DMI Architecture, DMI Browser, DMI/SNMP Mapping, Desktop SNMP Extension Agents. Setting up LAN Access, SNMP Configuration.

### Unit-III

Introduction, layering, OSI Layering, TCP/IP Layering, Protocols & Standards, Internet standards, Internet administration, Internet Addresses, Internet protocol: introduction, IP header, IP routing, subnet addressing, subnet mask, special case of IP addresses, Comparative Study of IPV4 & IPV6, port numbers Address Resolution Protocol, ARP packet format, Proxy ARP, ARP command, ARP Example, Reverse Address Resolution Protocol (RARP): Introduction, RARP Packet format, RARP Examples, RARP server design

### Unit-IV

Delivery and Routing of IP Packets, Routing Methods, Static versus Dynamic Routing, Routing table and Routing Module, Classless Addressing: CIDR. Internet Protocol (IP), Datagram, Fragmentation, Options, IP Package. Interior and Exterior Routing, Routing information protocol (RIP), Open shortest path first protocol (OSPF), BGP, GGP. Private Networks. Virtual Private Network (VPN), Network Address Translation (NAT).

### Unit –V

Internet Control Message Protocols (ICMP):- Types of message, message format, error reporting, query, checksum, ICMP Package. IGMP, IGMP Message and its Operation, IGMP Package. Transmission control protocol, Process-to-Process Communication, TCP Services Flow Control, TCP Timers. TCP Operation, TCP Package.. Application layers protocol, Telnet Protocol, File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP), X-Window system protocol, Remote procedure call, and Network file system.

### References:

- Forouzan, TCP/IP Protocol Suite 4th edition, TMH
- J.Richard Burkey, Network Management Concept and Practice, PHI
- Stevens, TCP/IP Illustrated Volume-I, Pearson
- Tittel: TCP/IP, Cenage Learning
- Uyless Black, TCP/IP and related protocols, McGraw Hill.
- Doughals E. Comer, Internetworking with TCP/IP Vol. I, Principles, Protocols, and Architecture, Prentice Hall, India.

## Cyber Security

### UNIT 1

Introduction of Cyber Crime, Challenges of cyber crime, Classifications of Cybercrimes: E-Mail Spoofing, Spamming, Internet Time Theft, Salami attack/Salami Technique, Data Diddling, Web jacking, Online Frauds, Software Piracy, Computer Network Intrusions, Password Sniffing, Identity Theft, cyber terrorism, Virtual Crime, Perception of cyber criminals: hackers, insurgents and extremist group etc. Web servers hacking, session hijacking.

### UNIT 2

**Cybercrime on Mobile and Wireless Device:** Proliferation of Mobile and Wireless Devices, trends in Mobility Credit Card Frauds in Wireless Computing, Types and techniques of Credit Card Frauds, Attacks on Mobiles: Mobile Viruses, Mishing, Vishing, Smishing & Hacking Bluetooth. Web servers hacking, session hijacking.

### UNIT 3

**Tools and Methods in Cybercrime:** Proxy Servers and Anonymizers, Password Cracking, Keyloggers and Spyware, virus and worms, Trojan Horses, Backdoors, DoS and DDoS Attacks, Buffer and Overflow, Attack on Wireless Networks, Phishing: Method of Phishing, Phishing Techniques.

### UNIT 4

**Cyber Crime and Criminal justice:** Concept of Cyber Crime and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber Fraud and Cheating, Defamation, Harassment and E-mail Abuse, Other IT Act Offences, Monetary Penalties, jurisdiction and Cyber Crimes, Nature of Criminality, Strategies to tackle Cyber Crime and Trends.

**The Indian Evidence Act of 1872 v. Information Technology Act, 2000:** Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements, Proving Electronic Messages.

### UNIT 5

**Introduction to Cyber Forensics:** Information Security Investigations, Corporate Cyber Forensics, Scientific Method in Forensic analysis, investigating large scale Data breach cases. Analyzing Malicious software. Types of Computer Forensics Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques.

### References

1. Principles of Cyber crime, Jonathan Clough Cambridge University Press
2. John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, 2<sup>nd</sup> Edition, CharlesRiver Media, 2005
3. Cyber Law Simplified, Vivek Sood, Pub: TMH.
4. Cyber Security by Nina Godbole, Sunit Belapure Pub: Willey-India
5. Information Warfare: Corporate attack and defense Hutchinson, Mathew Warren, Elsevier.
6. Cyber Laws and IT Protection, Harish Chander, Pub: PHI.



