



Telangana University

SCHEME OF INSTRUCTION & EXAMINATION MCA I YEAR

w.e.f: 2009-2010

SEMESTER – I

Sl. No	Syllabus Ref. No.	SUBJECT	Scheme of Instruction		Scheme of Examination		
			Periods per Week		Duration in Hrs.	Maximum Marks	
						Univ. Exam	Sessionals
		THEORY					
1	CS 601	Discrete Mathematics	4	-	3	70	30
2	MAT 602	Probability & Statistics	4	-	3	70	30
3	CS 603	Computer Programming and Problem Solving	4	-	3	70	30
4	CS 604	Elements of Information Technology	4	-	3	70	30
5	CS 605	Modern Economic Analysis	4	-	3	70	30
		PRACTICAL					
1	CS 631	Programming Lab – I (C & C++ Programming)	-	6	3	50	25
2	CS 632	Programming Lab – II (EIT Lab)	-	6	3	50	25
		Total	20	12		450	200

CS 601

DISCRETE MATHEMATICS

Instruction:

4 Periods per week

Duration of University Examination:

3 Hours

University Examination:

70 Marks

Sessional:

30 Marks

UNIT – I

Fundamentals of Logic: Basic Connectives and Truth Tables, Logical Equivalence, Logical Implication, Use of Quantifiers, Definitions and the Proof of Theorems.

Boolean Algebra: Switching Functions, Logic gates, Don't Care Condition.

Set Theory: Sets and Subsets, Set operations and the Laws of Set theory, Counting and Venn Diagrams.

UNIT-II

Properties of Integers: The well-ordering principle, Recursive definitions, The Division Algorithm, Euclidean Algorithm, Fundamental theorem of arithmetic. Functions: Cartesian Product, Functions, Onto Functions, Special Functions, Pigeonhole Principle, Composition and Inverse Functions, Computational Complexity. Relations: Partial Order Relations, Lattices, Equivalence Relations and Partitions.

UNIT-III

Principle of inclusion and Exclusion: Principles of Inclusion and Exclusion, Generalization of principle, Derangements, Rooks Polynomial, Arrangements with Forbidden Positions.

Generating Functions: Introductory examples, Definitions and examples, Partition of Integers, Exponential generating function, Summation operator.

UNIT-IV

Recurrence Relations: First-order linear recurrence relation, Second-order linear homogeneous recurrence relations with constant coefficients, Non-homogeneous recurrence relations, Divide -and- conquer algorithms.

Algebraic Structures: Definition , Examples and properties.

Groups: Definition, Examples and elementary properties, Homomorphism,

UNIT – V

Graph Theory: Definitions and examples, Sub graphs, Complements and graph isomorphism, Vertex degree, Planar graphs: Hamiltonian paths and Cycles, Graph coloring.

Trees: Definitions, Properties and Examples, Rooted Trees. Spanning Trees and Minimum Spanning Trees.

Suggested Reading:

1. Ralph P. Grimaldi, "Discrete and Combinatorial Mathematics", person Education, 4th Edition, 200,

References:

1. Kenneth H Rosen, "*Discrete Mathematics and its Applications*" Tata McGraw Hill , 6th Edition, 2007.
2. J.P. Tremblay & R. Manohar, "*Discrete mathematical Structures-with Applications to Computer science*" , McGraw Hi 11. 1987.
3. Joe L. Mott, A. kanda & T.P. Baker, "*Discrete mathematics for Computer scientists, & mathematicians*", prentice Hall N.J., 1986
- 4, Kevin Ferland, "Discrete Mathematics", Houghton Mifflin Company, 2009.

MAT 602**PROBABILITY AND STATISTICS****Instruction:****4 Periods per week****Duration of University Examination:****3 Hours****University Examination:****70 Marks****Sessional:****30 Marks****UNIT -I**

Data Validation and Information Abstraction: Methods of collecting data efficiently, Gathering information from data charting.

UNIT -II

Probability: Laws of Probability, Probability distributions, Discrete, Equiprobable, binomial Poisson.

UNIT -III

Continuous Distributions: Rectangular, normal, gamma and beta.

UNIT-IV

Statistical Methods: Frequency distributions, Mathematical Expectation, Moments, Skewness and Kurtosis.

UNIT -V

Correlation and Regression, Introduction to tests of Significance, u, t, x tests.

