**MA301: ENGINEERING MATHEMATICS –III**

**Credits:04**

**L-T-P: 3-1-0**

**UNIT I**

*Partial Differential Equations:*

Basic concepts, formation of partial differential equations, equation solvable by direct integration, linear and non-linear equations of first order. Homogenous linear equations with constant coefficients, solutions of heat equations, wave equations, transmission line equations and Laplace equations.

**UNIT II**

*Tensor Analysis:*

Curvilinear coordinates, unit vectors in curvilinear system, representation of a vector in terms of unit base vectors, contravariant and covariant components of F, arc length and volume element in orthogonal curvilinear coordinates. Transformations of coordinates.Definition of tensors, fundamental operations with tensors, Symmetric and skew-Symmetric tensors, Riemannian space and metric tensor, Conjugate tensor, Christoffel symbols.

**UNIT III**

*Calculus of Complex Variables*:

Analytic functions, C-R equations, conjugate functions, Harmonic functions, orthogonal systems.

Formation of analytic functions, conformal mapping, integration of a complex functions, Cauchy’s Integral Theorem, power series representation of complex functions, Laurent’s Series, singularities, Residue Theorem.

**UNIT IV**

*Transformations:*

Laplace transformation of elementary functions, inverse Laplace transform, Linearity, Laplace transform of derivatives and integrals, shifting Theorems, Laplace transform of unit step function, Dirac-delta function, Differentiation and integration of transforms, convolution, Application to differential equations.

Definition, properties, Z-transform of some basic sequences, Z-transforms of some basic discrete functions, Shifting theorems.

**Text Books / References**:

1. B.S. Grewal: **Higher Engg. Mathematics**, Khanna Publishers
2. Gilbert Strang: **Linear Algebra and applications**, Thomson Books
3. P.L. Meyer: **Introduction to Probability & Statistics**
4. Shanti Narayan: **Functions of Complex Variables**, S. Chand & Co.
5. Murray R. Spiegel: **Laplace Transforms**, Thomson Books
6. I.M. Snedon: **Elements of Partial Differential Equations**, S. Chand & Co.

**MA-302: DISCRETE MATHEMATICS**

 **Credits: 04**

**L- T- P: 3- 1 -0**

**Unit-I**

*Set Theory*:

Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some general identities on sets.

Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation, Order of relations.

Functions: Definition, Classification of functions, Operations on functions, Recursively defined functions. Growth of Functions.

**Unit-II**

*Algebraic Structures*:

Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, 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.

Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Simplification of Boolean Functions, Karnaugh maps, Logic gates, and Boolean algebra.

**Unit-IV**

*Propositional Logic*:

Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference.

Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

**Unit-V**

*Graphs:*

 Trees and Tree’s Properties

 Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths.

**Text Books/References:**

1. Koshy, **Discrete Structures**, Elsevier Pub. 2008

2. Kenneth H. Rosen, **Discrete Mathematics and Its Applications**, 6/e, McGraw-Hill,

 2006.

 3. B. Kolman, R.C. Busby, and S.C. Ross, **Discrete Mathematical Structures**, 5/e,

 Prentice Hall, 2004.

 4. E.R. Scheinerman, Mathematics: **A Discrete Introduction**, Brooks/Cole, 2000.

5. R.P. Grimaldi, **Discrete and Combinatorial Mathematics**, 5/e, Addison Wesley, 2004.

6**.** Jean Paul Trembley, R Manohar, **Discrete** **Mathematical Structures with**

 **Application to Computer Science**, McGraw-Hill, Inc. New York, NY, 1975.

**IT301: COMPUTER ORGANIZATION & ARCHITECTURE**

**Credits: 03**

**L-T-P: 3-0-0**

**Unit-I**

*Basic Structure Of Computers***:**

Computer Types, Functional unit, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation, Fixed Point Representation. Floating – Point Representation, Error Detection codes.

**Unit-II**

*Register Transfer Language And Micro-operations***:**

Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro-operations, logic micro operations, shift micro operations, Arithmetic logic shift unit, Instruction codes. Computer Registers Computer instructions– Instruction cycle.

**Unit-III**

*Memory*–

Reference Instructions.Input – Output and Interrupt. STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

**Unit-IV**

*Micro Programmed Control* **:**

Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Micro-programmed control

**Unit-V**

*Computer Arithmetic* **:**

Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit Decimal Arithmetic operations.

**Unit-VI**

*The Memory System* **:**

Basic concepts semiconductor RAM memories. Read-only memories Cache memories performance considerations, Virtual memories secondary storage.Introduction to RAID.

**Unit-VII**

*Input-Output Organization* **:**

Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input –Output Processor (IOP), Serial communication; Introduction to peripheral component, Interconnect (PCI) bus. Introduction to standard serial communication protocols like RS232, USB, and IEEE1394.

**Unit-VIII**

*Pipeline And Vector Processing***:**

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

**Unit-IX**

*Multi Processors* **:**

Characteristics or Multiprocessors, Interconnection Structures, Interprocessor Arbitration. InterProcessor Communication and Synchronization Cache Coherance.Shared Memory Multiprocessors.

**TEXT BOOKS/ REFERENCES :**

1.**Computer Systems Architecture** – M.Moris Mano, IIIrd Edition, Pearson/PHI

2. **Computer Organization** – Car Hamacher, ZvonksVranesic, SafeaZaky, Vth Edition, McGraw Hill.

3. **Computer Organization and Architecture** – William Stallings Sixth Edition, Pearson/PHI

4. **Structured Computer Organization** – Andrew S. Tanenbaum, 4th Edition PHI/Pearson

5. **Fundamentals or Computer Organization and Design**, - SivaraamaDandamudi Springer Int. Edition.

