DR. A P J ABDUL KALAM UNIVERSITY, INDORE

SYLLABUS

of

BACHELOR OF ENGINEERING

(First Year, Grading System)

College of Engineering

Dr. A P J Abdul Kalam University, Indore

DR. A P J ABDUL KALAM UNIVERSITY, INDORE

Syllabus for Bachelor of Engineering

List of Subject (First Year, Grading System)

Unit 1: Diode and its Circuits:

Introduction to Semiconductor theory: Classification of materials- Insulators, conductors and semiconductors and their Energy Bands, Types of semiconductors- Intrinsic, Extrinsic. PN Junction Diode: Biasing and operation of PN Diode, V-I characteristics, Limiting Values of PN Diode, Breakdown in PN Diode, Applications of PN Diode. Zener Diode: V-I Characteristics, Applications of Zener Diode. Rectifier Circuits: PN Diode as a Rectifier, Half Wave Rectifier, Full Wave Rectifier, Full Wave Bridge Rectifier, Clipping Circuits, Clamper Circuits.

Unit 2: Number Systems:

Introduction, Binary Number System, Octal Number System, Decimal Number System, Hexadecimal System, Conversions: Binary to Decimal conversion and vice- ersa, Octal to Decimal Conversion and vice versa, Hexadecimal to Decimal Conversion and vice-versa, Binary to Hexadecimal Conversion and vice-versa, Octal to Decimal and vice-versa, Octal to Hexadecimal and vice versa. Complements: One's Complement, Two's Complement, Nine's Complement, Ten's Complement. Binary Arithmetic (addition, subtraction, multiplication, division), Octal Arithmetic, Hexadecimal Arithmetic, Signed Numbers, Floating Numbers, Codes.

Unit 3: Boolean Algebra and Logic Gates:

Introduction, Definitions, Principle of Duality, Basic Theorems, Applications of Boolean Algebra, Boolean Functions, Complement of Boolean Function. Logic Gates (Symbol, Truth Table, Logic Diagram): And, OR, NOT, NAND, NOR, XOR, XNOR. Universal Gates: NAND Gate and NOR Gate implementation, Realization of other Logic Operations using NAND/NOR. Buffer, Negative and Positive Logic, Mixed Logic.

Unit 4: Signals:

Introduction, Representation of Discrete-time Signals: Graphical Representation, Functional Representation, Tabular Representation, Sequence Representation. Elementary Signals: Unit Step Function, Unit Ramp Function, Unit Parabolic Function, Unit Impulse Function, Sinusoidal Signal, Real Exponential Signal, Complex Exponential Signal, Rectangular Pulse Function, Triangular Pulse Function, Signum Function, Sinc Function, Gaussian Function. Basic Operations on Signals: Time Shifting, Time Reversal, Amplitude Scaling, Time Scaling, Signal Addition, Signal Multiplication. Classification of Signals: Deterministic and Random Signals, Periodic and Non-periodic Signals, Energy and Power Signals, Causal and Non-causal Signals, Even and Odd Signals.

Unit 5: Communications Systems:

Introduction to Communication Systems, Elements of Communication Systems: Transmitter, Channel, Receiver, Noise. IEEE Frequency Spectrum Used in Communication Systems: Frequency Bands, Units of Measurement and Abbreviations, Bandwidth and other Parameters, Spectrum Assignment and Regulation. Need of Modulation, Amplitude Modulation, Frequency Modulation, Communication Media and its Classification: Guided and Unguided Propagation.

References

[1]   Hwei P. Hsu, Schaum's Outline of Signals and Systems, McGraw-Hill.

[2]   A. V. Oppenheim, A. S. Willsky, S Hamid Nawab, Signals and Systems, PHI.

[3]   A. Anand Kumar, Signals and Systems, PHI.

[4]   Basics of Electronics Engineering, Wiley India Pvt. Ltd.

List of Practicals:

1. Study of different electronic components and instruments like resistor, capacitor, inductor, multimeter, power supply, and function generator.
2. Study of different parts of (CRO) cathode ray oscilloscope.
3. Study of P-N junction diode V-I characteristics.
4. Study of Zener diode   V-I characteristics.
5. Study and Verify the truth table of Basic logic gates.
6. Study and Verify the truth table of Exclusive gates.
7. Study and Verify the truth table of Universal gates.
8. To verify the truth of half adder & full adder.
9. Study of Half wave rectifier.
10. Study of Full wave rectifier.

Unit 1: Molecular Structure & Bonding:

VSEPR Model, Valance-Bond Theory, Molecular Orbital Theory, Molecular Orbital of Polyatomic Molecules. Electrochemistry: Arrhenius theory of electrolytic dissociation, Transport Number, Kohlrausch's Law, Solubility Product, Redox Reaction, Electrochemical & Concentration Cells.

Unit 2: Chemical & Phase Equilibria:

Phase Diagram for single component system (Water), Phase diagram for Binary Eutectic System (Copper-Silver), Corrosion of metals in acids, Corrosion by Oxygen, Corrosion by Metal Contact. Reaction Dynamics: Order, Molecularity, Rate Law, Methods of determining order of reaction (Ist & 2nd Order).

Unit 3: Polymers & Polymerization:

Monomers, Polymers, their classification, thermoplastics & thermosetting with examples, Bio-Polymerization, Bio-Degradable Polymerization, Preparation, Properties & Technical Applications of PVC, PVA, Teflon, Nylon6, & Nylon6:6, Polyester, Phenol-Formaldehyde, Urea- Formaldehyde, Natural & Synthetic Rubber, Vulcanization of Rubber.

Unit 4: Photochemistry:

Photo-excitation of organic molecules, Jablonski Diagram, Laws of Photochemistry and quantum yield, some examples of photochemical reactions, chemistry of vision and other applications of photochemistry

Unit 5: Thermochemistry:

Fundamental concept of first law, work, heat, energy and enthalpies, relation between Cv & Cp. Second Law: Entropy, Free Energy, (The Helmholtz and Gibbs) and chemical potential. Numerical problems based on water analysis and water softening process. Determination of hardness by complexometry, Alkalinity and its determination and their relevant numerical problems, testing of lubricating oils, viscosity and viscosity index, flash & fire point, cloud & pour point, Aniline Point, Carbon Residue, Steam-emulsion number, Neutralization number, Saponification number.

References

[1] Lee, J. D, Author, Concise Inorganic Chemistry, Oxford University Press

[2] Alberty, R. A., Physical Chemistry, John Wiley and Sons

[3] N. Krishnamurthy, P. Vallinayagam, Engineering Chemistry, PHI Learning Pvt. Ltd.

[4] Kuriacose J.C. and Rajaram J., Chemistry in Engineering and Technology, Tata McGraw Hill.