Suggested reading:

- 1) S.C. Gupta and V.K. Kapoor, "*Fundamentals of mathematical Statistics*", 1989.
- 2) William Mendenhall, Robert J. Beaver, Barbara M. Beaver, "*Introduction to Probability and Statistics*", Thomson Brooks/Cole, Eleventh Edition, 2003.
- 3) Richard A. Johnson, "*Probability and Statistics for Engineers*", Prentice Hall of India. Seventh Edition 2005.

CS 603

COM PUTER PROGRAMMING AND PROBLEM SOLVING

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination:	70 Marks
Sessional:	30 Marks

The First Three Units (I, II & III) are for 'C' Programming and the last Two Units (IV and V) are for C++

UNIT -I

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and Running programs, System Development.

Introduction to C Language: C programs, identifiers, Types, Variables, Constants, Operators. Input/Output, Expressions:- precedence and associativity, evaluating expressions, type conversion, statements, Selection:- making decisions (conditional statements) ,repetition (control statements).

UNIT-II

Functions : Designing Structured Programs, Functions in C, User-defined functions, Inter-function communication (Parameter passing mechanism), Standard Functions, Scope, Recursion.

Arrays: Concepts, Using Arrays in C, Inter-Function Communication (Passing arrays to functions), Two Dimensional arrays, Multidimensional arrays. Application:- selection, bubble and insertion sort.'

Pointers: Introduction, Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, Arrays and Pointers in C w.r.t arithmetic, passing arrays to function), memory allocation functions ..

Strings : String concepts, C Strings, String Input/Output Functions, Array of Strings, String Manipulation functions.

UNIT -III

Enumerated, Structure, and Union Types: The Type -Definition (*typedef*), Enumerated types, Structure, Unions. Enumerations, Unions, Pre-Processor Directives.

Text Input/Output Files in C: Files, Streams, Standard Library Input/Output functions, Formatting Input/Output Functions, Character Input/Output Functions,

Binary Input/Output : Text versus Binary streams, Standard Library Functions in Files, Converting File Type.

UNIT-IV

Introduction to C++: Introduction and Basic elements of C++.

Functions in C++: User-defined functions, Types of functions, Parameter passing mechanisms, Overloading, Inline functions, Function Templates.

UNIT- V

Classes: Introduction to classes, Inheritance, Operator Overloading, Dynamic Polymorphism using Virtual functions, Abstract Classes.

Templates and Exceptional Handling.

Suggested Reading:

1) Behrouz A. Forollzan, Richard F Grilberg, "*Computer Science - A Structured approach using C*", 3rd Edition, Cengage Learning 2007. (For Units I, II, III)

2)D. S. Malik, "*C++ Programming Language* ", Cengage Learning, 2009. (For Units IV and V)

References:

1.Harry.H. Cheng, "*CIC++ for Engineers and Scientist - An Interactive Approach*", McGraw-Hill, International Edition, 2009.

2.Owen L. Astrachan, "*Programming with C++*", Tata Mcgraw Hill, 2007.

3.Bjarne Stroustrup, "*The C++ Programming language*", 3rd Edition, Addison- Wesley, 1998 ..

CS 604

ELEMENTS OF INFORMATION TECHNOLOGY

Instruction:

4 Periods per week

Duration of University Examination:

3 Hours

University Examination:

70 Marks

Sessional:

30 Marks

UNIT -I

Digital Age: Digital basis of Computers, Data/Information, Hardware Input, Output, Memory, Communication Hardware, Software, Application Software, System Software, Communications, Five kinds of Computers, Development in communication Technology, Connectivity and . Interactivity, Five Generations of Programming Languages, Programming languages used today, Object Oriented & Visual Programming.

Operating Systems: Booting, Managing Storage, Resources, Files tasks, Common operating systems: Windows 95/98, DOS, and Windows -NT.

UNIT -II

Processors: The CPU and Main Memory, Data Representation, Micro Computer System Unit, Input & Output devices, Keyboard, Pointing devices, Source data entry devices, Soft copy output, Hardcopy output, more output devices, Diskettes, Hard-disks, Optical disks, Flash memory, Magnetic tape, Compression and Decompression.

UNIT -III

Telecommunications: DATA, Video, Audio communication, the Internet, the World Wide Web, new Internet technologies, Communication channels, Networks, . conduits of communication, Communication networks, Local networks, factors affecting communication among devices.

UNIT- IV

Files & Databases: Data storage hierarchy, File management, Files Management Systems, Database Management Systems, type of database organization, and features of a DBMS.

