Faculty of Engineering & Technology

P.K.University

Shivpuri (MP)

Department of Electronics & Communication Engineering

Evaluation Scheme & Syllabus

B.Tech. Second Year

(III & IV Sem)

(Effective from session 2025-26)

EVALUATION SCHEME

B.TECH –ELECTRONICS COMMUNICATION & ENGG.

3RD SEMESTER

STUDY AND EVALUATION SCHEME FOR B.TECH IN ELECTRONICS COMMUNICATION & ENGINEERING												
YEAR2nd/SEMESTER-III												
SUBJECT CODE	SUBJECTS NAME	STUDY SCHEME Periods/Week			Credits	MARKSINEVALUATIONSCHEME						Total Marks of Internal &External
						INTERNAL ASSESSMENT			EXTERNALASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
UENGIEC301	ENGINEERING MATHEMATICS-III	3	1	0	4	30	-	30	70	-	70	100
UNETWEC302	NETWORK ANALYSIS & SYNTHESIS	3	1	0	4	30	-	30	70	-	70	100
UDIGIEC303	DIGITAL LOGIC DESIGN	3	0	0	3	30	-	30	70	-	70	100
USIGNEC304	SIGNAL & SYSTEMS	3	0	0	3	30	-	30	70	-	70	100
UELECEC305	ELECTRONIC DEVICES AND CIRCUITS	3	0	0	3	30	-	30	70	-	70	100
UENVIEC306	ENVIRONMENT & ECOLOGY	3	0	0	3	30	-	30	70	-	70	100
UDIGLEC307	DIGITAL LOGIC DESIGN LAB	0	0	2	1	-	25	25	-	25	25	50
USIGNEC308	SIGNAL & SYSTEMS LAB	0	0	2	1	-	25	25	-	25	25	50
UELECEC309	ELECTRONIC DEVICES AND CIRCUITS LAB	0	0	2	1	-	25	25	-	25	25	50
UELECEC-310	ELECTRONIC WORKSHOP & PCB DESIGN LAB	0	0	2	1	-	25	25	-	25	25	50
Total		18	2	8	24	180	100	280	420	100	520	800

Department of Electronics & Communication Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
II Year Semester-III
UENGIEC301
ENGINEERING MATHEMATICS-III   (L-T-P-3-1-0)

UNIT - I

Numerical Techniques – I: Zeroes of transcendental and polynomial equations, Bisection method, Regula-falsi method, Newton-Raphson method, Rate of convergence of above methods.
Interpolation: Finite differences, Newton"s forward and backward interpolation. Lagrange"s and Newton"s divided difference formula for unequal intervals**.**

UNIT- II
Numerical Techniques –II: Solution of system of linear equations, Matrix Decomposition methods, Jacobi method, Gauss- Seidal method.
Numerical differentiation & Integration: Trapezoidal rule, Simpson"s one third and three- eight rules, Solution of ordinary differential equations (first order, second order and simultaneous) by Euler"s, Picard"s and fourth-order Runge- Kutta methods.

UNIT- III
Statistical Techniques: Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves, Correlation, Linear, non – linear and multiple regression analysis, Binomial, Poisson and Normal distributions. Tests of significations: Chi-square test, t-test.

UNIT- IV
Function of Complex variable: Analytic function, C-R equations, Harmonic Functions, Cauchy"s integral theorem, Cauchy"s integral formula, Derivatives of analytic functions, Taylor"s and Laurent"s series, Singularities, Zeroes and Poles, Residue theorem.

UNIT -V
Integral Transforms: Fourier integral, Complex Fourier transform, Inverse Transforms, Convolution Theorems, Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensional heat transfer equations, wave equations and Laplace equations, Z- Transform and its application to solve difference equation.

Text Books:

1. Peter V. O"Neil, Advance Engineering Mathematics Thomson (Cengage) Learning, 2007.
2. Jain, Iyenger Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi
3. J.N. Kapur, Mathematical Statistics, S. Chand & company Ltd.

Reference Books:

1. R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House.
2. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.
3. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited, New Delhi.
4. E. Balagurusamy, Numerical Methods, Tata McGraw-Hill Publishing Company Limited, New Delhi

Department of Electronics & Communication Engineering
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P.K. University, Shivpuri (MP)
II Year Semester-III
UNETWEC302
NETWORK ANALYSIS & SYNTHESIS

(L-T-P-3-1-0)

UNIT I
Signal Analysis, Complex Frequency, General Characteristics and Descriptions of Signals, Node Voltage Analysis, Mesh Current Analysis, Step Function and Associated Wave Forms, The Unit Impulse, Initial and final conditions, Step and Impulse Response, Response of Source Free Circuits, Forced Response, Phasor and Steady State Responses of Circuits to Sinusoidal Functions, Resonance in AC Circuits.

UNIT II
Review of Laplace Transforms, Poles and Zeroes, Initial and Final Value theorems, The transform circuit, Superposition Theorem, Thevenin"s and Norton"s theorems, Maximum Power Transfer Theorem, Convolution Integral, Amplitude and phase responses. Network functions.

UNIT III
Graph Theory fundamentals, Matrix Representation of Graphs, Formulation of Network Response Equations using Incidence Matrix, Duality in Networks. Computation of Ladder and Non-Ladder Networks, Routh-Hurwitz Stability Criterion, Bode Diagrams.

