FACULTY OF SCIENCE

SYLLABI

FOR

M. Sc. INFORMATION TECHNOLOGY
(SEMESTER SYSTEM)

EXAMINATIONS 2014 - 2015
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<tr>
<td>MS-21</td>
<td>Major Project</td>
<td>320</td>
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</table>

The project period will be of 6 months duration.
The project will involve development of application/system software in industrial/commercial/scientific environment.
The report should consist of the following:

- Cover page including Project title, Name of the student, Name of the Department and Names of the Project Guides (both External and Internal).
- Acknowledgements.
- Certificates from company and department duly signed by external guide, Principal and internal guide.
- Contents with page numbers.
- Introduction (includes background and application or importance of the project)
- Objectives
- System Analysis

System Feasibility study

- Software requirement specifications
- Design with system flowcharts and input/output design.
- Implementation and Testing
  - Hardware and software used
  - Listing of well commented programs with result/output or detailed algorithms with input and output.

Further scope of the project

- Bibliography
- Appendices (any other information related to project)

Each student should observe the following norms while submitting the synopsis/thesis for the Project:

(a) Use both sides of the paper instead of only single side.
(b) Use one and half interline spacing in the text (instead of double space)
(c) Stop using a blank sheet before the page, carrying figure or table.
(d) Try to insert figure/table in the text page itself (instead of using a fresh page for it, each time.)

Students must consult/inform the internal guides regarding the progress of their work at least once in 20 days. It is the duty of the student to be in touch with his internal guide. The student must prepare 5 copies of the report including one copy for self. The remaining four are to be submitted before 31st May every year as per the following:

1. Main Library
2. Department Library
3. Internal Guide
4. Company

One softcopy of the work is to be submitted to the concerned head of the department/institution along with the report. The student must present his/her work in 15 minutes mainly focusing on his/her contribution with the help of slides followed by demonstration of the practical work done. The project Viva will be completed before 15th June every year exact dates will be informed before 31st May every year.

An external examiner, internal examiner and the internal guide will conduct project viva.
Objectives: This paper enables students to understand graphics hardware and various 2D and 3D algorithms. After the completion of this paper, student will be able to:

- Implement the principles and commonly used paradigms and techniques of computer graphics.
- Use OpenGL proficiently using C / C++.

Note:

i. The Question Paper will consist of Four Units.
ii. Examiner will set total of NINE questions comprising TWO questions from each Unit and ONE compulsory question of short answer type covering whole syllabi.
iii. The students are required to attempt ONE question from each Unit and the Compulsory question.
iv. All questions carry equal marks unless specified.

UNIT - I

1. **Introduction to Computer Graphics:** Overview of Graphics Systems, Display Devices, Hardcopy Devices. Interactive Input Devices- Pointing and positioning devices (cursor, light pen, digitizing tablet, the mouse, track balls), Display Processors, Character Generation; Interactive graphical techniques; Positioning, (Elastic or Rubber Band lines, Inking, zooming, panning)

2. **Raster Scan Graphics:** Line Drawing algorithms-Direct method, DDA and Bresenham’s; Circle drawing algorithm- 2-point, 4-point, trigonometric method, 8-point, Bresenham method, Bresenham Midpoint method.

UNIT - II

3. **Two Dimensional Geometric Transformation & Viewing:** homogeneous coordinate system; Basic Transformations- Translation, Rotation, Scaling, Reflection, Shear, composite transformation like- Rotation about an Arbitrary Point, Reflection through an Arbitrary Line; transformation of points and unit square.

4. **Clipping:** Point clipping Line clipping algorithms: Cyrus-Beck, Cohen-Sutherland and Liang-Barsky, Polygon Clipping; Window to viewport coordinate transformation,

UNIT - III

5. **Graphics Programming using C/C++:** Basic Graphical functions; Mouse Programming, Graphic Languages: Primitives (Constants, actions, operators, variables), display subroutines, plotting and geometric transformations, Concept of Animation, Saving, Loading and Printing graphics images from/to disk. Animated algorithms for sorting, Towers of Hanoi.

6. **Open GL using C/C++:** Geometric Primitives and Attributes; Viewing; Color; Lighting, Animation.
UNIT - IV

7. **Three Dimensional Concepts & Object Representations:** Three Dimensional Display Methods, Parallel Projection, Perspective Projection; Translation, Rotation, Scaling, Composite Transformation; Hidden line and surface elimination-Z-buffer, back face, scan line, depth sorting.

8. **Shading:** Modelling light intensities- flat shading, gouraud shading, phong shading. Representation of Space Curves, Cubic Splines, Bezier Curves, B-spline Curves, B-spline Curve Fit, B-spline Curve Subdivision, Parametric Cubic Curves, Quadric Surfaces. Bezier Surfaces.