Application Software: Common features of software, Word processing, Spread sheet, software for Cyber space, Internet programming, HTML, XML, & Active X.

UNIT -V

Information Systems: Organization:- Departments, Tasks, Management Levels, Management Information systems, Six phases of system analysis and design.

Software Development: Programming as a five step procedures.

Security Issues: Threats to computers & Communication systems, Safeguarding computers and communications.

Suggested Reading:

- 1) Williams B.K. Sawyer., *"Using. Information Technology"*, Sixth Edition, Tata McGraw Hill, 2006.

References:

- 1) Aksoy & DeNardis " *Introduction to Information technology*", Cengage Learning, 2006.
- 2) Dennis P. Curtin & Kim Folley, et.al., *Information Technology. The breaking Wave*", Tata McGraw Hill, 1998.
- 3) IITL Edn Solutions Ltd. *"Introduction to Information Technology"*, Pearson Education, 2005.

CM 605

MODERN ECONOMIC ANALYSIS

Instruction:

4 Periods per week

Duration of University Examination:

3 Hours

University Examination:

70 Marks

Sessional:

30 Marks

UNIT -I

The nature and scope of Managerial Economics, Fundamental concepts Of managerial Economics.

UNIT -II

Demand Analysis, concepts of demand, demand elasticities.

UNIT -III

Production and cost analysis and principles: Production function, single output isoquantum, average cost curve -Laws of returns -Laws of supply, price determination under different competitive situation.

UNIT -IV

National income: Concepts, measurement and determinants.

Planning: The machinery for planning in India, Salient features of India's Five, Year plans.

UNIT-V

Indian Financial Systems, Functions and role of Reserve Bank of India. Conventional Banks and Industrial Finance. Term "lending Financial Institutions -role and functions .

Suggested reading:

1)Dhiraj Bhattacharya & Pranab Chakraborti, "*Fundamentals of Business Economics*", A. H. Wheeler & Co. (P) Ltd., 1986.

2)Barry Keating & J. Holton Wilson, "*Managerial Economics*", Biztantra, Second edition, 2003.

3)Dominick Salvatore, "*Managerial Economics*", Thomson, Fourth Edition, 2001.

CS 631

PROGRAMMING LAB-1 (C & C++ PROGRAMMING)

Instruction:

6 Periods per week

Duration of University Examination:

3 Hours

University Examination:

50 Marks

Sessional:

25 Marks

C –Programs:

1. Program to calculate simple formulae like area of Circle, Rectangle etc,
2. Program to find Maximum, Minimum and Sum of given set of numbers.
3. Program to find whether a number is Prime or not.
4. Program to find $Sin(x)$ and $Cosine(x)$ using series expansion
5. Program to demonstrate Call-by-Reference parameter passing mechanism.
6. Program to implement Linear and Binary Search mechanisms.
7. Program to implement Selection and Bubble sort.
8. Program to implement Matrix multiplication using pointers.
9. Program to find the number of letters, words and sentences in a given string.
10. Program to do String manipulation without using in-built library functions.
11. Program to generate address labels using structures.
12. Program to demonstrate Sequential file Access.
13. Program to demonstrate Random File Access.

C++ - Programs

14. Recursive functions (Greatest common divisor, Tower of Hanoi, Fibonacci etc).
15. Classes for Bank Account, Student Information, Library Catalogue, Employee
16. Creation of Complex, Vector classes using operator overloading.
17. Creation of Inheritance hierarchy (bank account, person)
18. Template functions for Min () and Max () for finding minimum and maximum in a List
19. Program on Class Templates
20. Programs demonstrating virtual, pure virtual functions using abstract base class "Shape".
21. Programs to demonstrate multiple inheritances and exception handling.
22. Programs demonstrating Stream and File I/O using student and employee classes.

