Faculty of Engineering and Technology
P. K. University
Shivpuri (MP)

Department of Computer Science Engineering & IT

Evaluation Scheme & Syllabus for

B.Tech. Second Year

(III & IV Semester)

(Effective from session 2025-26)

EVALUATION SCHEME

STUDY AND EVALUATION SCHEME FOR B.TECH. COMPUTER SCIENCE & ENGG.													
YEAR 2nd /SEMESTER-3rd													
SUBJECT CODE	SUBJECTS NAME	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal &External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
UENGICO301	ENGINEERING MATHEMATICS-III	3	1	0	4	30	-	30	70	-	70	100
UDIGICO302	DIGITAL LOGIC DESIGN	3	0	0	3	30	-	30	70	-	70	100
UDATACO303	DATA STRUCTURES	3	0	0	3	30	-	30	70	-	70	100
UDISCCO304	DISCRETE STRUCTURES & THEORY OF LOGIC	3	0	0	3	30	-	30	70	-	70	100
UCOMPCO305	COMPUTER ORGANIZATION AND ARCHITECTURE	3	1	0	4	30	-	30	70	-	70	100
UENVICO306	ENVIRONMENT & ECOLOGY	3	0	0	3	30	-	30	70	-	70	100
UDIGICO307	DIGITAL LOGIC DESIGN LAB	0	0	2	1	-	25	25	-	25	25	50
UDATACO308	DATA STRUCTURES LAB	0	0	2	1	-	25	25	-	25	25	50
UDISCCO309	DISCRETE STRUCTURES & THEORY OF LOGIC LAB	0	0	2	1	-	25	25	-	25	25	50
UCOMPCO310	COMPUTER ORGANIZATION AND ARCHITECTURE LAB	0	0	2	1	-	25	25	-	25	25	50
Total		18	2	8	24	180	100	280	420	100	520	800

STUDY AND EVALUATION SCHEME FOR B.TECH. COMPUTER SCIENCE & ENGG.

YEAR 2nd /SEMESTER-4th

SUBJECT CODE	SUBJECTS NAME	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal &External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
UNANOCO401	NANO SCIENCE	3	0	0	3	30	-	30	70	-	70	100
UINTRCO402	INTRODUCTION TO MICROPROCESSOR	3	1	0	4	30	-	30	70	-	70	100
UOPERCO403	OPERATING SYSTEM	3	0	0	3	30	-	30	70	-	70	100
USOFTCO404	SOFTWARE ENGINEERING	3	1	0	4	30	-	30	70	-	70	100
UTHEOCO405	THEORY OF AUTOMATA AND FORMAL LANGUAGES	3	1	0	4	30	-	30	70	-	70	100
UUNIVCO406	UNIVERSAL HUMAN VALUE & PROFESSIONAL ETHICS	3	0	0	3	30	-	30	70	-	70	100
UOPERCO407	OPERATING SYSTEM LAB	0	0	2	1	-	25	25	-	25	25	50
USOFTCO408	SOFTWARE ENGINEERING LAB	0	0	2	1	-	25	25	-	25	25	50
UINTRCO409	INTRODUCTION TO MICROPROCESSOR LAB	0	0	2	1	-	25	25	-	25	25	50
Total		18	3	6	24	180	75	255	420	75	495	750

Department of Computer Science Engineering & IT
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P.K. University, Shivpuri (MP)
II YEAR III SEMESTER
UENGICO301: ENGINEERING MATHS–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. R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House..
2. Jain, Iyenger Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi
3. J.N. Kanpur, Mathematical Statistics, S. Chand & company Ltd.

Department of Computer Science Engineering & IT
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II YEAR III SEMESTER
UDIGICO302: DIGITAL LOGIC DESIGN

L	T	P
3	0	0

Unit-I

Digital Design and Binary Numbers:

Binary Arithmetic, Negative Numbers and their Arithmetic, Floating point representation, Binary Codes, Cyclic

Codes, Error Detecting and Correcting Codes, Hamming Codes.