## Data Mining and Knowledge Discovery

### Unit-I

Introduction, to Data warehousing, needs for developing data Warehouse, Data warehouse systems and its Components, Design of Data Warehouse, Dimension and Measures, Data Marts:-Dependent Data Marts, Independents Data Marts & Distributed Data Marts, Conceptual Modeling of Data Warehouses:-Star Schema, Snowflake Schema, Fact Constellations. Multidimensional Data Model & Aggregates.

### Unit-II

OLAP, Characteristics of OLAP System, Motivation for using OLAP, Multidimensional View and Data Cube, Data Cube Implementations, Data Cube Operations, Guidelines for OLAP Implementation, Difference between OLAP & OLTP, OLAP Servers:-ROLAP, MOLAP, HOLAP Queries.

### UNIT-III

Introduction to Data Mining, Knowledge Discovery, Data Mining Functionalities, Data Mining System categorization and its Issues. Data Processing :- Data Cleaning, Data Integration and Transformation. Data Reduction, Data Mining Statistics. Guidelines for Successful Data Mining.

### Unit-IV

Association Rule Mining:-Introduction, Basic, The Task and a Naïve Algorithm, Apriority Algorithms, Improving the efficiency of the Apriori Algorithm, Apriori-Tid, Direct Hasing and Pruning(DHP),Dynamic Item set Counting (DIC), Mining Frequent Patterns without Candidate Generation(FP-Growth),Performance Evaluation of Algorithms,.

### Unit-V

Classification:-Introduction, Decision Tree, The Tree Induction Algorithm, Split Algorithms Based on Information Theory, Split Algorithm Based on the Gini Index, Overfitting and Pruning, Decision Trees Rules, Naïve Bayes Method.

Cluster Analysis:- Introduction, Desired Features of Cluster Analysis, Types of Cluster Analysis Methods:- Partitional Methods, Hierarchical Methods, Density- Based Methods, Dealing with Large Databases. Quality and Validity of Cluster Analysis Methods.

### References:

1. Berson: Data Warehousing & Data Mining &OLAP , TMH
2. Jiawei Han and Micheline Kamber, Data Mining Concepts & Techniques, Elsevier Pub.
3. Arun.K.Pujari, Data Mining Techniques, University Press.
4. N.P Gopalan: Data Mining Technique & Trend, PHI
5. Hand, Mannila & Smith: Principle of Data Mining, PHI
6. Tan, Introduction to Data Mining, Pearson Pub.,



## Semantic Web & Ontologies

### Unit-I

**Semantic Web:** Building Models , Calculating with knowledge, Exchanging Information, Semantic Web Technologies ,Types of Web :Smart Web & Dumb Web, Applications ,Semantic Data ,Search Engine for Semantic Web

### Unit-II

**Semantic Modeling:** Modeling for human communication, Explanation and prediction, Mediating Variability: Variation & Classes, Variation & Layers, and Expressivity in Modeling.

### Unit-III

**Resource Description Language RDF :** Introduction , Advanced features , simple ontologies in RDF Schema , encoding of special data structures, RDF formal semantics ,syntactic reasoning with deduction rules ,Distributing data across web , Managing data from multiple sources .

### Unit-IV

**Web Ontology Language OWL :** OWL syntax and Intuitive semantics , OWL species , **Owl formal semantics :** Description Logics , Model-Theoretic Semantics of OWL, Automated reasoning with OWL ,Ontology Matching and Distributed Information .

### Unit-V

**Semantic Web Application Architecture:** RDF Parser/Serializer, RDF store: RDF data standards and Interoperability of RDF stores , RDF query engines , SPARQL: Query language for RDF , conjunctive Queries for OWL DL ,RDF backed web portals , Data federation .

**Ontology Engineering:** Constructing Ontologies manually, Reusing Existing Ontologies, Semiautomatic Ontology Acquisition, Ontology Mapping

### Text Books:

1. Hitzler, Markus, Rudolph , “ Foundations of Semantic Web Technologies” , Chapman & Hall/CRC,2009,ISBN 9781420090505
2. Allemang , Hendler , “ Semantic Web for the working Ontologist” 2<sup>nd</sup> ed. Elsevier Pub
3. Liang Yu , “ Introduction to the Semantic Web and Semantic Web Services”, Chapman & Hall/CRC
4. Antoniou , Harmelen , “A semantic Web Primer”, PHI Pub.
5. Rajendra Akerkar , “ Foundations of Semantic Web” , Narosa Publishing ,New Delhi



## Bioinformatics

### Unit-I Introduction

Introduction to bioinformatics, objectives of bioinformatics, Basic chemistry of nucleic acids, structure of DNA & RNA, Genes, structure of bacterial chromosome, cloning methodology, Data maintenance and Integrity Tasks.