List of Practicals:

1. To prepare urea formaldehyde resin.

2. Determine the percentage of moisture content in the given coal sample.

3. Determine the change of viscosity of a given lubricating oil with Change in temperature by Redwood viscometer No.1

4. Determine the flash fire point given lubricating oil by Able's closed cup apparatus.

5. To determine the aniline mixed aniline point of petroleum products and hydrocarbon solvents.

6. Determination of cloud point and pour point of crude oil.

7. To determine flash point and fire point of the given lubricating oil using Pensky Marten's apparatus.

8. Determine the type extent of alkalinity of given sample of water by N/20 HCl (hydrochloric acid).

9. To determine the total hardness of given sample by complexometric titration.

10. To determine the strength (in g/L) of the given unknown strength sodium thiosulphate (hypo) solution by a known strength (5.00 g/L) N/40 standard cupper sulfate solution.

11. To determine the strength (in g/L) of ferrous ammonium sulfate ($FeSO_4$, $(NH_4)2SO_4.6H_2O$) by titrating it against standard (1.0 g/L) potassium dichromate ($K_2Cr_2O_7$) solution.

12. Determination of iron content in an iron ore by titrating it against standard N/20 $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6].H_2SO_4$, $FeSO_4$ as an external indicator.

Unit-I:

Grammar – Applied Grammar and usage, Parts of Speech, Articles, Tenses, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure, Punctuations.

Unit-II:

Vocabulary Development – Using Dictionaries and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Derivation from root words, Jargon, Scientific Jargon.

Unit-III:

Developing Reading Skills – Reading Comprehension, Process, Active & Passive Reading, Reading Speed Strategies, Benefits of effective reading, note-making, note- taking, Reading comprehension of technical material and SQ3R reading technique

Unit-IV:

Developing Writing Skills – Planning, Drafting & Editing, Writing with style, right-words selection, writing effective sentences, developing logical paragraphs, art of condensation, précis, essay, technical definition and technical description

Unit-V:

Business Correspondence – Business Letters, Parts & Layouts of Business Letters, Writing Resume/Application Calling/ Sending Quotations/ Orders/ Complaints and E-mails

Text Book:
Sanyukta Shah Neb, English, Tech-Max Publication, Pune.

References:
(1) A.J. Thomson and A.V. Martinet, A Practical English Grammar, Oxford IBH Pub.
(2) Sanjay Kumarm Pushp Lata, English for Effective Communication, Oxford.

Topics for the Laboratory:

1. Basic Grammar & Vocabulary Practice (Synonyms, Antonyms, Analogies, Sentence Completion, Correctly Spelt Words, Idioms, Proverbs, Common Errors.

2. Phonetic Symbols, Pronunciations

3. Listening Skills – Including Listening Comprehension

4. Extempore and JAM (Just a Minute Session)

5. Role Play – I

6. Role play – II

7. Body Language

8. Debate

9. Oral Presentation – Preparation & Delivery using Audio – Visual Aids with stress on body language and voice modulations.

Unit 1: Introduction to Engineering Mechanics:

Definitions and Classification of Engineering Mechanics, Statics: fundamental laws of statics. Different system of forces. Dynamics: Equation of motion, Kinematics and Kinetics.

Unit 2: Resolution and Composition of Forces:

Force, Pressure and Stress, Free Body Diagram , Bow's Notation, Characteristics and Effects of a Force, System of Forces, Resolution of a Force, Composition of Forces, Resultant/ Equilibrant Force, Law of Parallelogram of Forces, Law of Triangle of Forces, Polygon Law of Forces, Lami's Theorem, Equilibrium of a Body Under Two / Three/More Than Three Forces. Law of Superposition of Forces.

Unit 3: Coplanar Non Concurrent Forces:

Moment of a Force, Principle of Moments/ Varignon's Theorem, Parallel Forces : Resultant of Parallel Forces, Couple: Moment of a Couple, Resolution of Force into a Couple. Coplanar Non Concurrent Forces: Resultant of Coplanar Non Con-Current Forces.

Unit 4: Beams and Trusses

Types of Beams: Simply Supported Beam, Overhanging Beam, Cantilever Beam. Types of Supports of a Beam or Frame. Load on the Beam or Frame: Different Types of Loading. Support Reaction of a Beam or Frame: Analytical Method. Truss Analysis: Method of Joints, Sections and Graphical methods.

Unit 5: Centre of Gravity and Moment of Inertia

Centroid, Centre of Gravity, Determination of Centroid of Simple Figures, Centroid of Composite Sections. Centre of Gravity of Solid Bodies. Area Moment of Inertia: Basic Concept of Inertia, Definition of Moment of Inertia, Theorems of Moment of Inertia, Radius of Gyration, Polar Moment of Inertia of Standard Sections, Moment of Inertia of Composite Section, Principal Moment of Inertia , Mass Moment of Inertia.

Evaluation:

Evaluation will be continuous an integral part of the class as well through external assessment.

References

[1]   Engineering Mechanics by I. H. Shames.

[2]   Engineering Mechanics by R. K. Rajput.

[3]   Applied Mechanics by I. B. Prasad.

[4]   Engineering Mechanics by H. I. Shah.

[5]   Engineering Mechanics by Gujral.

Unit 1: Projections of Points, Straight Lines and Planes:

Types and use of Lines, Lettering & Dimensioning, Various types of projection System, Projection of Points in different quadrants, projections of lines and planes for parallel, perpendicular & inclined to horizontal and vertical reference planes.

Unit 2: Projections Solids and Development of Surfaces:

Cylinder, Cone, Pyramid, & Sphere with axes parallel, perpendicular & inclined to both reference planes. Development of surfaces of various solids. Sections of Solids Section planes, Sectional views, True shape of Sections for Prism, Cylinder, Pyramid, and Cone & Sphere. Orthographic Projections of Simple objects and Machine Components like Bolts and Screw.

Unit 3: Isometric projections:

Isometric scales, isometric views of Simple objects.

Unit 4: Introduction to computer-aided drafting (CAD):

Cartesian and Polar Co-ordinate system, Absolute and Relative Co-ordinates systems; Basic drawing commands: Line, Point, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline; Basic editing Commands: Basic Object Selection Methods, Window and Crossing Window, Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror. Display Commands: Zoom, Pan, Redraw, and Regenerate; Simple dimensioning and text, Simple exercises.

Unit 5: Solid modelling:

Basics of 2-D solid modelling.

Laboratory

Drawing for topics covered in the theory as suggested by the course coordinator.

Evaluation

Evaluation will be continuous an integral part of the class as well through external assessment.

References

[1] N.D. Bhatt and V.M.Panchal, Engineering Drawing Plane and Solid Geometry, Charotar Publishing House.
[2] James leach, AutoCAD 2015 Instructor, SDC Publications.

List of Practicals:

[1] Sketching and drawing of projection of points.

[2] Sketching and drawing of projection Straight line and planes.

[3] Draw projection of solids on a drawing sheet.

[4] Draw development of surfaces on a drawing.

[5] To learn isometric scale in a lab.

[6] Draw isometric projectins and isometric view of simple object.

[7] To learn true shape of sections for prism,cylinder,pyramid and cone.

[8] Draw orthographic projection of simple object.

[9] Draw orthographic projection of machine component like bolts and screw.

[10] Draw ellips, hyperbola and parabola on sheet.

Unit 1: Introduction:

Domestic and Global Environmental concerns, principles of sustainable development, Sustainable agriculture, organic farming, bio-fuels, Threats for sustainability
Energy- Sources of Energy: Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydal, nuclear sources.