Minterm and Maxterm Realization of Boolean Functions, Gate-level minimization: The map method up to four variable, don't care conditions, SOP and POS simplification, NAND and NOR implementation, Quine Mc- Cluskey Method (Tabular method).

Unit-II

Combinational Logic:

Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Code Converters, Parity Generators and Checkers, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Hazards and Threshold Logic

Unit-III

Memory and Programmable Logic Devices:

Semiconductor Memories, RAM, ROM, PLA, PAL, Memory System design.

Unit-IV

Synchronous Sequential Logic:

Sequential Circuits, Storage Elements: Latches, Flip Flops, Analysis of Clocked Sequential circuits, state reduction and assignments, design procedure.

Registers and Counters: Shift Registers, Ripple Counter, Synchronous Counter, Other Counters.

Unit-V

Asynchronous Sequential Logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race free state assignment, hazards.

References:

1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education. 2.A.K .Singh, "Foundation of Digital Electronics and Logic design",New Age international. 3.M. Rafiquzzaman, "Fundamentals of Digital Logic and Microcomputer Design", Wiley Dreantech Publication.

4.ZVI Kohavi, "Switching and Finite Automata theory" ,Tata McGraw-Hill. 5.C.H Roth,Jr., "Fundamentals of Logic Design", ,Jaico Publishing. 6. Rajaraman & Radhakrishnan, "Digital Logic and Computer Organization",PHI Learning Private Limited,

Delhi India.

7. Donald D. Givone, "Digital Principles and Design", Tata MCGraw Hill. 8. Marcovitz:Introduction to logic Design ,Tata Mcgraw-hill Education (India) Pvt. Ltd.

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II YEAR III SEMESTER
UDATACO303 : DATA STRUCTURES

L	T	P
3	0	0

UNIT I
Introduction: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off.
Abstract Data Types (ADT), Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Application of arrays, Sparse Matrices and their representations.
Linked lists: Array Implementation and Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition, Generalized Linked List.

UNIT II
Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Recursion, Tower of Hanoi Problem, Simulating Recursion, Principles of recursion, Tail recursion, Removal of recursion Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Desuetude and Priority Queue.

UNIT III
Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, Complete Binary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked Representation of Binary trees, Tree Traversal algorithms: In order, Preorder and Post order, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.

UNIT IV
Graphs: Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal : Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm, Introduction to Activity Networks.

UNIT V
Searching: Sequential search, Binary Search, Comparison and Analysis Internal Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Radix Sort, Practical consideration for Internal Sorting.
Search Trees: Binary Search Trees (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, AVL trees, Introduction to m-way Search Trees, B Trees & B+ Trees . Hashing: Hash Function, Collision Resolution Strategies.
Storage Management: Garbage Collection and Compaction.

References:

1. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein, “Data Structures Using C and C++”, PHI Learning Private Limited, Delhi India
2. Horowitz and Sahani, “Fundamentals of Data Structures”, Galgotia Publications Pvt Ltd Delhi India.
3. AK Sharma, “Data Structure Using C”, Pearson Education India.
4. Rajesh K. Shukla, “Data Structure Using C and C++” Wiley DreamtechPublication.
5. Michael T. Good rich,Roberto Tamassia,David M. Mount “Data Structures and Algorithms in C++”, Wiley India.
6. P. S. Deshpandey, “C and Data structure”, Wiley Dream tech Publication.
7. R. Kruse etal, “Data Structures and Program Design in C”, Pearson Education
8. Berztiss, AT: Data structures, Theory and Practice, Academic Press.
9. Jean Paul Trembley and Paul G. Sorenson, “An Introduction to Data Structures with applications”, McGraw Hill.
10. Adam Drozdek “Data Structures and Algorithm in Java”, Cengage Learning

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II YEAR III SEMESTER
UDISCCO304 : DISCRETE STRUCTURES & THEORY OF LOGIC

L	T	P
3	0	0

UNIT I

Set Theory: Introduction, Combination of sets, Multi sets, ordered pairs, Set Identities.
Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Order of relations.
Functions: Definition, Classification of functions, Operations on functions, Recursively defined functions.
Natural Numbers: Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases.