REFERENCES:

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Paper Code: MS – 40
Paper Title: Software Engineering
Maximum Marks: 80
Number of Lectures: 90
(45 Minutes duration)

L       P
6       0

Objectives: This course enables students to understand Software Configuration Managements Tools and Techniques. After the completion of this paper, student will be able to
- Use principles, concepts, methods, and techniques of the software engineering approach to produce quality software.
- Apply software engineering principles and practices in the planning and development of an actual software product.

Note:
1. The Question Paper will consist of Four Units.
2. Examiner will set total of **NINE** questions comprising **TWO** questions from each Unit and **ONE** compulsory question of short answer type covering whole syllabi.
3. The students are required to attempt **ONE** question from each Unit and the Compulsory question.
4. All questions carry equal marks unless specified.

UNIT - I

Team: Software Engineer, Skills of Software Engineer, Human Factors in Software Engineering.

2. **Software Requirement Specification (SRS)**: Software Requirements, Definition of SRS, Characteristics of SRS, Components of SRS, Designing of SRS.

**UNIT - II**

3. **System Analysis**: Principles of Structures Analysis, DFDs, E-R Diagrams, Data Dictionary.


**UNIT - III**


**UNIT - IV**


8. **Hardware and Software Selection**: Hardware Acquisition, Benchmarking, Vendor Selection, Software Selection, Performance and Acceptance Criteria, Site Preparation.

**REFERENCES**


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**Paper Code: MS – 41**  
**Paper Title: Analysis and Design of Algorithm**  
**Maximum Marks: 80**  
**Number of Lectures: 90**  
(45 Minutes duration)  

**L  P**  
6  8

**Objective:**

The objective of the module is to create skills in students to design and analyze algorithms. After studying this subject students will be able to

- Understand algorithms and give theoretical estimates for the resources needed by any algorithm.
- Analyze Algorithms.
- Have an empirical approach to gauge the comparative performance of a given set of algorithms.
Note:

i. The Question Paper will consist of Four Units.
ii. Examiner will set total of NINE questions comprising TWO questions from each Unit and ONE compulsory question of short answer type covering whole syllabi.
iii. The students are required to attempt ONE question from each Unit and the Compulsory question.
iv. All questions carry equal marks unless specified.

UNIT - I

1. **Algorithms and Analysis:** Introduction, Algorithms specification, Recursive algorithms, space and time complexity, Asymptotic Notation (O, _, and Θ, o) practical complexities, Best, average and worst case performance of algorithms, examples, Introduction to recurrence relations.

2. **Divide and Conquer:** General method, Binary search, Merge sort, Quick sort, Selection problem, Strassen’s matrix multiplication and analysis of these problems.

UNIT - II

3. **Greedy Method:** General Method, Knapsack problem, Job sequencing with deadlines, Minimum spanning Trees (Prim’s Algorithm, Kruskal’s Algorithm), Single source shortest paths and analysis of these problems.

4. **Dynamic Programming:** General method, Optimal binary search trees, 0/1 Knapsack, the traveling salesperson problem, All pair shortest path problem (Bellman and Floyd’s Algorithm)

UNIT - III

5. **Back Tracking:** General method, N queen's problem, Graph coloring, Hamiltonian cycles, Analysis of these problems.

6. **Branch-And-Bound:** General Method, 0/1 Knapsack, Traveling Salesperson problems, Efficiency considerations.

UNIT - IV

7. **Lower-Bound Theory:** Introduction to Algebraic problems, Introduction to lower bounds, Comparison Trees, Techniques for Algebraic problems, Some Lower Bounds on Parallel Computation.

8. **NP-hard and NP-complete problems:** Basic concepts, Statement of Cook's Theorem, Satisfiability SAT, Examples of NP-hard graph [Clique Decision Problem, Chromatic Number Decision Problem] and NP-scheduling problems [Scheduling Identical Processors, Job Shop Scheduling].

REFERENCES:

7. Mark Allen Weiss: Data Structure and Algorithms Analysis in C++, Pearson Education
Objectives: This course enables students to understand the concepts of Operating System. After the completion of this paper, student will be able to

- Manage various processes and use the scheduling algorithms.
- Handle the deadlock conditions.
- Manage the files on the disk with effective outcome.

Note:

i. The Question Paper will consist of Four Units.
ii. Examiner will set total of NINE questions comprising TWO questions from each Unit and ONE compulsory question of short answer type covering whole syllabi.
iii. The students are required to attempt ONE question from each Unit and the Compulsory question.
iv. All questions carry equal marks unless specified.

UNIT - I

1. **Introduction to Operating System**: History, Structure of OS, Functions/Operations of OS, Types: Single User, Multi-user, Simple Batch Processing, Multiprogramming, Multitasking, Parallel systems, Distributed system, Real time system.