UNIT IV
Parameters of Two Port Networks, Correlation between Two Port Parameters, Two Port, Relation between Port Parameters, Transfer Functions using Two Port Parameters, Interconnection of TwoPorts , Reciprocal and Symmetric Networks, Terminated Two Port Networks, Interconnections of Two Port Networks, Image Impedance, Iterative Impedance. Harmonics and Dirichlet`s Conditions, Waveform Symmetry and Fourier Coefficients. Filter Networks.

UNIT V
Active Network Synthesis and Realizability: Elements of Relizability Theory, Hurwitz Polynomial, Positive Real Functions (PRF), Characteristics of PRF, Methodology for Simple Network Synthesis, Synthesis of Two Element Type One Port Network.

Text Book:
1. Franklin F. Kuo, "Network Analysis and synthesis", Wiley India Pvt Ltd.
2. MS Sukhija, T.K. Nagsarkar, "Circuits and Networks", Oxford University Publication.

1. ME Van Valkenberg, "Network Analysis", Prentice Hall of India Ltd.
2. Ghosh, "Network Theory: Analysis and Synthesis", PHI Learning Pvt. Ltd

Department of Electronics & Communication Engineering
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P.K. University, Shivpuri (M.P.)
II Year Semester-III
UDIGIEC303
DIGITAL LOGIC DESIGN

(L-T-P-3-0-0)

UNIT I

Digital System And Binary Numbers: Number System and its arithmetic, Signed binary numbers, Binary codes, Cyclic codes, Hamming Code, the map method up to five variable, Don"t care conditions, POS simplification, NAND and NOR implementation, Quine Mc-Clusky method (Tabular method).

UNIT II
Combinational Logic: Combinational Circuits: Analysis Procedure, Design procedure, Binary adder-subtractor, Decimal adder, Binary multiplier, Magnitude comparator, Multiplexers, Demultiplexers, Decoders, Encoders.

UNIT III
Sequential Logic And Its Applications: Storage elements: latches & flip flops, Characteristic Equations of Flip Flops, Flip Flop Conversion, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters: Johnson & Ring Counter.

UNIT IV
Synchronous & Asynchronous Sequential Circuits: Analysis of clocked sequential circuits with state machine designing, State reduction and assignments, Design procedure. Analysis procedure of Asynchronous sequential circuits, circuit with latches, design procedure, Reduction of state and flow table, Race-free state assignment, Hazards.

UNIT V
Memory & Programmable Logic Devices: Digital Logic Families: DTL, DCTL, TTL, ECL & CMOS etc., Fan Out, Fan in, Noise Margin; RAM, ROM, PLA, PAL; Circuits of Logic Families, Interfacing of Digital Logic Families, Circuit Implementation using ROM, PLA and PAL; CPLD and FPGA.

Text Books:
1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education.
2. David J. Comer, "Digital Logic & State Machine Design", Oxford University Press.
3. RP Jain, "Modern Digital Electronics", Tata McGraw Hill Publication.

1. DP Kothari and J.S. Dhillon, "Digital Circuits and Design", Pearson Education.
2. A. Anand Kumar, "Fundamentals of Digital Circuits", PHI Lear

Department of Electronics & Communication Engineering
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P.K. University, Shivpuri (M.P.)
II Year Semester-III
USIGNEC304
SIGNALS AND SYSTEMS

(L-T-P-3-0-0)

UNIT I

Signals: Representation of Signals, Singularity Functions, Discrete Time Signals, Types of Signals, Time Scaling and Shifting, Convolution and Correlation of LTI Systems, Correlation of energy and power signals.

UNIT II
Systems and Analysis of System: System Classification, Linearity/Time Invariance, Causal System, Characterization of LTI Systems, Unit Sample Response, Generalization of D.T. Systems, Concept of Stability, Convolution Integrals/summations, Energy and Power spectral density, Properties of Power spectral Density, Analysis of First order systems, Analysis of second order systems.

UNIT III
Fourier Transforms: Properties and Significance of CTFT, CTFT of Common Signals, Inverse CTFT; Introduction to DTFT, DTFT of Common Signals, Theorems and Properties – DTFT, Inverse DTFT; Continuous Time and Discrete Time Hilbert Transform and its Properties. Introduction of Gaussian signal and its Fourier transform.

UNIT IV
Laplace Transform and Z Transform: Laplace Transforms- Introduction, Laplace Transforms of common signals, Theorems and properties of Laplace Transforms, Concept of Region of Convergence, Inverse Laplace Transforms; Z Transforms – Introduction, Z Transforms of Common Signals, Theorems and properties of Z Transforms, Inverse Z Transforms.

UNIT V
Sampling of Time Signals: Nyquist Criterion, Sampling theorem and frequency domain representation of sampling, Sampling Techniques, Reconstruction of band limited signal from its samples, Sampling of Sinusoidal and other signals.

Text Book:

1. AV Oppenheim, A.S. Willsky and S. Hamid Nawab, „Signals and Systems", Pearson Education.

2. TK Rawat, "Signals and Systems", Oxford University Press.

1. BP Lathi, "Principals of Linear Systems and Signals", Oxford University Press.
2. P. Ramakrishna Rao, „Signal and System", Tata McGraw Hill, New Delhi.
3. Kishore S. Trivedi, "Probability & Statistics with Reliability Queuing and Computer Science Applications", Wiley Publication.

Department of Electronics & Communication Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (M.P.)
II Year Semester-III
UELECEC305
ELECTRONIC DEVICES AND CIRCUITS

(L-T-P-3-0-0)

UNIT I

Energy Bands and Charge Carrier in Semiconductor: Bonding forces and energy bands in solids, Charge Carriers in Semiconductors, Carrier Concentrations, Drift Mechanism.