UNIT II

Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphism‟s, Definition and elementary properties of Rings and Fields, Integers Modulo n.

UNIT III

Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram.
Lattices: Definition, Properties of lattices –Bounded, Complemented, Modular and Complete Lattice, Morphisms oflattices.
Boolean Algebra:Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra. Combinational and sequential Circuits.

UNIT IV

Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference, Natural Deduction. Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

UNIT V

Trees: Definition, Binary tree, Binary tree traversal, Binary search tree.
Graphs: Definition and terminology, Representation of graphs, Multi graphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring.
Recurrence Relation & Generating function: Recursive definition of functions, Recursive algorithms, Method of solving recurrences.
Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle

References:

1. Liu and Mohapatra, “Elements of Discrete Mathematics”, McGrawHill
2. Jean Paul Trembley, R Manohar, “Discrete Mathematical Structures with Application to Computer Science”, McGraw-Hill
3. YN Singh, “Discrete Mathematical Structures”, Wiley India, New Delhi, First Edition, August2010.
4. RP Grimaldi, Discrete and Combinatorial Mathematics, Addison Wesley,

Department of Computer Science Engineering & IT
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II YEAR III SEMESTER
UCOMPCO305: COMPUTER ORGANIZATION AND ARCHITECTURE

L	T	P
3	1	0

UNIT I
Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register bus and memory transfer, Processor organization, general register organization, stack organization and addressing modes, Look ahead carry adders. Multiplication: Signed operand multiplication, Booths algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation, Arithmetic & logic unit design.

UNIT II
Instruction types, formats, instruction cycles and sub cycles (fetch, execute etc), micro-
operations, execution of a complete instruction, Hardwire and micro-programmed control: micro-programmed sequencing, concept of horizontal and vertical microprogramming.

UNIT III
Basic concept and hierarchy, semiconductor R AM memories, 2D &21 memory organization.ROM memories,Cache memories: concept and design issues & performance, address mapping and replacement, Auxiliary memories: magnetic disk, magnetic tape and optical disks, Virtual memory: concept implementation.

UNIT IV
Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions, Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors, Serial Communication: Synchronous & asynchronous communication, standard communication interfaces.

UNIT V
Architectural Classification Schemes, Flynn‟s & Feng‟s Classification, Performance Metrics and Measures, Speedup Performance Laws, Pipelining and Memory Hierarchy Basic and Intermediate Concepts, Linear and Nonlinear Pipeline Processors, Optimization of Cache Performance.

Reference Books:

1. Patterson, “Computer Organization and Design” Elsevier Pub.2009
2. William Stalling, “Computer Organization”,PHI
3. M. Morris Mano, “Computer System Architecture”, PearsonLearning
4. Miles Murdocca, Vincent Heuring “Computer Architecture and Organisation: An Integrated Approch” 2**nd Edition**
5. Kai Hwang, “Advance Computer Architecture”,TMH
6. **Vravice, Hamacher**&Zaky, “Computer Organization”,TMH
7. John P Hays, “Computer Organization”, McGraw Hill
8. Tannenbaum, “Structured Computer Organization”,PHI
9. P Pal Chaudhry, “Computer Organization & Design”PHI

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II YEAR III SEMESTER
UENVICO306 : ENVIRONMENT & ECOLOGY

L	T	P
3	0	0

UNIT.1

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, initiativesby 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

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II YEAR III SEMESTER

UDIGICO307 DIGITAL LOGIC DESIGN LAB

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Objective: To understand the digital logic and create various systems by using these logics.