### Unit-II Bioinformatics Databases & Image Processing

Types of databases, Nucleotide sequence databases, Protein sequence databases, Protein structure databases, Normalization, Data cleaning and transformation, Protein folding, protein function, protein purification and characterization, Introduction to Java clients, CORBA, Using MYSQL, Feature Extraction.

### Unit-III Sequence Alignment and database searching

Introduction to sequence analysis, Models for sequence analysis, Methods of optimal alignment, Tools for sequence alignment, Dynamic Programming, Heuristic Methods, Multiple sequence Alignment

### Unit-IV Gene Finding and Expression

Cracking the Genome, Biological decoder ring, finding genes through mathematics & learning, Genes prediction tools, Gene Mapping, Application of Mapping, Modes of Gene Expression data, Mining the Gene Expression Data

### Unit-V Proteomics & Problem solving in Bioinformatics

Proteome analysis, tools for proteome analysis, Genetic networks, Network properties and analysis, complete pathway simulation: E-cell, Genomic analysis for DNA & Protein sequences, Strategies and options for similarity search, flowcharts for protein structure prediction.

### List of References

1. Gopal & Jones, BIOINFORMATICS with fundamentals of Genomics & Proteomics, TMH Pub
2. Rastogi, Bioinformatics – Concepts, skills & Applications, CBS Pub
3. Bergeron, Bioinformatics computing, PHI
4. Claverie, Bioinformatics, Wiley pub
5. Baxevanis, Bioinformatics, Wiley Pub
6. Stekel, Microarray Bioinformatics, Cambridge



## Digital Image Processing

### Unit-I

Digital Image fundamentals, A simple image model, Sampling and Quantization. Relationship between pixels. Imaging geometry. Image acquisition systems, Different types of digital images

### Unit-II

Image transformations, Introduction to Fourier transforms, Discrete Fourier transforms, Fast Fourier transform, Walsh transformation, Hadmord transformation, Discrete Cosine Transformation.

### Unit-III

Image enhancement, Filters in spatial and frequency domains, Histogram based processing. Image subtraction, Averaging, Image smoothing, Nedian filtering, Low pass filtering, Image sharpening by High pass filtering.

### Unit-IV

Image encoding and segmentation, Encoding: Mapping, Quantizer, Coder. Error free compression, Lossy Compression schemes. JPEG Compression standard. Detection of discontinuation by point detection, Line detection, edge detection, Edge linking and boundary detection, Local analysis, Global processing via Hough transforms and graph theoretic techniques

### Unit-V

Mathematical morphology- Binary, Dilation, crosses, Opening and closing, Simple methods of representation, Signatures, Boundary segments, Skeleton of a region, Polynomial approximation

### References:

1. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing Pearson.
2. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing using Matlab – TMH.
3. Sonka, Digital Image Processing & Computer Vision , Cengage Learning
4. Jayaraman, Digital Image Processing, TMH.
5. Pratt, Digital Image Processing, Wiley India
6. Annadurai, Fundamentals of Digital Image Processing, Pearson Education

## Wireless Network

### Unit I

Introduction of Wireless Networks, Different Generations of Wireless Networks.

Characteristics of the Wireless Medium: Radio Propagation Mechanisms, Path Loss Modelling and Signal Coverage, Effect of Multipath and Doppler, Channel Measurement and Modelling Techniques.

### Unit II

Network Planning: Introduction, Wireless Network Topologies, Cellular Topology, Cell Fundamentals, Signal to Interferences Radio Calculations, Network Planning for CDMA Systems.

Wireless Network Operations: Mobility Management, Radio Resources and Power Management

### Unit III

Multiple Division Techniques: FDMA, TDMA, CDMA, OFDM, SDMA. Comparison of Multiple

Division Techniques, Modulation Techniques – AM, FM, FSK, PSK, QPSK, QAM, 16QAM

Mobile Data Networks: Introduction, Data Oriented CDPD Network, GPRS, EDGE and High

Data Rates, SMS in GSM, Mobile Application Protocols.

