

BEA- 301 Mathematics-III

UNIT-I

NUMERICAL METHODS – 1 Solution Of Polynomial And Transcendental Equations – Bisection Method, Newton-Raphson Method And Regula-Falsi Method. Finite Differences, Relation Between Operators, Interpolation Using Newton's Forward And Backward Difference Formulae. Interpolation With Unequal Intervals: Newton's Divided Difference And Lagrange's Formulae.

UNIT-II

NUMERICAL METHODS – 2 Numerical Differentiation, Numerical Integration: Trapezoidal Rule And Simpson's 1/3rd And 3/8 Rules. Solution Of Simultaneous Linear Algebraic Equations By Gauss's Elimination, Gauss's Jordan, Crout's Methods, Jacobi's, Gauss-Seidal, And Relaxation Method.

UNIT-III

NUMERICAL METHODS – 3 Ordinary Differential Equations: Taylor's Series, Euler And Modified Euler's Methods. Rungekutta Method Of Fourth Order For Solving First And Second Order Equations. Milne's And Adam's Predictor-Corrector Methods. Partial Differential Equations: Finite Difference Solution Two Dimensional Laplace Equation And Poission Equation, Implicit And Explicit Methods For One Dimensional Heat Equation (Bender- Schmidt And Crank-Nicholson Methods), Finite Difference Explicit Method For Wave Equation.

UNIT-IV

Transform Calculus Laplace Transform, Properties Of Laplace Transform, Laplace Transform Of Periodic Functions. Finding Inverse Laplace Transform By Different Methods, Convolution Theorem. Evaluation Of Integrals By Laplace Transform, Solving Odes By Laplace Transform Method, Fourier Transforms.

UNIT-V

Concept of Probability Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

References:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
 2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
 3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
 4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
 5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
 6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
 7. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
 8. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
Statistic

ITA- 302 Discrete Structure

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

Reference Books:

1. C.L.Liu” Elements of Discrete Mathematics” TMH.
2. Lipschutz, “Discrete mathematics (Schaum)”, TMH.
3. U.S Gupta “ Discrete Mathematical Structures” Pearson.
4. S. Santha,” Discrete Mathematics with Combinatorics and graphtheory”, Cengage Learning.
5. Dr.Sukhendu. Dey “ Graph Theory With Applications” Shroff Publisher

ITA-303 Data Structure

UNIT-I

Introduction Data, data type, data object. Types of data structure – primitive & non-primitive, linear & non-linear. Operations on data structures – traversing, searching, inserting, deleting. Complexity analysis – worst case, best case, average case. Time – space trade off, algorithm efficiency, asymptotic notations – big oh, omega, theta.

UNIT-II

Arrays & Structure Introduction, declaration of arrays, operations on arrays – inserting, deleting, merging of two arrays, 1 dimensional & 2 dimensional arrays, row & column major representation, address calculation in array, storing values in arrays, evaluation of polynomial – addition & representation. Searching & sorting – Introduction, sequential search, binary search, Fibonacci search, indexed sequential search, hashed search. Types of sorting with general concepts – bubble, heap, insertion, selection, quick, heap, shell, bucket, radix and merge sort.

UNIT-III

Stacks & Queues Basic concept of stacks & queues, array representation of stacks, operation on stacks – push, pop, create, getTop, empty, linked representation of stack, multiple stack. Application of stack – Conversion: infix, prefix, postfix and evaluation of arithmetic expression. Linked representation of queue, operations on queue – insertion & deletion. Types of queue with functions – circular, deque, priority queue. Applications of queues – job scheduling, Josephus problem.

UNIT-IV

Linked List Introduction – basic terminology, memory allocation & deallocation for linked list. Linked list variants – head pointer, head node, types linked list – linear & circular linked list. Doubly linked list, creation of doubly list, deletion of node from doubly linked list, insertion of a node from doubly linked list, traversal of doubly linked list. Circular linked list – singly circular linked list, circular linked list with header node, doubly circular linked list. Applications of linked list – polynomial representation & garbage collection.

UNIT-V

Trees Basic terminology – general tree, representation of general tree, types of trees, binary tree-realization and properties, traversal in binary trees – inorder, preorder, postorder, applications of trees. Graph- Basic Terminologies and representations, Graph search and traversal algorithms.