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/De-multiplexer and Encoder using logic gates.
5. Implementation of 4x1 multiplexer using logic gates.
6. Implementation of 4-bit parallel adder using 7483 IC.
7. Design, and verify the 4-bit synchronous counter.
8. Design, and verify the 4-bit asynchronous counter.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

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II YEAR III SEMESTER
UDATACO308: DATA STRUCTURE (USING C/C++/ JAVA) LAB

L	T	P
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Program in C or C++ for following:

1. To implement addition and multiplication of two 2Darrays.
2. To transpose a 2Darray.
3. To implement stack using array.
4. To implement queue using array.
5. To implement circular queue using array.
6. To implement stack using linked list.
7. To implement queue using linked list.
8. To implement circular queue using linked list.
9. To implement binary tree using linked list.
10. To implement binary search tree using linked list.
11. To implement tree traversals using linked list.
12. To implement BFS using linked list.
13. To implement DFS using linked list.
14. To implement Linear Search.
15. To implement Binary Search.
16. To implement Bubble Sorting.
17. To implement Selection Sorting.
18. To implement Insertion Sorting.
19. To implement Merge Sorting.
20. To implement Heap Sorting

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II YEAR III SEMESTER
UDISCCO309: DISCRETE STRUCTURE & LOGIC LAB

L	T	P
0	0	2

Understanding of mathematical computation software such as Mapple, Prolog to experiment the followings:

1. Working of Computation software
2. Discover a closed formula for a given recursive sequence vice-versa
3. Recursion and Induction: Practice of proof techniques
4. Practice of various set operations
5. Testing of set operating using software
6. Counting
7. Combinatorial equivalence
8. Permutations and combinations
9. Difference between structures, permutations and sets
10. Implementation of a recursive counting technique
11. N digit binary sequences not h**aving adjacent1"s**
12. Probability simulation
13. The Birth day problem
14. Poker Hands problem
15. Baseball best-of-5 series: Experimental probabilities
16. Comparison of theoretical probability with experimental probability
17. Baseball: Binomial Probability
18. Basketball: One and one
19. Expected value problem
20. Binary relations

Department of Computer Science Engineering & IT
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II YEAR III SEMESTER
UCOMPCO310: COMPUTER ORGANIZATION LAB

L	T	P
0	0	2

1. **Implementing HALF ADDER, FULL ADDER using basic logic gates**
2. **Implementing Binary -to -Gray, Gray -to -Binary code conversions.**
3. **Implementing 3-8 line DECODER and Implementing 4x1 and 8x1 MULTIPLEXERS.**
4. **Verify the excitation tables of various FLIP-FLOPS.**
5. **Design of an 8-bit Input/ Output system with four 8-bit Internal Registers.**
6. **Design of an 8-bit ARITHMETIC LOGIC UNIT.**
7. **Design the data path of a computer from its register transfer language description.**
8. **Design the control unit of a computer using either hardwiring or microprogramming based on its register transfer language description.**
9. **Write an algorithm and program to perform matrix multiplication of two n * n matrices on the 2-D mesh SIMD model, Hypercube SIMD Model or multiprocessor system.**

Study of Scalability for Single board Multi-board, multi-core, multiprocessor using Simulator

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II YEAR IV SEMESTER
UNANOCO401: 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 nano particles, Optical Properties, Photo fragmentation, Columbic Explosion. Rare Gas & Molecular clusters; Inert gas clusters;
Super fluid clusters; Molecular clusters.

UNIT III

Growth Techniques of Nanomaterials: Litho and Non litho grapahic 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 Vibration 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 Computer Science Engineering & IT
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II YEAR IV SEMESTER
UINTRCO402: INTRODUCTION TO MICROPROCESSOR

L	T	P
3	1	0

UNIT I
Introduction to Microprocessor, Microprocessor architecture and its operations, Memory,
Input & output devices, Logic devices for interfacing, The 8085 MPU, Example of an 8085 based computer, Memory interfacing.