Unit 2: Environmental Ethics & Legislations:

Enforcement of Environment laws in India – The water act, The Air (Prevention and Control of Pollution) Act, 1981, The Environment (Protection) Act, 1986, Environmental Auditing

Unit 3: Environmental Pollution:

Air Pollution – sources, types of air pollutants, National Ambient Air Quality Standards, Controlling Air Pollution. Water pollution – sources, types of water pollutants, water quality indicators, and water quality standards. Soil Pollution: Types of soil pollutants: industrial wastes, pesticides, fertilizers and manures, salination of soil, Controlling Soil Pollution.

Unit 4: Environmental Challenges:

Local Challenges - Solid Waste – Impact of solid waste on natural resources, Deforestation; Global Challenges - climate change and global warming, Kyoto Protocol, Greenhouse Gases, Ways to reduce Greenhouse gases emissions, Carbon Footprint, ways to reduce carbon footprint, Carbon Trading.

Unit 5: Sustainable habitat, industrialization and urbanization:

Concept of Green Building, Volatile Organic Compounds (VOC), GRIHA Rating, LEED Rating, HVAC, Hybrid Car Technology, Industrial ecology, India's renewable energy capacity. Green Technology & Green Business: Green Business, Green Computing, E-waste management.

References

[1]   R. Rajagopalan, Environmental Studies, Oxford IBH Pub, 2011.

[2]   Kogent Learning Solutions Inc., Energy, Environment, Ecology and Society, Dreamtech, 2012.

[3]   Rag, R. L, Ramesh, Lekshmi Dinachandran, Introduction to sustainable engineering

Unit 1:

Overview of Civil Engineering, types of Infrastructures, Effect of infrastructure facilities on economy and environment, Role of Civil Engineers in the infrastructural Development Introduction to sub-domains of Civil Engineering, Size of Infrastructure Industry, emerging trends in infra spending through public and public-private partnership (PPP), talent shortage, and global trends in workforce mobility and skill- demands.

Unit 2:

Stages in the life of construction: Design, Construction, Maintenance, Repair, Demolition/Recycling; an overview of Indian Standards, units and conversion factors for Lengths, Areas, Volumes and Weights; Opportunities and challenge of India's Infrastructure, Interdisciplinary nature of Civil Engineering Projects.

Unit 3:

Roads: Types of Roads, Nagpur Road Plan, Components of Road and their function; Bridges: Important parts of bridges, classification of bridges; Types of Dams.

Unit 4:

Properties and classification of common building materials – Stones, Bricks, Sand, Limes, Cement, Mortar, Concrete, Steel.

Unit 5:

Overview of Indian Road Congress, National Highway Authority of India (NHAI) and American Society of Civil Engineers (ASCE), Emerging areas and new technologies in the field of civil engineering.

References

[1]   Elements of Civil Engineering by MD Saikia, B Mohan Das, MM Das, PHI Learning Private Limited, 2015

[2]   Prakash M.N. Shesha, Ganesh B., A Textbook on Elements of Civil Engineering, PHI Learning Pvt. Ltd. Study material provided by the instructor

Unit 1:

Basic definitions of terms related to Thermodynamics, First and Second law of Thermodynamics, Properties of Steam, Introduction to Boilers, Terminology of IC Engines, Two and Four Stroke Petrol and Diesel Cycle.

Unit 2:

Introduction to mechanical properties, basic manufacturing processes, pattern, type and its use in metal casting, Introduction of welding, brazing and soldering processes

Unit 3:

Case study on any topic from Manufacturing Engineering Magazine Published by Society of Manufacturing Engineers (USA), Machinist Magazine, Technorama published by Institution of Engineers (India) and Manufacturing Today and any other magazine related to mechanical engineering.

Unit 4:

Overview of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Society of Automotive Engineers, American Society of Mechanical Engineers (ASME); Indian Society of Mechanical Engineers (ISME) etc.

Unit 5:

Emerging areas and new technologies in the field of mechanical engineering (3D Printing)

References

[1]   Jonathan Wickert, Kemper Lewis, An Introduction to Mechanical Engineering, CENGAGE Learning. Michael Clifford, Kathy Simmons, Philip Shipway, An Introduction to Mechanical Engineering: Part 1 and Part 2, Taylor and Francis

Unit 1: Optics:

Interference, fresnel's biprism, Interference in thin film (due to reflected and transmitted light), thin film interference, Newton Ring Experiment and its application. Diffraction: types of diffraction, single slit, n-slit diffraction (diffraction grating), Resolving power of grating, Polarization.

Unit 2: Quantum Mechanics:

Group and particle velocity & their relationship. Uncertainty principle with elementary proof and their applications. Compton scattering, wave function and its properties, energy and momentum operators, time dependent and time independent Schrödinger wave equation. Particle in a box.

Unit 3: Nuclear Physics:

Nuclear composition, mass defect, binding energy, nuclear force, liquid drop model (semi empirical mass formula). Liner Particle Accelerator. Geiger -Muller Counter.

Unit 4: Semiconductors:

Crystalline and Amorphous solids, Band theory of solids, mobility and carrier concentrations, properties of P-N junction, Energy bands, Hall effect, V-I characteristics of photodiode, Zener diode and photovoltaic cell.

Unit 5: Lasers and Fibre Optics:

Laser: Introduction, characteristics and applications of laser. Stimulated and spontaneous processes, Einstein's A and B coefficients. Concepts of population inversion and metastable level. Laser component: Active medium, optical resonators and pumping. Principles and working of various lasers: Ruby, Nd:YAG and He-Ne.
Fiber Optics: Introduction, advantages and application of optical fiber. Light guidance mechanism, types of fibre, acceptance angle and cone, numerical aperture and V-Number. Fibre dispersion and losses and block diagram of fibre optic communication system.

Laboratory
Experiments as suggested by the course coordinator from the list as enclosed.

Evaluation
Evaluation will be continuous an integral part of the class as well through external assessment.

References

[1]   A Bezier, Concepts of Modern Physics, McGraw Hills
[2]   Ghatak, Optics, McGraw Hills

List of practicals:
1. To draw a V-I Characteristics of PN Diode.

2. To draw a V-I Characteristics of Zener Diode.

3. To draw a V-I Characteristics of LED Diode.

4. To Study of Solar cell.

5. Draw a Characteristics Curve of NPN transistor in CE mode.

6. Draw a Characteristics Curve of NPN transistor in CB mode.

7. Draw a Characteristics Curve of PNP transistor in CE mode.

8. Draw a Characteristics Curve of PNP transistor in CB mode.

9. Determination of wavelength of He-Ne laser with the help of diffraction grating.

10. To plot the Curve between reverse saturation current and 103/T and Find out the approximate value of energy band gap between of P-N junction Diode

11. To study of G-M Counter.

12. To determine the specific rotation of sugar solution using Lorentz half shade polarimeter.

13. To study of Hall Effect.

14. To determine the radius of plan-convex lance with the help of N-R method.

15. Determination of wavelength of Na lamp with the help of diffraction grating using spectrometer.

16. To determine the Resolving power of Telescope.

17. To determine the wavelength of Na light by Michelson's Interferometer.

Unit 1:

An overview of electrical engineering, generation, transmission and distribution, distributed generation, national power grids, smart grid.