References :

1. Varsha H. Patil “Data Structure Using C++” Oxford.
2. Rajesh K. Shukla “Data Structures Using C & C++” Wiley India.
3. Reema Thareja “Data Structure Using C” Oxford.
4. D. S Malik “Data Structure Using C++” Second Edition Cengage.
5. Kushwaha and Mishra “Data Structure: A programming Approach with C”, PHI Learning.
6. A. K Sharma “Data Structure Using C” Pearson.
7. Ellis Horowitz, Sartaj Sahni, “Fundamentals of Data Structures”, Computer Science Press

List of Experiments:-

1. Write a program to search an element in the array using Linear and Binary Search.
2. Write a program to perform the following operation in Matrix:
 1. Addition 2. Subtraction 3. Multiplication 4. Transpose
3. Write a program to perform the following operation on strings using string functions:
 1. Addition 2. Copying 3. Reverse 4. Length of String
4. Write program for implementing the following sorting methods to arrange a list of integers in ascending order:
 - a) Quick sort b) Selection sort c) Insertion sort d) Merge sort
5. Write a program that uses stack operations to convert a given infix expression into its postfix equivalent.
6. Write a program to merge two sorted array into one sorted array.
7. Write a program to implement stack using array and linked list.
8. Write a program to implement queue and circular queue using array.
9. Write a program to insert an element in the beginning and end of singly linked list.
10. Write a program to insert an element at any position in singly and doubly linked list.
11. Insert and delete a node at any position in doubly linked list.
12. Write a program of Tower of Hanoi.
13. Write a program that uses functions to perform the following:
 - a) Create a binary search tree of integers.
 - b) Traverse the above Binary search tree non recursively in in order.

ITA- 304 Object Oriented Programming & Methodology

UNIT-I

Introduction: Object oriented programming, Introduction, Application, characteristics, difference between object oriented and procedure programming, Comparison of C and C++, Cout, Cin, Data Type, Type Conversion, Control Statement, Loops, Arrays and string arrays fundamentals, Function, Returning values from functions, Reference arguments, Overloaded function, Inline function, Default arguments, Returning by reference.

UNIT-II

Object and Classes: Implementation of class and object in C++, access modifiers, object as data type, constructor, destructor, Object as function arguments, default copy constructor, parameterized constructor, returning object from function, Structures and classes, Classes objects and memory, static class data, Arrays of object, Arrays as class Member Data, The standard C++ String class, Run time and Compile time polymorphism.

UNIT-III

Operator overloading and Inheritance: Overloading unary operators, Overloading binary operators, data conversion, pitfalls of operators overloading, Concept of inheritance, Derived class and base class, access modifiers, types of inheritance, Derived class constructors, member function, public and private inheritance.

UNIT-IV

Pointer and Virtual Function: Addresses and pointers, the address-of operator & pointer and arrays, Pointer and Function pointer, Memory management: New and Delete, pointers to objects, debugging pointers, Virtual Function, friend function, Static function, friend class, Assignment and copy initialization, this pointer, dynamic type information.

UNIT-V

Streams and Files: Streams classes, Stream Errors, Disk File I/O with streams, file pointers, error handling in file I/O with member function, overloading the extraction and insertion operators, memory as a stream object, command line arguments, printer output, Function templates, Class templates Exceptions, Containers, exception handling.

Reference Books:

1. E. Balaguruswami, "Object Oriented Programming in C++", TMH.
2. Robert Lafore, "Object Oriented Programming in C++", Pearson.
3. M.T. Somashekare, D.S. Guru, "Object-Oriented Programming with C++", PHI.
4. Herbert Schildt, "The Complete Reference C++", Tata McGraw Hill publication.

List of Experiments:-

1. Write a program to find out the largest number using function.
2. Write a program to find the area of circle, rectangle and triangle using function overloading.
3. Write a program to implement complex numbers using operator overloading and type conversion.
4. Write a program using class and object to print bio-data of the students.
5. Write a program which defines a class with constructor and destructor which will count number of object created and destroyed.
6. Write a program to implement single and multiple inheritances taking student as the sample base class.
7. Write a program to add two private data members using friend function.
8. Write a program using dynamic memory allocation to perform 2x2 matrix addition and subtraction.
9. Write a program to create a stack using virtual function.
10. Write a program that store five student records in a file.
11. Write a program to get IP address of the system.
12. Write a program to shutdown the system on windows operating system

ITA- 305 Digital Circuits And Systems

UNIT-I

Number systems and logic gates: Decimal, Binary, Octal, Hexadecimal number systems and radix conversion. Codes- BCD, excess 3, gray, ASCII. Boolean algebra- Theorems and properties, Boolean functions, canonical and standard forms, De Morgans theorem, digital logic gates, Karnaugh maps.

UNIT-II

Combinational circuits: Introduction to combinational circuits, multilevel NAND, NOR implementation. Designing binary Adders and Subtractors. Decoder, Encoder, Multiplexer, Demultiplexer circuits.