Excess carriers in Semiconductors: Optical Absorption, Carrier Lifetime: Direct Recombination, Steady State Carrier Generation, Quasi-Fermi Level, Diffusion of carriers and Einstein relation.

UNIT II

Junctions: Equilibrium Conditions, Forward and Reveres Biased Junctions; Steady State Conditions.

Optoelectronic Devices: Photodiode V-I characteristic, Photodetector, Solar Cells, Light Emitting Diode.

UNIT III

MOSFET: Device structure and its operation in equilibrium, V-I characteristics. Circuits at DC, MOSFET as Amplifier and switch, Biasing in MOS amplifier circuits, small-signal operation and models, single stage MOS amplifier, MOSFET internal capacitances and high frequency model, frequency response of CS amplifier

UNIT IV

BJT: Review of device structure operation and V-I characteristics, BJT circuits at DC, BJT as amplifier and switch, biasing in BJT amplifier circuit, small-signal operation and models, single stage BJT amplifier, BJT internal capacitances and high frequency model, frequency response of CE amplifier.

UNIT V

Feedback: The general feedback structure, properties of negative feedback, the four basic feedback topologies, the series-shunt feedback amplifier, the series-series feedback amplifier, the shunt-shunt and shunt series feedback amplifier.

Oscillators: Basic principles of sinusoidal oscillators, op-amp RC oscillator circuits, LC oscillator.

Text Book:
1. AS Sedra and K. C. Smith, "Microelectronic Circuits", Oxford University Press.
2. Millman Jacob, Christos Halkias , Satyabrata Jit, "Electronic Devices and Circuits", Tata McGraw Hill.
3. BG Streetman and S. Banerjee "Solid State Electronics Devices", Prentice Hall of India.
4. Donald A. Neamen "Semiconductor Physics & Devices", Tata McGraw Hill.
5. Alok K. Dutta, "Semiconductor Devices and Circuits", Oxford University Press.
6. Jacob Millman and Arvin Grabel, "Microelectronics", Tata McGraw Hill.

Department of Electronics & Communication Engineering
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P.K. University, Shivpuri (M.P.)
II Year Semester-III
UENVIEC306
ENVIRONMENT & ECOLOGY

(L-T-P-3-0-0)

UNIT I

Definition, Scope & Importance, Need For Public Awareness• Environment definition, Eco
system - Balanced ecosystem, Human activities - Food, Shelter, Economic and social Security. Effects or human activities on environment Agriculture, Housing, Industry, Mining and Transportation activities, Basics of Environmental Impact Assessment. Sustainable Development

UNIT-II

Natural Resources• Water Resources· Availability and Quality aspects.Water borne diseases,
Water Induced diseases, Fluoride problem in drinking water. Mineral Resources, Forest Wealth, Material cycles-- Carbon, Nitrogen and Sulpher Cycles.
Energy - Different types of energy, Electro-magnetic radiation. Conventional and Non-Conventional sources – Hydro-Electric, Fossil Fuel based, Nuclear, Solar, Biomass and Bio.gas. Hydrogen as an alternative future source of Energy.

UNIT-Ill

Environmental Pollution and their effects. Water pollution, Land pollution. Noise pollution,
Public Health aspects, Air Pollution, Solid waste management, e-waste management
Current Environmental Issues of Importance: Population Growth, Climate Change and Global warming- Effects, Urbanization, Automobile pollution. Acid Rain Ozone Layer depletion, Animal Husbandry,

UNIT-IV
V Environmental Protection- Role of Government, Legal aspects, initiatives by Non-
Governmental organizations (NGO), Environmental Education, Women Education,

Text Books
l. Environmental Studies -Benny Joseph- Tata Mcgraw Hill-2005

2. Environmental Studies- Or. D.L. Manjunath, Pearson Education-2006.
3. Environmental studies - R, Rajagopalan -Oxford Publication • 2005.
4.Text book of Environmental Science & Technology- M. Anji Reddy- US Publication .

Reference Books
l. Principles of Environmental Science and Engineering -P. Venugoplan Rao, Prentice Hall of
India.
2. Environmental Science and Engineering- Meenakshi, Prentice Hall India

Department of Electronics & Communication Engineering
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P.K. University, Shivpuri (M.P.)
II Year Semester-III
UDIGIEC307
DIGITAL LOGIC DESIGN LAB

(L-T-P-0-0-2)

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, Concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.

2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.

3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.

4. Implementation and verification of Decoder using logic gates.

5. Implementation and verification of Encoder using logic gates.

6. Implementation of 4:1 multiplexer using logic gates.

7. Implementation of 1:4 demultiplexer using logic gates.

8. Implementation of 4-bit parallel adder using 7483 IC.

9. Design, and verify the 4-bit synchronous counter.

10. Design, and verify the 4-bit asynchronous counter.

11. Implementation of Mini Project using digital integrated circuit"s and other components.

Department of Electronics & Communication Engineering
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P.K. University, Shivpuri (M.P.)
II Year Semester-III
USIGNEC308
SIGNALS & SYSTEMS

(L-T-P-0-0-2)