Unit 2:

Various electrical equipments viz Transformer, Induction motor, synchronous machine, Circuit Breakers etc, Relays, substation components, Product specification, application

Unit 3:

Leading manufacturers of Electrical equipments and components, Electrical Engineering research organization, PSUs and utilities

Unit 4:

General Introduction to Power Electronics, Power System, Electrical Machines, Control System, Automation.

Unit 5:

Role of Electrical Engineer in Industry, R&D, Electrical Utilities, Placement scenario, future trends.

Evaluation
Evaluation will be continuous an integral part of the class only through internal assessment.

References

[1]   D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, latest edition.

[2]   M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and electronics engineering, Oxford University press,2012

Unit 1: Introduction:

What is electronics, An introduction to Electronic devices & circuits, Analog and digital electronics, Analog communication, Digital communication, Microwave engineering, Micro processor & controllers, Antenna, Signals & systems.

Unit 2: Scope and Applications-I:

Wireless communication, Satellite Communication, Internet Telephony, Nanotechnology, Teleconferencing, Embedded System, Wireless Sensor Networks, Optical Computing, Electrocardiograph, Display Technology, Advanced Optical Networks, Brain Computer Interfaces, Thin Film Technology, Global positioning system, Fiber Optics, Micro electro mechanical systems, Robotics, Radar, Speaker Recognition, Microwave Communication, Earthquake Monitoring, Remote Sensing, Direct to Home TV systems.

Unit 3: Scope and Applications-II:

Wireless Communication (mobile phones, geographical navigation, satellite communication, Wi-Fi etc.) Some of the Govt. sector / private sector electronics Labs/Division/Companies: CSIR LABS, CSIO, DRDO, BSNL , BEL, BHEL, C-DAC, DOORDARSHAN, ISRO, TBRL, IIT'S, Environment Monitoring Divisions PANASONIC, SAMSUNG, SONY, PHILIPS, TOSHIBA, SANSUI, VIDEOCON, ONIDA,HAIER, LG ELECTRONICS, PIONEER, LLYOD HITACHI, APPLE, WIPRO ,ELICO, HP.

Unit 4: Telecom Companies:

Top companies of VLSI, Fabrication units in India and abroad

Unit 5: Career Options:

Telecommunication, Software Development, Consumer Electronics, Semiconductor, Embedded Systems etc. Product Based Company – Building their own product and selling it in market, Service Based Company – Building product, application or part of them, for other companies and their clients Telecom equipment R&D, EDA Company Electronic Exchanges, Department of Telecommunications, BSNL, Railways, Electricity Board, Medical equipments manufacturing

COURSE OUTCOMES

To prepare the students according to the requirements of industry for highly skilled engineers and contribute to the next generation technology by their innovation.

EVALUATION

Evaluation will be continuous an integral part of the class.

References

Study material provided by the instructor

Unit 1:

Relevance & Importance of each subject, Specialization Flow Diagram, Pre-requisite Flow Diagram, Scope of the Branch and Future Avenues and career aspects

Unit 2:

Review of Computer Engineering Fundamentals: Definition, Evolution, Classification, Number System.

Unit 3:

Organization i.e. CPU, register, Bus Architecture, Instruction Set, Memory & Storage Systems, I/O Devices & Application Software.

Unit 4:
Computer Science & Engineering Application in: Data Processing, Information Systems, Communication, Interworking, World Wide Web, e-Business, Bio-Informatics, Health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc, Defence.

Unit 5:

Introduction to flowchart, Algorithm, Categories of Programming Languages, Program Design, What are data structures, Introduction to Programming, Basic Computer networking concepts, Types of networks, Security Threats: Viruses, Worms, Malware, Trojans, Spyware, and anti-spyware software, firewall, internet fraud. Major Computer Science & Engineering Journals.

References

[1]   Subhasis Banerjee, S. Arun Kumar, D. Dubhashi, Introduction to Computer Science,

[2]   Peter Nortan, Computing Fundamentals, McGraw Hill India Peter Norton,

[3]   Introduction to Computers, TMH Silakari & Rajesh K Shukla,

[4]   Basic Computer Engineering, Wiley India Kenneth Hoganson,

[5]   Concepts in Computing , Jones & Bartlett RJ Dromey, How to solve it by computer, Prentice Hall India Series

Unit 1:

Data and Information: Introduction, Type of data, Simple model of computer. Data processing using a computer: Introduction to Operating System, Data storage Media, High capacity network storage media. Introduction to Database Management System; Database modelling; Relational model; Distributed DBMS; Data warehouse, Data mining; Classification of Language and Applications

Unit 2:

IT Application in Communication: Network services-telephone services, Cellular telephone services, Radio and TV broadcasting, Audio-Visual conferencing, Video-on-demand. Internet Technology: Introduction, Working of internet, Introduction to network protocol and topologies, Types of network: LAN, WAN, Web browser. Internet Services: E-mail, Telnet, FTP, WWW, HTML, URL..

Unit 3:

IT Application in Multimedia: Introduction, Components of multimedia and challenges, Video compression, Video coding technology: JPEG, MPEG, And JBIG. Introduction to cloud computing: Types, Services, Models, Characteristics, Benefits and Challenges, Application, Limitations..

Unit 4:

IT Application in E-Commerce and E-Governance: Introduction, Different Types of E-Commerce with examples, Advantages and disadvantages, E-Commerce in India, E-Services, E-Commerce security, Internet security and ethics, Technology issues, Social issues, Introduction to E-Governance, Challenges, Application, advantages, Case study of MP-online and IRCTC.

Unit 5:

Social impact of information technology: Introduction, Social Uses of World Wide Web, Social networking Services, Privacy, security and integrity of Information, Disaster recovery Intellectual property rights, IT Enabled Services and careers, Career in information technology, Case study of NPTEL.

References

[1]   V.Rajaraman, Introduction to Information Technology; PHI

[2]   E Balagurusamy, Fundamentals of Computers, TMH

[3]   Santiram Kal Basic Electronics, PHI

[4]   M.N. Rao Cloud Computing, PHI

Unit 1: Recapitulation of Mathematics:

Basics of Differentiation, Rolle's and Lagranges Theorem, Tangents and Normals, Indefinite Integral (Substitution, Integration using Trigonometric Identity & Integration by Parts & Definite Integral).

Unit 2: Ordinary Derivatives & Applications:

Expansion of functions by Maclaurin's & Taylor's Theorem (One Variable), Maxima and Minima of functions of two variables, Curvature (Radius, Center & Circle of Curvature for Cartesian Coordinates), Curve Tracing.

Unit 3: Partial Derivatives & Applications:

Definition, Euler's Theorem for Homogeneous Functions, Differentiation of Implicit Functions, Total Differential Coefficient, Transformations of Independent Variables, Jacobians, Approximation of Errors.