UNIT II
Basic interfacing concepts, Interfacing output displays, Interfacing input devices, Memory mapped I/O, Flow chart symbols, Data Transfer operations, Arithmetic operations, Logic Operations, Branch operation, Writing assembly language programs, Programming techniques: looping, counting and indexing.

UNIT III
Additional data transfer and 16 bit arithmetic instruction, Arithmetic operations related to memory, Logic operation: rotate, compare, counter and time delays, Illustrative program: Hexadecimal counter, zero-to-nine, (module ten) counter, generating pulse waveforms, debugging counter and time delay, Stack, Subroutine, Restart, Conditional call and return instructions, Advance subroutine concepts, The 8085 Interrupts, 8085 vector interrupts.

UNIT IV
Program: BCD-to-Binary conversion, Binary-to-BCD conversion, BCD-to-Seven segment code converter, Binary-to-ASCII and ASCII-to-Binary code conversion, BCD Addition, BCD Subtraction, Introduction to Advance instructions and Application, Multiplication, Subtraction withcarry.

UNIT V
8255 Programmable peripheral interface, interfacing keyboard and seven segment display, 8254 (8253) programmable interval timer, 8259A programmable interrupt controller, Direct Memory Access and 8237 DMA controller.
Introduction to 8086 microprocessor: Architecture of 8086 (Pin diagram, Functional block diagram, Register organization).

References:

1. Ramesh Gaonkar, “Microprocessor Architecture, Programming, and Applications with the 8085”, 5th Edition, Penram International Publication (India) Pvt.Ltd.
2. Douglas V. Hall, “Microprocessors and Interfacing”, Tata McGraw Hill.
3. Yu-cheng Liu, Glenn A. Gibson, “Microcomputer Systems: The 8086 / 8088 Family -Architecture, Programming and Design”, Second Edition, Prentice Hall ofIndia.
4. Barry B. Brey, “The Intel Microprocessors, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium IV, Architecture, Programming & Interfacing”, Eighth Edition, Pearson Prentice Hall, 2009.
5. Peter Abel, “IBM PC Assembly language and programming”, Fifth Edition, Prentice

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II YEAR IV SEMESTER
UOPERCO403: OPERATING SYSTEMS

L	T	P
3	0	0

UNIT I
Introduction : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Re-entrant Kernels, Monolithic and Microkernel Systems.

UNIT II
Concurrent Processes: Process Concept, Principle of Concurrency, Producer/ Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker‟s solution, Peterson‟s solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.

UNIT III
CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

UNIT IV
Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

UNIT V
I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.

References:

1. Silberschatz, Galvin and Gagne, “Operating Systems Concepts”,Wiley
2. Andrew S. Tanenbaum, “Modern Operating System”, PHILearning
3. Tanenbaum /Woodhaull “Operating System Design and Implementation”, Pearson Publication.
4. Harvey M Dietel, “ An Introduction to Operating System”, PearsonEducation
5. Flynn, “Understanding Operating System” ,Cengage.
6. D M Dhamdhere, “Operating Systems : A Concept basedApproach”, McGrawHill.
7. Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw Hill Education”.
8. Stuart E. Madnick& John J. Donovan.OperatingSystems.McGraw Hill.
9. A. K. Sharma, “Operating System”, UniversityPress.
10. Achyut S Godbole, Atulkahate , “Operating System”, McGrawHill

Department of Computer Science Engineering & IT
(Faculty of Engineering and Technology)
P.K. University, Shivpuri (MP)
II YEAR IV SEMESTER
USOFTCO404: SOFTWARE ENGINEERING

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UNIT I
Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

UNIT II
Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modelling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards forSRS.
Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

UNIT III
Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various **Size Oriented Measures: Halestead‟s Software Science, Function Point (FP) Based Measures,** Cyclamate Complexity Measures: Control Flow Graphs.