1. Introduction to MATLAB
   a. To define and use variables and functions in MATLAB.
   b. To define and use Vectors and Matrices in MATLAB.
   c. To study various MATLAB arithmetic operators and mathematical functions.
   d. To create and use m-files.
2. Basic plotting of signals
   a. To study various MATLAB commands for creating two- and three-dimensional plots.
   b. Write a MATLAB program to plot the following Continuous time and discrete time signals
      1. Step Function
      2. Impulse Function
      3. Exponential Function
      4. Ramp Function
      5. Sine Function
3. Time and Amplitude transformations
   a. Write a MATLAB program to perform amplitude-scaling, time-scaling and time-shifting on a given signal.
4. Convolution of given signals
   a. Write a MATLAB program to obtain linear convolution of the given sequences.
5. Autocorrelation and Cross-correlation
   a. Write a MATLAB program to compute autocorrelation of a sequence x(n) and verify the property.
   b. Write a MATLAB program to compute cross-correlation of sequences x(n) and y(n) and verify the property.
6. Fourier Series and Gibbs Phenomenon
   a. To calculate Fourier Series coefficients associated with Square Wave.
   b. To Sum the first 10 terms and plot the Fourier Series as a function of time
7. Calculating transforms using MATLAB
   a. Calculate and plot Fourier Transform of a given signal
   b. Calculate and plot Z-transform of a given signal
8. Impulse response and Step response of a given system
   a. Write a MATLAB program to find the impulse response and step response of a system form its difference equation
   b. Compute and plot the response of a given system to a given input
9. Pole-zero diagram and bode diagram
   a. Write a MATLAB program to find pole-zero diagram, bode diagram of a given system from the given system function
   b. Write a MATLAB program to find, bode diagram of a given system from the given system function
10. Frequency response of a system
    a. Write a MATLAB program to plot magnitude and phase response of a given system
11. Checking Linearity/Non-Linearity of a system using SIMULINK
    a. Build a system that amplifies a sine wave by a factor of two.

Department of Electronics & Communication Engineering
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P.K. University, Shivpuri (M.P.)
II Year Semester-III
UELECEC309

ELECTRONIC DEVICES AND CIRCUITS LAB

(L-T-P-0-0-2)

1. **Study of Lab Equipments and Components:** CRO, Multimeter, and Function Generator, Power supply- Active, Passive Components and Bread Board.

2. **P-N Junction diode:** Characteristics of PN Junction diode - Static and dynamic resistance measurement from graph.

3. **Applications of PN Junction diode:** Half & Full wave rectifier- Measurement of V_{rms}, V_{dc}, and ripple factor.

4. **Characteristics of Zener diode:** V-I characteristics of zener diode, Graphical measurement of forward and reverse resistance..

5. **Application of Zener diode:** Zener diode as voltage regulator. Measurement of percentage regulation by varying load resistor.

6. **Characteristic of BJT:** BJT in CE configuration- Graphical measurement of h-parameters from input and output characteristics. Measurement of A_v, A_I, R_o and R_i of CE amplifier with potential divider biasing.

7. **Measurement of Operational Amplifier Parameters:** Common Mode Gain, Differential Mode Gain, CMRR, Slew Rate.

8. **Applications of Op-amp:** Op-amp as summing amplifier, Difference amplifier, Integrator and differentiator.

9. **Field Effect Transistors:** Single stage Common source FET amplifier –plot of gain in dB Vs frequency, Measurement of, bandwidth, input impedance, maximum signal handling capacity (MSHC) of an amplifier.

10. **Oscillators:** Sinusoidal Oscillators-

    a. Wein"s bridge oscillator

    b. phase shift oscillator.

11. Simulation of Amplifier circuits studied in the lab using any available simulation software and measurement of bandwidth and other parameters with the help of simulation software.

Department of Electronics & Communication Engineering
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P.K. University, Shivpuri (M.P.)
II Year Semester-III

UELECEC310

ELECTRONICS WORKSHOP & PCB DESIGN LAB

(L-T-P-0-0-2)

1. Study of CRO, DMM & Function Generator.
2. Study of various types of Active & Passive Components based on their ratings.
3. Winding shop: Step down transformer winding of less than 5VA.
4. Soldering shop: Fabrication of DC regulated power supply
5. Identification of various types of Printed Circuit Boards (PCB) and soldering Techniques.
6. Introduction to PCB Design software
7. PCB Lab: a. Artwork & printing of a simple PCB.

    b. Etching & drilling of PCB.

8. Wiring & fitting shop: Fitting of power supply along with a meter in cabinet.

B.TECH –ELECTRONICS COMMUNICATION & ENGG. 4TH SEM.

STUDYANDEVALUATIONSCHEME FORB.TECHIN ELECTRONICS COMMUNICATION & ENGINEERING													
YEAR2nd/SEMESTER-4TH													
SUBJECTCODE	SUBJECTSNAME	STUDYSCHEME Periods/Week			Credits	MARKSINEVALUATIONSCHEME							TotalMarks ofInternal &External
						INTERNALASSESSMENT			EXTERNALASSESSMENT				
		L	T	P		Th	Pr	Tot	Th	Pr	Tot		
UNANOEC401	NANO SCIENCE	3	0	0	3	30	-	30	70	-	70		100
UDATAEC402	DATA STRUCTURE & ALGORITHMS	3	1	0	4	30	-	30	70	-	70		100
UMICREC403	MICROPROCESSORS & MICROCONTROLLERS	3	0	0	3	30	-	30	70	-	70		100
UELECEC404	ELECTROMAGNETIC FIELD THEORY	3	1	0	4	30	-	30	70	-	70		100
UELECEC405	ELECTRONIC MEASUREMENTS & INSTRUMENTATION	3	0	0	3	30	-	30	70	-	70		100
UUNIVEC406	UNIVERSAL HUMAN VALUE & PROF. ETHICS	3	0	0	3	30	-	30	70	-	70		100
UDATAEC407	DATA STRUCTURE & ALGORITHMS LAB	0	0	2	1	-	25	25	-	25	25		50
UMICREC408	MICROPROCESSORS & MICROCONTROLLERS LAB	0	0	2	1	-	25	25	-	25	25		50
UELECEC409	ELECTRONIC MEASUREMENTS & INSTRUMENTATION LAB	0	0	2	1	-	25	25	-	25	25		50
UADVAEC410	ADVANCED ELECTRONICS SYSTEM LAB	0	0	2	1	-	25	25	-	25	25		50
	Total	18	2	8	24	180	100	280	420	100	520		800