Unit 4: Integral Calculus:

Definite Integrals as a Limit of Sum, Application in Summation of series, Beta and Gamma functions (Definitions, Relation between Beta and Gamma functions, Duplication formula, Applications of Beta & Gama Functions).

Unit 5: Applications of Integral Calculus:

Multiple Integral (Double & Triple Integrals), Change of Variables, Change the Order of Integration, Applications of Multiple Integral in Area, Volume, Surfaces & Volume of Solid of Revolution about X-Axis & Y-Axis.

References:

1. Michael Greenberg, Advanced Engineering Mathematics, Second Edition, Pearson Education, 2002 (Indian Edition).

2. B.V. Rammana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, 2007.

3. Potter, Goldberg & Edward, Advanced Engineering Mathematics, Oxford University Press.

4. S. S. Shastry, Engineering Mathematics, PHI Learning

5. C.B. Gupta, Engineering Mathematics I & II, McGraw Hill India, 2015

Exercises to be performed by students:

➢   Reading text selection from the list given below
➢   To write a book-review

Evaluation:

Evaluation will be continuous an integral part of the class. Assessment will be based on assignments, presentations, and interview of each candidate.

Unit 1: Ordinary Differential Equations:

First-order differential equations (Separable, Exact, Homogeneous, Linear), Linear differential Equations with constant coefficients.

Unit 2: Ordinary Differential Equations:

Homogeneous linear differential equations, Simultaneous linear differential equations Second-Order Linear Differential Equations with Variable Coefficients Removal of First Derivative, Change of Independent Variable and Variation of Parameters.

Unit 3:   Partial Differential Equations-I:

Definition, Formulation, Solution of PDE (By Direct Integration Method & Lagranges Method Charpit's General Method of Solution Partial Differential equations

Unit 4: Partial Differential Equations-II lus:

Partial Differential Equations with Constant Coefficients(Second and Higher Orders Homogeneous and Non- Homogeneous equations), Partial differential Equations Reducible to equations with constant coefficients

Unit 5: Algebra of Logic:

Boolean Algebra, Principle of Duality, Basic Theorems, Boolean Expressions and Functions. Elementary Concept of Fuzzy Logic Graph Theory: Graphs, Subgraphs, Degree and Distance, Tree, cycles and Network, Vector Spaces: Definition and examples, linear dependence and independence, dual spaces, inner product spaces

References:

[1]   Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press, 2013.

[2]   Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons Inc.

[3]   Michael Greenberg, Advanced Engineering Mathematics, Second Edition, Pearson

[4]   Education, 2002 (Indian Edition).

[5]   B.V. Rammana, Higher Engineering Mathematics, Tata McGraw Hill Publishing

        Company,

[6]   2007. Shanti Narayan, A Course of Mathematical Analysis. S. Chand & Co. Delhi.

[7]   Marwaha, Introduction to Linear Algebra, PHI Learning.

Sub Code : EE110	Sub Name : Fundamentals of Electrical Engineering	3 Credits

Unit 1: D.C. Circuits:

Units and dimensions, 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 circuits.

Unit 2: 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.

Unit 3: 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 4: 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, open circuit and short circuit test.

Unit 5: Electrical Machines:

D.C. Motor & D.C. Generator, Three phase Induction motor and Synchronous Machines, their general construction, working principle, emf equation and applications. Types of losses occurring in electrical machines.

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.

EVALUATION:
Evaluation will be continuous an integral part of the class followed by final examination.

Reference:

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.

List of Practicals:

1. Verificatiions of Thevenin's theorem.
2. Verificatiions of Superposition theorem.
3. Study of Transformer, name plate rating, determination of ratio and polarity.
4. Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and
5. Estimation of voltage regulation and efficiency at various loading conditions and verification by load test.
6. Seperation of resistance and inductance of choke coil.
7. Measurement of various line & phase quantities for a 3-phase circuit.
8. Identification of different Electronics components.
9. To study of Power Factor Meter.
10. To study of Ammeter, Voltmeter and Wattmeter.
11. To Study of Rheostate.

Unit 1:

Introduction to engineering Design process: Its importance, types of designs, various ways to think about design like visualization, photography etc, simplified iteration model, design versus scientific method, a problem solving methodology

Unit 2:

Considerations of a good design Achievement of performance requirements, Total life cycle, Regulatory and social issues in Indian context.

Unit 3:

Description of Design Process Conceptual Design, Embodiment Design, Detail Design, Planning for Manufacture, Planning for distribution, Planning for Use, Planning for the retirement of the product

Unit 4:

Product Design Cycle, Identification of customer needs and market research essentials, concept generation, technology and market assessment

Unit 5:

An exposure to various aspects of design including visual, creative and user-centric design (Visual merchandising, trends, materials, technology and techniques). Evolution in Transportation and Communication Technology, Bullock Cart to Lear Jets, Personal messengers to Cell Phones, Fighter planes

Evaluation:

Evaluation will be continuous an integral part of the class as well through external assessment.

References:

[1]   George E. Dieter and Linda C. Schmidt, Engineering Design, McGraw Hill Education (India) Pvt. Ltd. Arvid Eide, Introduction to Engineering Design, McGraw Hill.

[2]   Otto. K and Wood, K, Product Design, Pearson Education

Unit 1: Fitting:

Tools & Equipments – Practice in filing. Making Vee Joints, Square, Dovetail joints and Key making - plumbing. Suggested Mini project – Assembly of simple I.C. engines

Unit 2: Carpentry:

Tools and Equipments- Planning practice. Making Half Lap, Dovetail, Mortise & Tenon joints. Suggested Mini project - model of a single door window frame.

Unit 3: Sheet Metal:

Tools and equipments– practice. Making rectangular tray, hopper, scoop, etc. Suggested Mini project - Fabrication of a small cabinet, dust bin, etc. Tools and equipments - Arc welding of butt joint, Lap joint, Tee fillet. Demonstration of gas welding, TIG & MIG welding.

Unit 4: Smithy:

Tools and Equipments – Making simple parts like hexagonal headed bolt, chisel.

Unit 5: Foundry:

Tools and Equipments, Mould making, conducting casting operation of a job

Evaluation:
Evaluation will be continuous an integral part of the class as well through external assessment.

References:

[1]   S K Hazara Choudhary, Gopal.T.V, Kumar.T, and Murali.G, "A first course on workshop practice – Theory, Practice and Work Book", Suma Publications, Chennai, 2005.

[2]   Kannaiah.P and Narayanan.K.C, "Manual on Workshop Practice", Scitech Publications Venkatachalapathy.V.S,"First year   Engineering   Workshop   Practice", Ramalinga Publications

Unit 1: Introduction:

Generation and Classification of Computers- Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.

Unit 2: C Programming Basics:

Problem formulation – Problem Solving - Introduction to ' C' programming –fundamentals – structure of a 'C' program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in 'C' – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.

Unit 3: Arrays And Strings:

Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

Unit 4: Functions and Pointers:
Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays- Example Problems.

Unit 5: Structures And Unions:
Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

References:

[1]   Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata

       McGraw-Hill, 2006. 2. Dromey R.G., "How to Solve it by Computer", Pearson

       Education, Fourth Reprint, 2007.