UNIT IV
Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing ofProducts.
Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

UNIT V
Software Maintenance and Software Project Management: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Mo**dels (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.**

References:

1. RS Pressman, Software Engineering: A Practitioners Approach, McGrawHill.
2. Pankaj Jalote, Software Engineering, Wiley
3. Rajib Mall, Fundamentals of Software Engineering, PHIPublication.
4. KK Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
5. Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
6. Ian Sommerville, Software Engineering, AddisonWesley.
7. Kassem Saleh, “Software Engineering”, CengageLearning.
8. P fleeger, Software Engineering, Macmillan Publication

Department of Computer Science Engineering & IT
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P.K. University, Shivpuri (MP)
II YEAR IV SEMESTER
UTHEOCO405 : THEORY OF AUTOMATA AND FORMAL LANGUAGES

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UNIT I
Introduction; Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem

UNIT II
Regular expression (RE), Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen‟s Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages . Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation ofFA.

UNIT III
Context free grammar (CFG) and Context Free Languages (CFL): Definition, Examples, Derivation, Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure proper ties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs.

UNIT IV
Push Down Automata (PDA):Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA.

UNIT V
Turing machines (TM): Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computerof **Integer functions, Universal TM, Church‟s Thesis, Recursive and recursively enumerable** languages, Halting problem, Introduction to Undecidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory.

References:

1. Hopcroft, Ullman, “Introduction to Automata Theory, Languages and Computation”, **PearsonEducation.**
2. KLP Mishra and N. Chandrasekaran, “Theory of Computer Science: Automata, **Language**s and Computation”, PHI Learning Private Limited, DelhiIndia.
3. **Peter Linz, "An Introduction to Formal Language and Automata", Narosa Publishing house.**
4. YN Singh “Mathematical Foundation of Computer Science”, New Age **International.**
5. **Malviya, AK "Theory of Computation and Application", B Paperback Publications**
6. Papadimitrou, C. and Lewis, CL, “Elements of the Theory of Computation”, Pearson **Publication.**

Department of Computer Science Engineering & IT
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P.K. University, Shivpuri (MP)
II YEAR IV SEMESTER
UUNIVCO406: Universal Human Values and Professional Ethics

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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 fulfilment 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 Human-Human 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 fulfilment 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 nature- recyclability 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 eco-friendly 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.

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II YEAR IV SEMESTER
UOPERCO407 : OPERATING SYSTEMS LAB

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1. To implement CPU Scheduling Algorithms

- **FCFS**
- **SJF**
- **SRTF**
- **PRIORITY**
- **ROUNDROBIN**

2. Simulate all Page Replacement Algorithms

- **FIFO**
- **LRU**

3. Simulate Paging Technique of Memory Management

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

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II YEAR IV SEMESTER

USOFTCO408 : SOFTWARE ENGINEERING LAB

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For any given case/ problem statement do the following;

1. **Prepare a SRS document in line with the IEEE recommended standards.**
2. **Draw the use case diagram and specify the role of each of the actors. Also state the precondition, post condition and function of each use case.**
3. **Draw the activity diagram.**
4. **Identify the classes. Classify them as weak and strong classes and draw the class diagram.**
5. **Draw the sequence diagram for any two scenarios.**
6. **Draw the collaboration diagram.**
7. **Draw the state chart diagram.**
8. **Draw the component diagram.**
9. **Perform forward engineering in java. (Model to code conversion)**
10. **Perform reverse engineering in java. (Code to Model conversion)**
11. **Draw the deployment diagram.**

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II YEAR IV SEMESTER

UINTRCO409 : INTRODUCTION TO MICROPROCESSOR LAB

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1. Tutorials on 8085 Programming.
2. Interfacing and programming of 8255. (E.g. traffic light controller).
3. Interfacing and programming of 8254.
4. Interfacing and programming of 8279.
5. A/D and D/A converter interface.
6. Stepper motor interface.

Display interface