Department of Electronics & Communication Engineering
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II Year Semester-IV
UNANOEC401
NANO SCIENCE

(L-T-P-3-0-0)

UNIT –I

Introduction: Definition of Nano-Science and Nano Technology, Applications of Nano-Technology.

Quantum Theory for Nano Science: Particle in a box, Potential step: Reflection and tunneling (Quantum leak). Penetration of Barrier, Potential box (Traped particle in 3D: Nanodot).

Physics of Solid State Structures: Size dependence of properties, crystal structures, face centered cubic nanoparticles; Tetrehedrally bounded semiconductor structures; lattice vibrations.

Energy Bands: Insulators, semiconductor and conductors; Reciprocal space; Energy bands and gaps of semiconductors; effective masses; Fermi Surfaces.

Localized Particles: Acceptors and deep taps; mobility; Excitons.

UNIT II

Quantum Nanostructure: Preparation of quantum wells, Wires and Dots, Size and Dimensionality effect, Fermi gas; Potential wells; Partial confinement; Single electron Tunneling, Infrared detectors; Quantum dot laser superconductivity.

Properties of Individual Nano Particles: Metal nano clusters; Magic numbers; Theoretical modeling of nano particles; geometric structure; electronic structure; Reactivity, Fluctuations, Magnetic clusters; Bulk to nanostructure, semiconducting nanoparticles, Optical Properties, Photo fragmentation, Coulombic Explosion. Rare Gas & Molecular clusters; Inert gas clusters; Superfluid clusters; Molecular clusters.

UNIT III

Growth Techniques of Nanomaterials: Litho and Nonlithograpahic techniques, RF Plasma, Chemical methods, Thermolysis, Pulsed laser method, Self-assembly, E-beam evaporation, Chemical Vapour Deposition, Pulsed Laser Deposition.

UNIT IV

Methods of Measuring Properties: Structure: X-ray Diffraction Technique, Particle size determination, surface structure. Microscopy: Scanning Probe Microscopy (SPM), Atomic Force Microscopy (AFM), Field Ion Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy(TEM). Spectroscopy: Infra red and Raman Spectroscopy, X-ray Spectroscopy, Magnetic resonance, Optical and Vibrational Spectroscopy, Luminescence.

UNIT V

Carbon Nano Materials: Bucky Ball and Carbon Nano- Tubes: Nano structures of carbon (fullerene), Fabrication, Structure. Electrical, Mechanical and Vibrational properties and applications. Nano Diamond, Boron Nitride Nano-tubes, Single Electron Transistors, Molecular Machine, Nano-Biometrics, Nano Robots.

Text/Reference Books:

1. CP Poole Jr, FJ Owens, "Introduction to Nanotechnology".

Department of Electronics & Communication Engineering
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P.K. University, Shivpuri (M.P.)
II Year Semester-IV
UDATAEC402
DATA STRUCTURE & ALGORITHMS

(L-T-P-3-1-0)

UNIT I : Abstract Data Types, Sequences as value definitions, Data types in C, Pointers in C, Data Structures and C, Arrays in C, Array as ADT, One Dimensional Array, Implementing one Dimensional Array, Array as parameters, Two Dimensional Array, Structures in C, Implementing Structures, Unions in C, Implementation of unions, Structure Parameters, Allocation of storage and scope of variables, Recursive Definition and Processes: Factorial Function, Fibonacci Sequence, Recursion in C, efficiency of Recursion, Hashing: Hash Function, Open Hashing, Closed Hashing: Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

UNIT II : **Stack, Queue And Linked List:** Stack definition and examples, Primitive Operations, Example Representing Stacks in C, Push And Pop Operation Implementation, Queue as ADT, C Implementation of Queues, Insert Operation, Priority Queue, Array Implementation of Priority Queue, Inserting and Removing Nodes from a list-linked Implementation of stack, Queue and Priority Queue, Other List Structures, Circular Lists: Stack and Queue as Circular List -Primitive Operations on circular lists, Header Nodes, Doubly Linked Lists, Addition of Long Positive Integers on Circular and Doubly Linked List.

UNIT III : **Trees: Binary trees:** Operations on Binary Trees, Applications of Binary Trees, Binary Tree Representation, Node Representation of Binary Trees, Implicit Array Representation of Binary Tree, Binary Tree Traversal in C, Threaded Binary Tree, Representing List as Binary Tree, Finding the Kth element, Deleting an Element, Trees and their applications: C Representation of trees, Tree Traversals, Evaluating an Expression Tree, Constructing a Tree.