### Unit IV

Introduction to Wireless LAN, Evolution of WLAN, Wireless Home Networking, Technologies for Home Area Network (HAN), Overview of IEEE 802.11, Reference Architecture, PHY and MAC Layer, Wireless ATM, HIPERLAN.

### UNIT V

IEEE 802.15 WPAN, HomeRF, Bluetooth, Interference between Bluetooth and 802.11, Adhoc Networks, Introduction to 2.5 G and 3 G Networks.

### References

1. Kaveh Pahlavan, Prashant Krishnamurthy “principles of Wireless Networks”, PHI.
2. Qing- An Zeng, Dharma Prakash Agrawal “Introduction to Wireless and Mobile Systems” CENGAGE Learning.
3. Sumit Kaseera, Nishit Narang, A P Priyanka “2.5 G Mobile Networks: GPRS and EDGE”, TMH
4. Dr. KAMILLO FEHER “Wireless Digital Communications” , PHI
5. Jochen Schiller “ Mobile Communications”, PEARSON

## Quantum Computing

### UNIT-I

#### Introduction to quantum mechanics :

Postulates of quantum mechanics, Qubit and quantum states, Vector Spaces, Single Qubit Gates, multiple Qubit Gates, Controlled Gates, Composite Gates, Matrices and operators

### UNIT II

#### Density operators :

Density Operator for a Pure State, Density Operator for a Mixed State, Properties of a Density Operator, Characterizing Mixed States, Completely Mixed States, Partial Trace and Reduced Density Operator.

#### Quantum measurement theory:

Distinguishing Quantum States and Measurement, Projective Measurements, Measurements on Composite Systems, Generalized Measurements, Positive Operator Valued Measures

### UNIT III

#### Entanglement:

Quantum state entanglement ,Bell's Theorem, The Pauli Representation, Using Bell States For Density Operator Representation, Quantum gates and circuits: Single Qubit Gates, The Z Y Decomposition ,Basic Quantum Circuit Diagrams, Controlled Gates, Application of Entanglement in teleportation and super dense coding., Distributed quantum communication

#### Quantum Computer :

Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer, Optical Photon Quantum Computer – Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance

### UNIT IV

#### Quantum Algorithm:

Hadamard Gates, The Phase Gate, Matrix Representation of Serial and Parallel Operations, Quantum Interference, Quantum Parallelism and Function Evaluation, Deutsch -Jozsa Algorithm, Quantum Fourier Transform, Phase Estimation, Shor's Algorithm ,Quantum Searching and Grover's Algorithm

### UNIT V

#### Quantum Error Correction:

Introduction, Shor code, Theory of Quantum Error Correction, Constructing Quantum Codes, Stabilizer codes, Fault Tolerant Quantum Computation, Entropy and information –Shannon Entropy, Basic properties of Entropy, Von Neumann, Strong Sub Additivity, Data Compression, Entanglement as a physical resource

#### TEXTBOOK:

1. Quantum Computing Explained: David McMahon, Wiley Interscience (IEEE Computer Science).
2. Quantum Computing without Magic Devices : Zdzislaw Meglicki; PHI .
3. Quantum Computation and Quantum Information: M.A. Nielsen & Isaac L. Chuang, Cambridge University Press .
4. Quantum Computing and communications: An Engineering Approach: Sandor, Imre and Ferenc Balazs, Wiley



# MAHAKAUSHAL UNIVERSITY JABALPUR

## SELF STUDY (INTERNAL ASSESSMENT)

**Objective of Self Study:** is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

**Evaluation** will be done by assigned faculty based on report/seminar presentation and viva.



# MAHAKAUSHAL UNIVERSITY JABALPUR

## SEMINAR / GROUP DISCUSSION (INTERNAL ASSESSMENT)

**Objective of GD and seminar** is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

**Evaluation** will be done by assigned faculty based on group discussion and power point presentation.



# MAHAKAUSHAL UNIVERSITY JABALPUR

## **Major Project - II**

The student should prepare a working system or some design or understanding of a complex system that he has selected from the previous semesters using system analysis tools and submit the same in the form of a write-up i.e. detail project report. The student should maintain proper documentation of different stages of project such as need analysis, market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan wherever applicable. Each student is required to prepare a project report based on the above points and present the same at the final examination with a demonstration of the working system.