CS 632

**PROGRAMMING LAB-II
(EIT Lab)**

Instruction:

Duration of University Examination:

University Examination:

Sessional:

6 Periods per week

3 Hours

50 Marks

25 Marks

At the end of the course, students should be able to:

1. Identify and describe the relationships and role of the components of the "Logical" diagram of the computer. (e.g. processor, RAM, ROM, BIOS, input, output, storage.)
2. Relate the "logical" diagram of a computer system to the "physical" system by identifying physical components of a computer and describing their purpose. (e.g. the processor, memory chips, motherboard, disk drives, and controller cards such as AGP board, network cards, sound card, as well as parallel and serial ports etc)"
3. Assemble the computer which they will use and load the OS with partitions for Windows and Linux, configure for network connection
4. Troubleshoot his/her PC from time to time
5. Install/Un installs SW/HW on his/her PC from time to time
6. Identify and distinguish between various types of application software. by describing and using them. (e.g. word processor, spreadsheet, database, browser, mailers etc.)
7. MS Word: Create documents with standard formatting commands, single/multi column, insert pictures/objects, drawings, hyperlinks, header/footer, and tables. No macros.
8. MS Power Point: Create presentations with preset animations, using different layouts, backgrounds, slide master, insert pictures/objects, drawings, hyperlinks, header/footer, tables
9. MS Excel: Creating worksheets with various kinds of data, making charts, conditional formatting, awareness of the various functions- statistical, date/time, math/trig etc, ability to explore (help) and use these functions if need be, demonstration through some common

functions like sum, average, standard deviation, logical and information.

10.HTML: Should be able to create their web-page (title, text, frames, hyperlinks to some sites, pictures, lists, tables, fonts, forms and color) without using any web authoring tools.

11. Distinguish between various commercially available systems by relating the cost to features available on each system.

Alias	Cp	Fip	Man	Talk
Banner	Date	Gv	Mkdir	telnet
Bc	Diff	Gunzip	More	Unzip
Gh	Dir	Head	Mv	Vi
Cal	Display	History	Passwd	Vim
Cat	Df	Id	Pine	Vimtutor
Cc	Du	Indent	Ps	Wall
Ed	Echo	Dill	Pwd	Wait
Chgrp	Exit	Last	Reboot	Whereis
Chmod	Fg	Login	Rm	Who
Clear	File	Logname	Rmdir	Whoami
Chfn	Finger	In	Shutdown	Wrie
Chown	Find	Logout	Tail	Zip
Cmp	Gzip	Is	Tar	Ands
		mail		

13. **MS-Access:** Create database for student information, library information and inventory. Generation of queries, reports and transaction processing.

TELANGANA UNIVERSITY

SCHEME OF INSTRUCTION & EXAMINATION MCA I YEAR

SEMESTER- II

w.e.f: 2009-2010

Sl. No	Syllabus Ref. No.	SUBJECT	Scheme of Instruction		Scheme of Examination		
			Periods per Week		Duration in Hrs.	Maximum Marks	
						Univ. Exam	Sessionals
		THEORY					
1	CM 651	Accounting & Financial Management	4	-	3	70	30
2	CM 652	Principles of Object Oriented Programming	4	-	3	70	30
3	CM 653	Management Information Systems	4	-	3	70	30
4	CM 654	Data Structures	4	-	3	70	30
5	CM 655	Computer Architecture	4	-	3	70	30
		PRACTICAL					
1	CM 681	Programming Lab – III (OOP Lab)	-	6	3	50	25
2	CM 682	Programming Lab – IV (DS Lab)	-	6	3	50	25
		Total	20	12		450	200

CM 651**ACCOUNTING AND FINANCIAL MANAGEMENT****Instruction:****4 Periods per week****Duration of University Examination:****3 Hours****University Examination:****70 Marks****Sessional:****30 Marks****UNIT -I**

An overview of Accounting cycle -Basic. concepts and conventions -Books of Account Terminal statement.

UNIT- II

Financial statement analysis and interpretation -Ratio analysis.

UNIT -III

Working capital -Sources and uses -Funds flow and cash flow analysis -Management of inventory_

UNIT- IV

Capital Budgeting -Techniques for evaluation -Cost of capital -Computation of specific costs, and weighted average cost of capital

UNIT-V

Analysis of costs and their behavior -Cost volume -Profit analysis Variable costing and absorption costing.

Budgets- Flexible Budgeting -Long and Short term forecasting.

Suggested Reading:

- 1) James. C Van Horne, "*Fundamentals of Financial Management*", Pearson edition, Eleventh edition, 2001.
- 2) Khan MY, Iain PK, "*Financial Management*", Tata McGraw Hill, Second Edition, 1993_
- 3) Maheswari SN, "*Management Accounting and Financial Control*", Sultan Chand & Co.
- 4) Gupta G, Radhaswamy M, "*Advanced Accountancy*", Sultan Chand,& Sons.