6. **Computer Organization**, G. V. Anjaneyulu, Himalaya Pub house

**IT-302: Data Communication**

**Credits: 03**

**L-T-P: 3-0-0**

**Unit I:**

 A communication model, ISO-OSI reference model, Design philosophy, Layer, Protocol, Interface, and Service concepts, Node-to-node communication, Host-to-host communication, Layer-wise functionality, TCP/IP reference model, Comparison between TCP/IP and ISO-OSI reference model, Addressing

**Unit II:**

Analog signal, Digital signal, Bit rate, Baud rate, Bandwidth, Baseband Transmission, Broadband Transmission, Parallel Transmission, Serial Transmission-Asynchronous and Synchronous transmission, Transmission Media: Guided (twisted pair, coaxial, fiber optic) and unguided media, Transmission Impairments

**Unit III:**

Basics of Digital Communications: Signals, Noise, Data rate limits-Nyquist rate, Shannon capacity, Line Coding, Block Coding, Scrambling, PCM, ADPCM, DM

Basics of Analog Communications: Amplitude, Phase and Frequency Shift Keying; Amplitude, Phase and Frequency Modulation-QPSK,QAM

**Unit IV:**

Network topology: Mesh, Star, Ring, Bus, Hybrid; Multiplexing: FDM, TDM-Synchronous TDM, Statistical TDM, WDM,OFDM; Spread Spectrum: FHSS, DSSS; CDMA; Hubs, Bridges and Switches-types, differences; Modems; Types of Networks: LAN, MAN, WAN; Local Area Networks: Ethernet, Fast Ethernet, Introduction to Gigabit Ethernet; Circuit, Message and Packet switching; Virtual Circuit Network; A brief idea on X.25, Frame Relay, ATM; Communication Satellite: LEO, MEO and GEO satellite;

**Unit V:**

Data link layer: Design Issues: Services provided to the higher layer, Framing, Flow Control Techniques; Error Control: Error Detecting Codes-Parity, CRC, Error Correcting Codes-Hamming Code, Hamming Distance; Elementary data link protocols and their performance: Simple Stop-and-Wait protocol, Sliding Window protocols-One bit Sliding Window, Go Back n, Selective Repeat; Examples: HDLC, PPP.

**Text Books/References:**

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| 1. W. Stallings, **Data and Computer Communications**, 8th Ed, Pearson India, 2007.2. B. Forouzan, **Data Communications and Networking**, 4th Ed, Tata Mcgraw Hill, 2006. |
| 3. A. S. Tanenbaum, **Computer Networks**, 4th Ed, Pearson India, 2003.4. J. Quinn, **Digital Data Communications**, 1st Ed, Prentice Hall Career and Technology, 1995.5. P. C. Gupta, **Data Communications and Computer Networks**, 2nd Ed, Prentice Hall of  India, 2009.6. F. Halsall, **Data Communications, Computer Networks and Open Systems**, 4th Ed,  Addison Wesley, 1996. |

**IT-303: Digital Logic Design**

**Credits: 03**

**L-T-P: 3-0-0**

**Unit-I**

Digital system and binary numbers: : Signed binary numbers, binary codes, cyclic codes, error detecting and correcting codes, hamming codes.

Floating point representation

Gate-level minimization: The map method up to five variable, don’t care conditions, POS simplification, NAND and NOR implementation, QuineMc-Clusky method (Tabular method).

**Unit-II**

Combinational Logic: Combinational circuits, analysis procedure, design procedure, binary adder-subtractor, decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers

**Unit-III**

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-IV**

Memory and programmable logic: RAM, ROM, PLA, PAL.

Design at the register transfer level: ASMs, design example, design with multiplexers.

**Unit-V**

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

**Text Books/References**:

1. *M. Morris Mano and M. D. Ciletti,* **Digital Design***, 4th Edition, Pearson Education*
2. R. H. Katz and G. Boriello, **Contemporary Logic Design**, 2/e, Prentice Hall of India, 2009.
3. A. P. Malvino, D. P. Leach and G.Saha, **Digital Principles and Applications**, 7/e, McGraw Hill, 2010.
4. Z. Kohavi and N. Jha, **Switching and Finite Automata Theory**, 3/e, Cambridge University Press, 2010.
5. S. C. Lee, **Digital Circuits and Logic Design**, Prentice Hall of India, 2006.
6. J. F. Wakerly, **Digital Design Principles and Practices**, 4/e, Prentice Hall of India, 2008.

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**IT304: DATA STRUCTURE**

**Credits: 03**

**L-T-P: 3-0-0**

**Unit- I**

Introduction: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, 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

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**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, Dequeue 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: Inorder, Preorder and Postorder, 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. Transistive 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.

File Structures: Sequential and Direct Access, Relative files, Indexed files, B+ tree as index, Multi-index files, Hashed files.

**Text Books/Reference Books:**

1. **Data Structures and Algorithms**, A. V. Aho, J. E. Hoppcroft, J. E. Ullman,

 Addision Wesley.

1. **Fundamentals of Data Structures**, E. Horowitzz, S. Sahni, Galgotia Publ.
2. **Data Structures using C**, A.S. Tanenbbaum
3. **Algorithms, Data Structures**, and Problem Solving, Addision Wesley.
4. **Data Mangement and File Structures**, Loomis, Marry, PHI
5. M. A. Weiss – **Data Structures & Algorithm Analysis in C++,** Addision Wesley.
6. Lipshutz – **Theory and Problems of Data Structures**, McGraw Hill.
7. Neil Graham -**Learning with C++,** MacGraw Hill