UNIT IV : **Sorting And Searching:** General Background of Sorting: Efficiency Considerations, Notations, Efficiency of Sorting, Exchange Sorts: Bubble Sort; Quick Sort; Selection Sort; Binary Tree Sort; Heap Sort, Heap as a Priority Queue, Sorting Using a Heap, Heap Sort Procedure, Insertion Sorts: Simple Insertion, Shell Sort, Address Calculation Sort, Merge Sort, Radix Sort, Sequential Search: Indexed Sequential Search, Binary Search, Interpolation Search.

UNIT V : **Graphs:** Application of Graph, C Representation of Graphs, Transitive Closure, Warshall's Algorithm, Shortest Path Algorithm, Linked Representation of Graphs, Dijkstra's Algorithm, Graph Traversal, Traversal Methods for Graphs, Spanning Forests, Undirected Graph and their Traversals, Depth First Traversal, Application of Depth First Traversal, Efficiency of Depth First Traversal, Breadth First Traversal, Minimum Spanning Tree, Kruskal's Algorithm, Round Robin Algorithm.

Text Book:

1. Aaron M. Tenenbaum, Yeedidyah Langsam, Moshe J. Augenstein, "Data structures using C and
   C++", Pearson Education.

2. Reema Theraja, "Data Structure using C", OUP Publication.

References Books:

1. E. Balagurusamy, "Programming in ANSI C', Second Edition, Tata McGraw Hill Publication.
2. Robert L. Kruse, Bruce P. Leung Clovis L. Tondo, "Data Structures and Program Design in C", Pearson Education.

Department of Electronics & Communication Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (M.P.)
II Year Semester-IV
UMICREC403
MICROPROCESSORS & MICROCONTROLLERS

(L-T-P-3-0-0)

UNIT I

8085 MICROPROCESSOR: History and Evolution of Microprocessor and their Classification, Architecture of 8085 Microprocessor, Address / Data Bus multiplexing and demultiplexing. Status and Control signal generation, Instruction set of 8085 Microprocessor, Classification of instructions, addressing modes, timing diagram of the instructions.

UNIT II
Hardware Interfacing with 8085: Methods of data Transfer and Interrupts of 8085

microprocessor: Classification of interrupts, Programming using interrupts, Direct Memory Access, Serial and parallel data transfer, Interfacing of Memory Chips with 8085 Microprocessor, Interfacing of 8085 with 8155/8156 (RAM), 8355/8755 (ROM). Interfacing of Programmable Devices with 8085 Microprocessor, 8279 programmable Keyboard/Display interface, 8255A programmable Parallel interface, 8254 programmable Interval Timer, 8259A programmable Interrupt Controller, Assembly language programming.

UNIT III
16-bit low power MCU MSP430: Introduction to microcontrollers and embedded systems, Von Neumann (Princeton) and Harvard architecture, RISC and CISC machine, Introduction to MSP430: Architecture, Programming Techniques, Addressing Modes, Programming System registers and configuration I/O ports pull up/down registers concepts, Low Power aspects of MSP430: low power modes, Active vs Standby current consumption.

UNIT IV
Configuring Peripherals in MSP430: External interrupts and software interrupt, interrupt programming, Watchdog timer, Clock Tree in MSP430, Timer/ counter interrupt, Programming MSP430 timer, counter programming, Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430, data transfer using DMA.

UNIT V
Serial Communication Interfaces in MSP430: Basics of serial communication, mode of serial communication, RS232, serial communication issue, Serial port programming. Implementing and programming UART, I2C, SPI interface using MSP430, Interfacing external devices, external memory, keyboards, display devices, DAC/ADC, DC Motor, Stepper Motor, Servomotor, power management, Sensor Interfacing and signal conditioning. Case Study: MSP430 based embedded system application using the interface protocols for communication with external devices: "A Low-Power Battery less Wireless Temperature and Humidity Sensor with Passive Low Frequency RFID.

Text Book:
1. Ramesh Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", Penram International Publication (India) Pvt. Ltd.

2. DV Hall, "Microprocessors Interfacing", Tata McGraw Hill Publication.
3. N. Senthil Kumar, M. Saravanan, S. Jeevananthan, "Microprocessors and Microcontrollers", Oxford University Press Publication.
4. Getting Started with the MSP430 Launchpad by Adrian Fernandez, Dung Dang, Newness publication ISBN-13: 978-0124115880

Department of Electronics & Communication Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (M.P.)
II Year Semester-IV
UELECEC404
ELECTROMAGNETIC FIELD THEORY

(L-T-P-3-1-0)

UNIT I

Coordinate Systems and Transformation :
Basics of Vectors: Addition, subtraction and multiplications; Cartesian, Cylindrical, Spherical transformation.
Vector calculus: Differential length, area and volume, line surface and volume integrals, Del operator, Gradient, Divergence of a vector, Divergence theorem, Curl of a vector, Stokes"s theorem, Laplacian of a scalar.

UNIT II
Electrostatic fields: Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gausses" Law- Maxwell"s equation, Electric dipole and flux line, Energy density in electrostatic fields, Electric field in material space: Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, Dielectric-constants, Continuity equation and relaxation time, boundary conditions, Electrostatic boundary value problems: Poisson"s and Laplace"s equations., Methods of Images.

UNIT III
Magneto statics : Magneto-static fields, Biot - Savart"s Law, Ampere"s circuit law, Maxwell"s equation, Application of ampere"s law, Magnetic flux density- Maxwell"s equation, Maxwell"s equation for static fields, magnetic scalar and vector potential.

UNIT IV
Magnetic forces: Materials and devices, Forces due to magnetic field, Magnetic torque and moment, a magnetic dipole. Magnetization in materials, Magnetic boundary conditions, Inductors and inductances, Magnetic energy.