[2]   Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition,

       Pearson Education, 200.

List of Practicals:

[1] Write C Program for hello word.

[2] Write C Program for print integer.

[3] Write C Program to add two numbers repeatedly.

[4] Write C Program to check odd or even number.

[5] Write C program to perform addition, subtraction, multiplication and division.

[6] Write C Program to check whether input alphabet is a vowel or not.

[7] Write C Program to check leap year.

[8] Write C Program to Add digits of number.

[9] Write C Program for Factorial.

[10] Write C Program to find HCF and LCM.

[11] Write C Program for Decimal to binary conversion.

[12] Write C Program to add n numbers.

[13] Write C Program for reverse a number.

[14] Write C Program for Palindrome Numbers.

[15] Write C Program to print patterns of numbers and stars.

[16] Write C Program to print diamond pattern.

[17] Write C Program for prime number.

[18] Write C Program to generate and print Armstrong numbers.

[19] Write C Program for Fibonacci series.

[20] Write C Program for Linear search.

[21] Write C Program for binary search.

The main objective of introducing this course is to sensitize students about the socio-cultural aspects of the rural areas parochial to their colleges. Students are expected to observe, investigate and learn about the following aspects of the rural region:

1. Demographics, Literacy, Geographical parameters of the Village
2. Schemes of government of India and State of Madhya Pradesh in operation in the villages
3. Social/ Cultural aspects ranging from popular dance forms, music and customs of the concerned village

- There will be **NO EXAMINATION** in **HU112 Rural Outreach**. The grades earmarked will be awarded on the basis of internal Assessment.
- This course shall be done by the students in a self-study mode. Study methodology shall comprise of combining field visits, case studies, analyzing policy documents from different government departments, discussions with field officers, active NGO's and so on.
- The course will not be listed in the time-table and its activities shall be performed by the students at any time convenient to them.
- The faculty associated with the course shall evaluate the candidate and grade him.
- For evaluation purpose, students are expected to submit a hand-written summary on the government schemes and policies for the socio-cultural development of the concerned village. This shall be followed by final submission of two case studies covering broad spectrum of socio-cultural issues ranging from life in slums, infant mortality, watershed management, potability of water, animal welfare etc. These case studies (handwritten) shall be submitted to the mentor for the final evaluation of the coursework.

Unit 1: Introduction to Surveying:

Overview of Surveying, branches of surveying, principles of Surveying. Instruments Used for various measurements, Electronic Distance Measurement (EDM), Various EDM Instruments, Survey Maps, Conventional Symbols of Objects in the Map, Introduction to GIS, GPS, remote sensing and Digital Terrain Models (DTMS), applications of Remote Sensing.

Unit 2: Linear Measurements:

Methods and terminologies of linear measurements, linear measurements using chain surveying, various operations in carrying out the chain surveying, various accessories for chaining, different type of chains and tapes, testing of chains. Running Survey Lines: Ranging, chaining and laying offsets, linear Measurements with chain on level ground /on sloping ground, Errors in chaining: Errors in Measurements with Incorrect Chain Length, Linear Measurements with Tape on Smooth Level or Sloping Ground / on Rough Ground, Tape Corrections, Setting out Right Angle on / From a Chain Line, Offsets – Limiting Length of Offset, Effect of Error in Laying out Direction, Effect of Error in Direction and Length Both. Obstacles in Chain Survey: Obstacles to Ranging, Obstacles to Chaining, Obstacles to Ranging and Chaining both. Numerical Problems.

Unit 3: Angular measurements:

Overview and terminologies, Principle of Compass, Types of Compass, Compass Surveying, Traversing, Traversing with Chain and Compass, Designation of Bearings, Calculation of Included Angle from Bearings, Calculation of Bearing From Included Angles Errors and Precautions in Compass Surveying, Local attraction, Correction to Measured Bearing for Local Attraction, Adjustment of Closing Error. Magnetic Declination, Dip, Introduction Plane Table Surveying, Methods of Plane Table Surveying- Radiation Method and Intersection Method. Introduction to Theodolite. Numerical Problems.

Unit 4: Vertical Measurements:

Overview and terminologies, Leveling Instruments-Different Types of Levels, Leveling Staff. Temporary and Permanent Adjustments of a Level. Leveling: Classification Based on Purpose of Leveling –Simple leveling, Differential or Compound or Continuous Leveling, Fly Leveling, Profile or Longitudinal Leveling, Cross-Section Leveling, Reciprocal Leveling, Precise Leveling, Booking and Reducing Levels. Height of Collimation or Height of Instruments Method. Rise and Fall Method, Errors and Precautions in leveling, Balancing Back Sight and Foresight, Error Due to Earth's Curvature and Refraction, Field Problems or Difficulties in Leveling, Numerical Problems.

Unit 5: Measurement of Areas and Volumes:

Introduction, Areas: Areas from Field Measurements –Area Consisting of Irregular Boundary, Area from Plan –Graphical Method, Measurement of Area by Planimeter Errors & Precautions in Computation of Area. Volumes: Measurement of Volume. –from Cross Sections, from Spot Levels , from Contours, Area of Sections, Capacity of a Reservoir, Elevation - Capacity Curve, Earthwork, Mass Diagram. Numerical Problems.

References:

[1]   Surveying volume-1 3/e by S.K. Duggal Publisher Tata McGraw Hill Education

[2]   Surveying, by Mimidas Saikia BM Das, MM Das Publisher PHI Learning

[3]   Surveying & Leveling by N. N. Basak Publisher MC.Graw Hill Education

[4]   Plane Surveying by A.M. Chandra New Age International Publisher

[5]   Surveying Vol.1 by B.C. Punmia Publisher Luxmi Publications

[6]   Fundamentals of Surveying by S.K. Roy PHI Learning

[7]   Remote Sensing and Image Interpretation 6/e by Lillesand Kiefer Chipman Willey India Pvt ltd.

[8]   Surveying 7/e by A. Bannister, Stanley Raymond, Raymond Bakesr Publisher Pearson Education.

List of Practicals:

[1]   To perform the chain survey of a small area.

[2]   To study the different types of compass used in survey.

[3]   To perform plane table surveying by radiation method .

[4]   To perform plane table surveying by intersection method.

[5]   To mesure the horizontal and vertical angles by using theodolite.

[6]   To mesure the included angles by using theodolite.

[7]   Plotting and calculation of area by chain surveying.

[8]   To perform leveling by height of instrument method.

[9]   To perform leveling by rise and fall method.

[10]   To know the process of leveling staff

Unit 1: Manufacturing Processes:

Sheet Metal Work processes (applications, advantages/ disadvantages). Welding: Types–Equipments – Tools and accessories – Techniques employed - applications, advantages/ disadvantages – Gas cutting – Brazing and soldering. Lathe Practice: Types - Description of main components – Cutting tools – Work holding devices – Basic operations. Simple Problems. Drilling Practice: Introduction – Types – Description – Tools. Simple Problems.