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination:	70 Marks
Sessional:	30 Marks

UNIT-I

Object Oriented System Development: Understanding Object Oriented Development, Understanding Object Oriented Concepts, Benefits of Object Oriented Development.

Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables and Arrays, Operators, Control Statements, Classes, Methods, Inheritance, Packages and Interfaces.

UNIT-II

Exceptional Handling, Multithreaded Programming, 1 to basics, Reading console input and output, Reading and Writing Files, Print Writer Class, String Handling.

UNIT -III

Exploring Java language , Collections Overview, Collections interfaces, Collection Classes, Iterators, Random Access Interface, Maps, Comparators, Arrays, Legacy classes and Interfaces, String Tokenizer, Bit Set, Date, Calendar observable, Timer.

UNIT IV

Java I/O classes and Interfaces, Files, Stream and Byte Classes, Character Streams, Serialization.

UNIT -V

GUI and Event Driven Programming: Applet Class, Event Handling, Delegation event model event classes, event listener Interfaces.

Customizing Frame Windows, GUI Programming Basics, Text Related CUI Components, Layout Managers, Effective use of Nested panels, Other GUI components, Menus and Handling Mouse Events.

Suggested reading:

- 1) Patrick Naughton "JAVA 2, The Complete Reference" Tata McGraw Hill 2005.
- 2) Richard A. Johnson, "Java Programming and Object-Oriented Application Development" Cengage Learning, India edition 2009

References:

- 3) John Dean and Raymond Dean "Introduction to Programming with JAVA A problem solving approach", McGraw Hill 2008.
- 4) Joc Wigglesworth and Paula McMillan, Java Programming: Advanced Topics" Cengage Learning, 3rd Edition 2009

CS.653

MANAGEMENT INFORMATION SYSTEMS

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination:	70 Marks
Sessional:	30 Marks

UNIT-I

An Introduction to concepts of System and Organizations. Strategic uses of Information Technology, Business Process in Engineering and Information Technology.

UNIT-II

Applications of Operational Information Systems to Business, Tactical and Strategic Information System to Business.

UNIT -III

Information Systems Planning, approach to System Building Alternative Application Development.

UNIT-IV

Managing Knowledge, Knowledge Management in the Organization, Enhancing Management Decision-Making, DSS, GDSS, and ESS.

UNIT- V

Management of Information Systems. Information System security and control, Ethical issue, managing firm infrastructure and Enterprise system.

Suggested Reading:

1. Robert Schultheis, Mary Summer, *"Management Information Systems The Manager's view"*, Tata McGraw Hill, fourth edition, 2006.
2. Kenneth C. Loudon, Jane P. Loudon, *"Management Information System"*, Prentice Hall, 2008

Reference:

4. Ralph Stair, George Reynolds "Principles information Systems", Cengage Learning 2008.
3. James A, O'Brien, " *Management Information Systems* ", Tata McGraw Hill, Sixth edition, 2004.

Instruction:**Duration of University Examination:****University Examination:****Sessional:****4 Periods per week****3 Hours****70 Marks****30 Marks****UNIT - I**

Linear Lists: Array based representation Linked Lists: Properties, Operations, Ordered Linked Lists, Doubly Linked Lists, Circular Linked Lists.

UNIT - II

Matrices: Special and Sparse matrices.

Stacks: Operations, array and linked representation of stacks, applications of stacks

Queues: Operations, array and linked representation of queues, applications of queues.

UNIT-III

Trees: Definitions and properties. Binary trees: Binary tree traversal (recursive and non-recursive). Binary Search Trees: Operations and Analysis, AVL Trees: Operations on AVL trees. B- Trees, Operations on B-Trees

UNIT -IV

Searching Algorithms: Sequential Search and Binary Search. Complexity analysis of searching algorithms. Hashing: Collision resolution, Open addressing, Quadratic probing, Chaining. Hashing Analysis. Sorting Algorithms: Selection Sort, Quick Sort, Merge Sort, Heap Sort, Shell Sort. Complexity analysis of sorting algorithms.

UNIT -v

Graphs: Definitions, notations and representations. Operations on Graphs, Graph Traversals, Applications of Graphs: Shortest Path and Minimal Spanning Tree Algorithms.

Suggested Reading:

- I. S Sahani, "Data Structures, Algorithms and Applications in C++" Second Edition, Universities Press, 2005.