UNIT V
Waves and Applications: Maxwell"s equation, Faraday"s Law, transformer and motional electromotive forces, Displacement current, Maxwell"s equation in final form
Electromagnetic wave propagation: Wave propagation in loss dielectrics, Plane waves in lossless dielectrics Plane wave in free space. Plain waves in good conductors, Power and the pointing vector, Reflection of a plain wave in a normal incidence. Transmission Lines and Smith Chart.

Text Book:

1. MNO Sadiku, "Elements of Electromagnetic", Oxford University Press.

Reference Books:

1. WH Hayt and JA Buck, "Engineering Electromagnetic", McGraw- Hill Education.

Department of Electronics & Communication Engineering
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II Year Semester-IV
UELECEC405
ELECTRONIC MEASUREMENT AND INSTRUMENTATION
(L-T-P-3-0-0)

UNIT-I
Unit, dimensions and standards: Scientific notations and metric prefixes. SI electrical units, SI temperature scales, Other unit systems, dimensions and standards.
Measurement Errors: Gross error, systematic error, absolute error and relative error, accuracy, precision, resolution and significant figures, Measurement error combination, basics of statistical analysis.

PMMC instrument, Galvanometer, DC ammeter, DC voltmeter, series ohm meter.

UNIT II
Transistor voltmeter circuits, AC electronic voltmeter, current measurement with electronic instruments, probes, Digital voltmeter systems, Digital multimeter, digital frequency meter System.

UNIT III
Voltmeter and ammeter methods, Wheatstone bridge, low resistance measurements, Low Resistance Measuring Instruments, AC bridge theory, capacitance bridges, Inductance bridges, Q meter.

UNIT IV
CRO: CRT, Wave Form Display, Time Base, Dual Trace Oscilloscope, measurement of voltage, frequency and phase by CRO, Oscilloscope probes, Delay time based Oscilloscopes, Sampling Oscilloscope, DSO, DSO applications.

UNIT V
Instrument calibration: Comparison method, digital multimeter as standard instrument, calibration instrument, Recorders: X-Y recorders, plotters Transducers.

Text Book:
1. David A. Bell, "Electronic Instrumentation and Measurements", Oxford University

   Press.

1. Oliver and Cage, "Electronic Measurements and Instrumentation", Tata McGraw Hill Publication.
2. Alan S. Morris, "Measurement and Instrumentation Principles", Elsevier (Buterworth Heinmann).

UUNIVEC406

(L-T-P-3-0-0)

<u>UNIVERSAL HUMAN VALUE & PROFF. ETHICS</u>

UNIT 1:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Understanding the need, basic guidelines, content and process for Value Education

2. Self Exploration–what is it? - its content and process; „Natural Acceptance" and Experiential

Validation- as the mechanism for self exploration

3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT 2:

Understanding Harmony in the Human Being - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient „I" and the material „Body"
8. Understanding the needs of Self („I") and „Body" - Sukh and Suvidha

9. Understanding the Body as an instrument of „I" (I being the doer, seer and enjoyer)

10. Understanding the characteristics and activities of „I" and harmony in „I"

11. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail

12. Programs to ensure Sanyam and Swasthya - Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 3:

Understanding Harmony in the Family and Society- Harmony in HumanHuman Relationship
13. Understanding Harmony in the family – the basic unit of human interaction

14. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship

15. Understanding the meaning of Vishwas; Difference between intention and competence

16. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship

17. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals

18. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family! - Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 4:

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence 19.Understanding the harmony in the Nature

20.Interconnectedness and mutual fulfillment among the four orders of naturerecyclability and self-regulation in nature

21.Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space

22.Holistic perception of harmony at all levels of existence - Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 5:

Implications of the above Holistic Understanding of Harmony on Professional Ethics

23.Natural acceptance of human values

24.Definitiveness of Ethical Human Conduct

25.Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

26.Competence in professional ethics:

a) Ability to utilize the professional competence for augmenting universal human order

b) Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems,

c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

27. Case studies of typical holistic technologies, management models and production systems

28.Strategy for transition from the present state to Universal Human Order:

 a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

 b) At the level of society: as mutually enriching institutions and organizations

Books and References:

1.R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

2. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow, Reprinted 2008.

3. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.

Department of Electronics & Communication Engineering
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P.K. University, Shivpuri (M.P.)
II Year Semester-IV

UDATAEC407
DATA STRUCTURE & ALGORITHMS LAB

(L-T-P-0-0-2)

1. Run time analysis of Fibonacci Series
2. Study and Application of various data Structure
3. Study and Implementation of Array Based Program
a. Searching (Linear Search, Binary Search)
b. Sorting (Bubble, Insertion, Selection, Quick, Merge etc)
c. Merging
4. Implementation of Link List
a. Creation of Singly link list, Doubly Linked list

b. Concatenation of Link list
c. Insertion and Deletion of node in link list
d. Splitting the link list into two link list
5. Implementation of STACK and QUEUE with the help of

a. Array
b. Link List
6. Implementation of Binary Tree, Binary Search Tree, Height Balance Tree
7. Write a program to simulate various traversing Technique
8. Representation and Implementation of Graph

a. Depth First Search
b. Breadth First Search
c. Prim`s Algorithm
d. Kruskal`s Algorithms
9. Implementation of Hash Table

Department of Electronics & Communication Engineering
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II Year Semester-IV

UMICREC408
MICROPROCESSORS & MICROCONTROLLERS LAB

(L-T-P-0-0-2)