UNIT-III

Sequential circuits: Introduction to Sequential circuits, flip-flops, RS, D, T, JK, M/S JK-flipflops, truth tables, excitation tables and characteristic equations, clocked and edge triggered flipflops, Registers- Definition, serial, parallel, shift left/right registers, Johnson counter, asynchronous and synchronous counters.

UNIT-IV

Digital logic families: Bipolar and unipolar logic families, Digital IC specifications, RTL, DTL, All types of TTL circuits, ECL, IIL, PMOS, NMOS & CMOS Logic.

UNIT-V

Clocks and timing circuits: Bistable, Monostable & Astable multivibrator, Schmitt trigger circuit, Introduction of Analog to Digital & Digital to Analog converters, Display devices, 7 and 16 segment LED display, LCD.

Reference Books

1. M. Morris Mono, "Digital logic design", Pearson Education Pvt. Ltd.
2. A Anand Kumar, "Fundamentals of digital circuits", PHI Learning Pvt Ltd.
3. A K Maini, "Digital Electronics Principles and Integrated Circuits, Wiley India Pvt Ltd.
4. R P Jain, "Modern Digital Electronics", Tata McGraw-Hill publishing company Ltd.
5. D P Kothari and J S Dhillon, "Digital Circuits and Design", Pearson Education Pvt. Ltd.

List of Experiments:-

1. Study and verify the operation of AND, OR, NOT, NOR and NAND logic gates.
2. Design all basic logic gates using NOR universal gate.
3. Design all basic logic gates using NAND universal gate.
4. Verification of Demorgan's theorem.
5. Construction and verification of half adder and full adder circuits.
6. Construction and verification of half subtractor and full subtractor circuits.
7. Design of Binary to Grey & Grey to Binary code Converters .
8. Design of BCD to excess-3 code converter.
9. Design and verification of Multiplexer circuit
10. Design and verification of De-multiplexer circuit.

ITA- 306 Java Programming Lab

UNIT-I

Overview of Java, Installation, First Simple Program, Compilation process , Java Keywords , Identifiers , Literals, Comments, Data Types, Variables, Dynamic initialization, type conversion and casting, Operators, Control Statements.

UNIT-II

Declaring Objects, Introducing Methods, Constructors, this Keyword, Garbage Collection, finalize Method, Overloading Methods, Overloading Constructors, Using Objects as Parameters, Inheritance, Creating a Multilevel Hierarchy, Packages and Interfaces, Exception Handling, Multithreaded

UNIT III

The Applet Class: Applet Basics, The Applet Class, Applet Architecture, Applet Initialization and Termination , Simple Applet Display Methods, Simple Banner Applet, Using the Status Window, The HTML APPLET Tag, Passing Parameters to Applets, Improving the Banner Applet.

UNIT IV

Introducing the AWT: Working with Windows, Graphics, and Text, AWT Classes, Window Fundamentals, Component, Container, Panel, Frame, Working with Frame Windows, Handling Events in a Frame Window, AWT Controls, Layout Managers, and Menus, Adding and Removing Controls, Grid Layout, Border Layout, introduction to swing and servlet.

UNIT V

Event Handling, Two Event Handling Mechanisms, The Delegation Event Model, Events, Event Sources, Event Listeners, Event Classes, The Mouse Event Class and others, JDBC: JDBCODBC bridge, the connectivity model, the driver manager, navigating the result set object contents, the JDBC exceptional classes, connecting to remote database.

Reference:-

1. E. Balagurusamy, "Programming with java A Primer", McGrawHill.
2. Sharanam Shah, " Core Java 8 for Beginners", Shroff Publisher.
3. Naughton & Schildt, "The Complete Reference Java 2", Tata McGraw Hill.
4. Horstmann & Cornell, "Core Java 2" (Vol I & II), Pearson.

List of Experiments:

1. Write a program that accepts two numbers from the user and print their sum.
2. Write a program to calculate addition of two number using prototyping of methods.
3. Program to demonstrate function overloading for calculation of average.
4. Program to demonstrating overloaded constructor for calculating box volume.
5. Program to show the detail of students using concept of inheritance.
6. Program to demonstrate package concept.
7. Program to demonstrate implementation of an interface which contains two methods declaration square and cube.
8. Program to demonstrate exception handling in case of division by zero error.
9. Program to demonstrate multithreading.
10. Program to demonstrate JDBC concept using create a GUI based application for student information.

11. Program to display “Hello World” in web browser using applet.
12. Program to add user controls to applets.
13. Write a program to create an application using concept of swing.
14. Program to demonstrate student registration functionality using servlets with session management.

ITA-307 Self-Study / GD Seminar

Objective of GD and seminar is to improve the mass communication and convincing/understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves. Evaluation will be done by assigned faculty based on group.