References:

1. D S Malik, "Data Structures using C++", Cengage Learning, 2003
2. Carmen Leiserson & Rivest, "Introduction to Algorithms", Prentice Hall India, 1996.
3. Mark Allen Weiss, "Data structures and Algorithm Analysis in C++", Third Edition, Pearson Education, 2007

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination:	70 Marks
Sessional:	30 Marks

UNIT -I

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip Flops, Sequential Circuits.

Digital Components: Integrated Circuits, Decoder, Multiplexers, Registers, Shift Registers, Binary counter, Memory unit.

Data Representation: Data types, Complements, Fixed and Floating Point Representation, Other binary codes and error Detection codes.

UNIT -II

Register Transfer and Micro operations: Register Transfer language, Register transfer, Bus and Memory Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations and Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycles, Memory Reference Instructions, Input, Output and Interrupts, Design of Accumulator logic.

UNIT -III

Programming the Basic Computer: Introduction, Machine Language, Assembly Language, The Assembler, Programming Arithmetic and Logic Operations, Subroutines, and input-output, Programming.

Micro programmed Control: Control Memory, Address Sequencing, Micro program Example, Design of Control Unit.

UNIT -IV

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC.

Parallel Processing: Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline. Computer Arithmetic: Addition and Subtraction, Multiplication algorithms, Division Algorithms, Floating point arithmetic operations, decimal arithmetic unit, and decimal arithmetic operations.

UNIT -V

Input -Output organization: Peripheral Devices, I/O interlace, Asynchronous data transfer, Modes of transfer, Priority Interrupt, OM A, Input output Processor, Serial Communication

Memory Organization: Memory Hierarchy, Main Memory, Cache Memory.

Suggested Reading:

1) M. Morris Mano, "*Computer System Architecture*", Pearson Education Asia, Third Edition, 1993.

References:

1. Miles Murdocca, Vincent Heuring, "Computer Architecture and Organization", John Wiley & Sons 2007.
2. Sivarama P Dandamudi "Fundamentals of Computer Organization and Design", Wiley Dream Tech publishers, 2003.
3. William Stallings, "Computer Organization & Architecture", Pearson Education, Sixth Edition 2003,
4. G.V.Anjaneyulu "Computer Organization".

Instruction:**Duration of University Examination:****University Examination:****Sessional:****6 Periods per week****3 Hours****50 Marks****25 Marks**

1. A program to illustrate the concept of class with constructors, methods and overloading.
2. A program to illustrate the concept. of inheritance and dynamic polymorphism
3. A program to illustrate the usage of abstract class.
4. A program to illustrate multithreading.
5. A program to illustrate thread synchronization.
6. A program to illustrate Exception handling.
7. A program to illustrate user-defined Exceptions
8. A program to demonstrate use of User-defined Packages.
9. A program using StringTokenizer .
10. A program using Linked list class
11. A program using Tree Set class
12. A program using Hash Set and Iterator classes.
13. A program using Map classes.
14. A program using Enumeration and Comparator interfaces.
15. A program using File and File name Filter
16. A program to illustrate the Usage of Byte and Character I/O streams.
17. A program to illustrate the Usage of Serialization
18. A Program using Date class
19. An application involving GUI with different controls, menus and event handling.
20. A program to implement an applet.

Instruction:**Duration of University Examination:****University Examination:****Sessional:****6 Periods per week****3 Hours****50 Marks****25 Marks**

1. Implementation of ADT Stacks.(Arrays and Linked representations)
2. Infix to Postfix conversion (unparenthesized)
3. Infix to Postfix conversion (Parenthesized)
4. Evaluation of postfix expression.
5. Implementing Parenthesis Matching Application using Stack
6. Implementation of ADT Queues. (Linear, Circular and DeQueue)
7. Application of Queues (Super-market, Ticket reservation etc)
8. Implementation of ADT Linked Lists (Singly, doubly and Circular)
9. Implementation of Linear, binary search.
10. Implementation of Hashing
11. Implementation of Collision resolution techniques.
12. Implementation of Insertion sort.
13. Implementation of Selection sort.
14. Implementation of Shell sort.
15. Implementation of Quick sort.
16. Implementation of Merge sort.
17. Implementation of basic operations on Binary trees.
18. Implementation of traversals on binary trees.
19. Implementation of Binary Search Trees
20. Implementation of Heap sort.
21. Implementation of operations of AVL Trees.
22. Implementation of Red-Black Trees.
23. Implementation of Graph Search Methods.
24. Program to find a Minimal Spanning Tree.