Unit 2: Power Generation:

External and internal combustion engines Auto diesel & dual cycles, comparative study– Hydro, thermal and nuclear power plants (layouts, element/component description, advantages, disadvantages, applications). Simple Problems. Introduction to Steam water and gas turbines, basics of Rankine & Joule cycle, centrifugal pumps.

Unit 3: Machine Elements:

Springs: Helical and leaf springs – Springs in series and parallel. Cams: Types of cams and followers – Cam profile Power Transmission: Gears (terminology, spur, helical and bevel gears, gear trains). Belt drives (types). Chain drives. Simple problems. Introduction to mechanisms, four bar chain , inversions .

Unit 4: Thermal Engineering:

Basic concepts of thermodynamics , Concept of system ,Introduction to Zeroth , first & second law of thermodynamics , salient features of steam boilers , accessories & mountings ,High pressure boilers Basic modes of heat transfer Fourier's law , Stefan Boltzmann's law ,Newton's law . Concept of refrigeration & air conditioning, ton of refrigeration, COP. working of domestic refrigerator & air conditioner

Unit 5: Mechanical Properties And Deformation Mechanisms:

Mechanisms of plastic deformation, slip and twinning – Types of fracture –mechanical Properties of materials , Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test lzod and charpy, fatigue and creep failure mechanisms. Ferrous & non ferrous materials, non metallic materials, Alloys & phase diagram.

Laboratory:

Experiments as suggested by the course coordinator.

References:

[1]   Jonathan Wickert, Kemper Lewis, An Introduction to Mechanical Engineering, CENGAGE Learning.

[2]   Michael Clifford, Kathy Simmons, Philip Shipway, An Introduction to Mechanical Engineering: Part 1 and Part 2, Taylor and Francis

List of Practicals:

[1] Study of different manufacturing process.

[2] Experiments on bernoulli's theorem.

[3] Study of hardness testing machine of a specimen.

[4] Study of linear and angular measurement using, vernier, micrometer, slip gauge, dial gauge and sine-bar.

[5] Study of different types of boilers and mountings.

[6] Study of cams and follower mechanism.

[7] To find cop of a refrigeration unit.

[8] Study of different ic engines & measurement of b.h.p. using rope/belt dynamometer.

[9] Study of different types of drives.

[10] Study of different types of power plant.

Unit 1: Diode and Its Circuits:

Introduction to Semiconductor theory: Classification of materials- Insulators, conductors and semiconductors and their Energy Bands, Types of semiconductors- Intrinsic, Extrinsic. PN Junction Diode: Biasing and operation of PN Diode, V-I characteristics, Limiting Values of PN Diode, Breakdown in PN Diode, Applications of PN Diode. Zener Diode: V-I Characteristics, Applications of Zener Diode. Rectifier Circuits: PN Diode as a Rectifier, Half Wave Rectifier, Full Wave Rectifier, Full Wave Bridge Rectifier, Clipping Circuits, Clamper Circuits.

Unit 2: Number Systems:

Introduction, Binary Number System, Octal Number System, Decimal Number System, Hexadecimal System, Conversions: Binary to Decimal conversion and vice-versa, Octal to Decimal Conversion and vice versa, Hexadecimal to Decimal Conversion and vice-versa, Binary to Hexadecimal Conversion and vice-versa, Octal to Decimal and vice-versa, Octal to Hexadecimal and vice versa. Complements: One's Complement, Two's Complement, Nine's Complement, Ten's Complement. Binary Arithmetic (addition, subtraction, multiplication, division), Octal Arithmetic, Hexadecimal Arithmetic, Signed Numbers, Floating Numbers, Codes.

Unit 3: Boolean Algebra and Logic Gates:

Introduction, Definitions, Principle of Duality, Basic Theorems, Applications of Boolean Algebra, Boolean Functions, Complement of Boolean Function. Logic Gates (Symbol, Truth Table, Logic Diagram): And, OR, NOT, NAND, NOR, XOR, XNOR. Universal Gates: NAND Gate and NOR Gate implementation, Realization of other Logic Operations using NAND/NOR. Buffer, Negative and Positive Logic, Mixed Logic.

Unit 4: Signals:

Introduction, Representation of Discrete-time Signals: Graphical Representation, Functional Representation, Tabular Representation, Sequence Representation. Elementary Signals: Unit Step Function, Unit Ramp Function, Unit Parabolic Function, Unit Impulse Function, Sinusoidal Signal, Real Exponential Signal, Complex Exponential Signal, Rectangular Pulse Function, Triangular Pulse Function, Signum Function, Sinc Function, Gaussian Function. Basic Operations on Signals: Time Shifting, Time Reversal, Amplitude Scaling, Time Scaling, Signal Addition, Signal Multiplication. Classification of Signals: Deterministic and Random Signals, Periodic and Non-periodic Signals, Energy and Power Signals, Causal and Non-causal Signals, Even and Odd Signals

Unit 5: Fourier Series Representation of Periodic Signals:

Introduction, Representation of Fourier Series, Existence of Fourier Series, Trigonometric Form of Fourier Series: Evaluation of Fourier Coefficients of the Trigonometric Fourier Series, Cosine Representation (Alternate Form of the Trigonometric Representation), Wave Symmetry: Even or Mirror Symmetry, Odd or Rotation Symmetry, Half Wave Symmetry, Quarter Wave Symmetry. Exponential Fourier Series: Determination of the Coefficients of Exponential Fourier Series, Trigonometric Fourier Series from Exponential Fourier Series, Exponential Fourier Series from Trigonometric Fourier Series, Cosine Fourier Series from Exponential Fourier Series. Properties of Continuous-Time Fourier Series: Linearity Property, Time Shifting Property, Time Reversal Property, Time Scaling Property, Time Differentiation Property and Time Integration Property.

References

[1] Hwei P. Hsu, Schaum's Outline of Signals and Systems, McGraw-Hill.

[2] A. V. Oppenheim, A. S. Willsky, S Hamid Nawab, Signals and Systems, PHI.

[3] A. Anand Kumar, Signals and Systems, PHI.

[4] Basics of Electronics Engineering, Wiley India Pvt. Ltd.

List of Practicals:

1. Study of different electronic components and instruments like resistor, capacitor, inductor, multimeter, power supply, and function generator.
2. Study of different parts of (CRO) cathode ray oscilloscope.
3. Study of P-N junction diode V-I characteristics.
4. Study of Zener diode   V-I characteristics.
5. Study and Verify the truth table of Basic logic gates.
6. Study and Verify the truth table of Exclusive gates.
7. Study and Verify the truth table of Universal gates.
8. To verify the truth of half adder & full adder.
9. Study of Half wave rectifier.
10. Study of Full wave rectifier.