1. To study 8085 microprocessor system.
2. i) Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.
ii) Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
iii) To perform multiplication and division of two 8 bit numbers using 8085.
3. Learn and understand how to configure MSP-EXP430G2 Launchpad digital I/O pins. Write a C program for configuration of GPIO ports for MSP430 (blinking LEDs, push buttons interface).
Exercises:
a) Modify the delay with which the LED blinks.
b) Modify the code to make the green LED blink.

c) Modify the code to make the green and red LEDs blink:
i. Together
ii. Alternately
d) Alter the code to turn the LED ON when the button is pressed and OFF when it is released.
e). Alter the code to make the green LED stay ON for around 1 second every time the button is pressed.
f). Alter the code to turn the red LED ON when the button is pressed and the green LED ON when the button is released.
4. Usage of Low Power Modes:

Configure the MSP-EXP430G2 Launchpad for Low Power Mode (LPM3) and measure current consumption both in active and low power modes. Use MSPEXP430FR5969 as hardware platform and measure active mode and standby mode current.
Exercises:
a) How many Low power modes are supported by the MSP430G2553 platform?
b) Measure the Active and Standby Current consumption in LPM3 mode for the same application using MSP430F5529 LaunchPad
5. Learn and understand GPIO based Interrupt programming. Write a C program and associated GPIO ISR using interrupt programming technique.

Exercises:
a) Write the code to enable a Timer interrupt for the pin P1.1.
b) Write the code to turn on interrupts globally
6. Implement Pulse Width Modulation to control the brightness of the on-board, green LED. This experiment will help you to learn and understand the configuration of PWM and Timer peripherals of the MSP430G2553.

Exercises:
a) Observe the PWM waveform on a particular pin using CRO.
b) What is the maximum resolution of PWM circuitry in MSP430G2 Launchpad?
c) Change the above code to create a PWM signal of 75% duty cycle on particular PWM pin.
7. The main objective of this experiment is to control the on-board, red LED by the analog input from a potentiometer. This experiment will help you to learn and understand how to configure an ADC to interface with a potentiometer.

Exercises:
a) Alter the threshold to 75% of Vcc for the LED to turn on.
b) Modify the code to change the Reference Voltage from Vcc to 2.5V.
8. Learn and understand how to configure the PWM and ADC modules of the MSP-EXP430G2 Launchpad to control the DC motor using external analog input.

Exercises:
a) What is the maximum resolution of PWM circuitry in MSP430G2 LaunchPad and how it can be achieved using program?
b) Create a PWM signal of 75% duty cycle on particular PWM pin.
c) Create Switch case code from the example code to run the DC Motor in 3 set of speeds.
9. Understand the ULP Advisor capabilities and usage of ULP Advisor to create optimized, power-efficient applications on the MSP-EXP430G2 Launchpad.

Exercises:
a) How does the ULP Advisor software help in designing power-optimized code?
b) Which ULP rule violation helps us to detect a loop counting violation?
c) Connect the MSP430 to terminal on PC and echo back the data
10. Configure of Universal Serial Communication Interface (USCI) module of MSP430G2553 for UART based serial communication. The main objective of this experiment is to use UART of the MSP430G2553 to communicate with the computer.

Exercise:
Modify the above code to transmit the set of strings to the serial terminal via UART as shown below:
char str1[]="MSP430G2 launchpad"
char str2[]= "Ultra low power mixed signal processing applications"
11. Understand and Configure 2 MSP430F5529 Launchpads in master-slave communication mode for SPI protocol.

Exercises:
a) Which port pins of MSP430 can be configured for SPI communication?
b) What is the data transfer rate supported by MSP430 for SPI communication?

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UELECEC409
ELECTRONIC MEASUREMENT AND INSTRUMENTATION LAB
(L-T-P-0-0-2)

1. Study of semiconductor diode voltmeter and its use as DC average responding AC voltmeter.

2. Study of L.C.R. Bridge and determination of the value of the given components.

3. Study of distortion factor meter and determination of the % distortion of the given scillator.

4. Study of the transistor tester and determination of the parameters of the given transistors.

5. Study of the following transducer (i) PT-100 transducer (ii) J- type transducer (iii) K-type transducer (iv) Pressure transducer

6. Measurement of phase difference and frequency using CRO (Lissajous Figure)

7. Measurement of low resistance Kelvin's double bridge.

8. To measure unknown capacitance of small capacitors by using Schering's bridge.

9. To measure unknown Inductance using Hay's bridge.

10. To measure unknown frequency using Wein's frequency bridge.

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II Year Semester-IV
UADVAEC410

(L-T-P-0-0-2)

ADVANCED ELECTRONICS SYSTEM LAB

Transistor Modeling and Circuits

- Metal Oxide Semiconductor Field Effect Transistors (MOSFETs)

*DC biasing of Common Source

*MOSFET Common Source Amplifier

*MOSFET Source Follower

*Current Mirror

- SPICE parameters for MOSFET transistors.

- Step-Down (Buck) DC-DC Converters.

- Step-Up (Boost) DC-DC Converter

- CMOS Amplifier design.

Timing

-MOSFET based Ring oscillators

-MOSFET based Relaxation oscillators

- MOSFET based Voltage-controlled oscillators

- Integration of crystal oscillator into circuits

Data Conversion

- Analog to Digital Conversion

* Successive Approximation ADC

- Digital to Analog Conversion

* Scaled Resistor Network

System Considerations

- System-level stability: decoupling, ground loops

- Basics of EMC and screening

- Examples of complete electronic systems