Unit 1: Computer:

Definition, classification, Organization i.e. CPU, register, Bus Architecture, Instruction Set, Memory & Storage Systems, I/O Devices, and System and 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 Power Point, MS Excel Introduction to algorithm, Complexities and Flowchart,

Unit 2: 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 Associatively, Program Structure, Data Types, Variables, Operators, Expressions, Statements and Control Structures, I/O Operations, Array, Functions. Object & Classes, Scope Resolution Operator, Constructors & Destructors, Friend Functions, Inheritance, Polymorphism, Overloading Functions & Operators, Types of Inheritance, Virtual Functions, Introduction to Data Structures

Unit 3: 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**.**

Unit 4: Computer Security Basics:

Introduction to Viruses, Worms, Malware, Trojans, Spyware, and Anti-Spyware Software, Different types of attacks like Money Laundering, Information Theft, Email Spoofing, Denial of Services (DoS), Cyber Stalking, Logic Bombs, Hacking, Spamming, Cyber Defamation, Pharming Security Measures Firewall, Computer Ethics & Good Practices, Introduction to Cyber Laws about internet fraud, Good Computer Security Habits.

Unit 5: Database 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 (laaS, PaaS, SaaS), Cloud deployment models/ types of cloud (public, private, community and hybrid cloud), Pros and Cons of Cloud Computing.

References:

[1]   E Balaguruswamy, Fundamentals of Computers, TMH

[2]   Silakari and Shukla, Basic Computer Engineering, Wiley India

[3]   V Rajaraman, Fundamentals of Computes, PHI Ajoy Kumar Ray & Tinku Acharya, Information Technology Principles and Application Peter Norton, Introduction to Computers, TMH

List of practicals:

[1]   GUI Operating System: Mouse Practice, Starting, Login, Shutdown, Exploring.

[2]   Directories, Resizing, Moving, Minimizing, closing of software windows.

[3]   Familiarization with file icons, Launching Applications, Deleting, Renaming files.

[4]   Managing Directories, Searching for files, Using Accessories.

[5]   Study of various components of computer like CPU, keyboard, mouse, monitor, printer, CVT and storage devices.

[6]   Study of MS-word – opening and saving of documents, formatting, editing and spell check, find and replace, printing, merging. Creating Table, Charts and Graphics.

[7]   Study of Spreadsheet – creating, saving, editing and printing. Entering data, selecting cells, formatting text, applying border shades and backgrounds, creating formulas, creating charts.

[8]   Study of Power Point – creating, opening, editing and saving of slides. Adding and formatting text, creating animations, working with images and special effects. Printing presentation.

[9]   Study of MS Access– creating, saving, editing and printing of tables. Managing relationships, writing queries e.g. SELECT, UPDATE, DELETE, INSERT. Forms designing and report printing.

[10] Study of Web Browser and mailing programs.

Unit 1: Principles of programming:

System Life Cycle - Performance Analysis and Measurements- Time and Space complexity- Complexity calculation of simple algorithms. Hashing:- Static Hashing-Hash Tables- Different Hash Functions-Mid Square- Division-Folding-Digit Analysis, Collision-Collision Resolution Techniques.

Unit 2: Study of basic data structures and its types:

Arrays- Structures-Sparse matrix – Stacks – Queues-Circular queues- Priority queues - Dqueues. Evaluation of expressions – Polynomial representation using arrays.

Unit 3: Linked Lists :

Linked stacks and queues - Doubly linked lists – Polynomial representation using linked lists, Garbage collection and Compaction.

Unit 4: Trees - Binary Trees:

Tree Traversal – Inorder - Preorder and Postorder, Search trees - AVL Trees, height balanced trees, Multiway search Trees- B Trees-B+ Trees. Graphs – Depth first and breadth first search.

Unit 5: Sorting methods:

Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, External sorting methods. Searching Techniques-DFS, BFS.

Reference:

[1]   Horowitz ,Sahni & Anderson Freed, Fundamentals of Data Structures in C, 2nd ed., Universities Press, Hyderabad, 2009

[2]   Rajesh K Shukla, Data Structures Using C & C++ ,Wiley India, New Delhi, 2009

[3]   G. S Baluja, Data Structures Through C, Dhanpat Rai & Co. , New Delhi, 2009

[4]   Sartaj Sahni , Data Structures, Algorithms and Applications in C++ , 2nd ed., Universities Press, Hyderabad, 2009

[5]   13. Seymour Lipschutz, Data Structures with C, Schaum's Outlines, McGraw Hill , New Delhi, 2010

List of practicals:

[1] Write a program to search an element in a two dimensional array.

[2] Using iteration and recursion concepts write programs for finding the element in the array using the Binary search method.

[3] Write a program to perform following operations on table using functions only-Addition, Subtraction, Multiplication, Transpose.

[4] Write a program using iteration and recursion concepts for quick sort..

[5] Write a program to implement various operations on strings.

[6] Write a program for swapping two numbers using call by value and call by reference strategies.

[7] Write a program to implement Binary search tree.

[8] Write a program to create Linked List and perform operation such as insert, delete, update and reverse.

[9] Write a program to simulate various sorting and searching algorithms.

[10] Write a program to simulate various Graph traversing techniques.

[11] Write a program to simulate various tree traversal techniques.

Unit 1: Principles of programming:

System Life Cycle - Performance Analysis and Measurements- Time and Space complexity-Complexity calculation of simple algorithms. Hashing:- Static Hashing-Hash Tables-Different Hash Functions-Mid Square- Division-Folding-Digit Analysis, Collision-Collision Resolution Techniques.

Unit 2: Study of basic data structures and its types:

Arrays- Structures-Sparse matrix – Stacks – Queues-Circular queues- Priority queues - Dqueues. Evaluation of expressions – Polynomial representation using arrays.

Unit 3: Linked Lists :

Linked stacks and queues - Doubly linked lists – Polynomial representation using linked lists, Garbage collection and Compaction.

Unit 4: Trees - Binary Trees:

Tree Traversal – Inorder - Preorder and Postorder, Search trees - AVL Trees, height balanced trees, Multiway search Trees- B Trees-B+ Trees. Graphs – Depth first and breadth first search.

Unit 5: Sorting methods:

Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, External sorting methods. Searching Techniques-DFS, BFS.

Reference:

[1] Horowitz ,Sahni & Anderson Freed, Fundamentals of Data Structures in C, 2nd ed., Universities Press, Hyderabad, 2009.

[2] Rajesh K Shukla, Data Structures Using C & C++ ,Wiley India, New Delhi, 2009.

[3] G. S Baluja, Data Structures Through C, Dhanpat Rai & Co. , New Delhi, 2009.

[4] Sartaj Sahni , Data Structures, Algorithms and Applications in C++ , 2nd ed., Universities Press, Hyderabad, 2009.

[5] Seymour Lipschutz, Data Structures with C, Schaum's Outlines, McGraw Hill , New Delhi, 2010.

List of practicals:

[1] Write a program to search an element in a two dimensional array.

[2] Using iteration and recursion concepts write programs for finding the element in the array using the Binary search method.

[3] Write a program to perform following operations on table using functions only-Addition, Subtraction, Multiplication, Transpose.

[4] Write a program using iteration and recursion concepts for quick sort..

[5] Write a program to implement various operations on strings.

[6] Write a program for swapping two numbers using call by value and call by reference strategies.

[7] Write a program to implement Binary search tree.

[8] Write a program to create Linked List and perform operation such as insert, delete, update and reverse.

[9] Write a program to simulate various sorting and searching algorithms.

[10] Write a program to simulate various Graph traversing techniques.

[11] Write a program to simulate various tree traversal techniques.