UNIT - II

3. **Process Synchronization**: Concurrent Processes, Race condition, Shared data; Critical section problem: Mutual exclusion, Progress, Bounded waiting; Software solution: Busy form of waiting, lock and unlock primitives, Dekker’s algorithm, Peterson’s solution, Baker’s Algorithm; Synchronization: Semaphores, Monitors, Reader Writer Problem, Producer Consumer Problem, Dinning Philosopher Problem.
4. **System Deadlock**: System Model; Deadlock Characterization: Necessary conditions, Resource Allocation graph; Deadlock prevention: Mutual Exclusion, Hold and Wait, No Preemption, Circular wait; Deadlock Avoidance: Safe state, unsafe state, Resource Allocation graph Algorithm, Banker’s Algorithm; Deadlock Detection & Recovery from deadlock: Wait-for-graph

UNIT - III

5. **Memory Management**: Hierarchy of memory types, Cache memory: Types: Associative memory, direct mapped, set associative.
6. **Memory Allocation**: Address binding, Address Space, Memory Protection, Contiguous and Non-Contiguous allocation, Swapping, Fragmentation; Paging: Protection, Shared pages, Techniques for structuring of page table; Segmentation: Segmentation with paging; Virtual
Memory: Demand paging; Page replacement Algorithms: FIFO, Optimal, LRU, LFU, MFU, Working set, Thrashing;

UNIT - IV

7. **Storage Management**: File(s): Attributes, Operations, Types, Structure; Access Methods: Sequential, Direct access, Index; Directory Structure: Single level, Two level, Tree Structured, Acyclic Graph; File System mounting; File sharing; Protection: Types of access, access control.

8. File system structure, File system implementation, Directory implementation, Allocation methods: Contiguous Allocation, Linked Allocation, Indexed Allocation; Disk scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK; Disk management; Swap space management; RAID.

REFERENCES:
Objectives: This paper enables student to enhance the programming skills using object oriented programming approaches. After the completion of this paper, student will be able to

- To create enterprise and standard applications Java.
- To develop web applications with database support.
- To develop client server based applications.

Note:

i. The Question Paper will consist of Four Units.
ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Unit and **ONE** compulsory question of short answer type covering whole syllabi.
iii. The students are required to attempt **ONE** question from each Unit and the Compulsory question.
iv. All questions carry equal marks unless specified.

UNIT-I

1. **Review of Java Basics:** Applets, Multithreading, AWT Controls, Event Handling.
2. **Swing:** Features, components, Swing vs AWT, swing containers, controls, using Dialogs, sliders, progress bars, tables, creating user interface using swing.

UNIT-II

3. **Java Database Connectivity:** Connectivity model, Java. SQL package, JDBC Exception classes, Database connectivity, Data manipulation and navigation, Using PreparedStatement, creating database applications
4. **Java RMI:** Distributed object technologies, RMI architecture, creating RMI applications.

UNIT-III

5. **Java Servlets:** Servlets vs CGI, Servlet Lifecycle, creating and running servlets.
6. **Networking:** Networking basics, Client / server model, Java and the Net, TCP/IP client sockets, TCP/IP server sockets, Inet Address, URL, Data grams, creating networking applications.

UNIT-IV

7. **Java Beans:** Component architecture, Components, Advantages of Beans, Bean Developer kit (BDK), JAR files, introspection, developing Beans, Using Bound properties, The Java Beans API, Introduction to EJB (Enterprise Java Beans), Types of EJB, Uses of EJB.

REFERENCES:

1. Schildt, Herbert: The Complete Reference Java 2. TMH.
2. Ivan Bayross: Web Enabled Commercial Application Development using Java 2.0, BPB.

Paper Code: MS – 46
Paper Title: Emerging Trends in Computing
Maximum Marks: 80
Number of Lectures: 90
(45 minutes duration)

Objectives: This course enables students to be familiar with emerging technologies as Parallel Computing, Cloud Computing, Grid Computing, Data Warehousing, Data Mining, Mobile Computing and Software Security.

Note:
1. The Question Paper will consist of Four Units.
2. Examiner will set total of NINE questions comprising TWO questions from each Unit and ONE compulsory question of short answer type covering whole syllabi.
3. The students are required to attempt ONE question from each Unit and the Compulsory question.
4. All questions carry equal marks unless specified.

UNIT-I

UNIT-II
3. Data Warehouse: Data Warehousing, Characteristics of a Data Warehouse; Data warehouse delivery method; Data Warehouse Architecture: Three tier architecture; System Processes: Process flow within a data warehouse, extract and load process, clean and transform data, backup and archive process, query management process; Process Architecture :Load manager, warehouse manager, query manager, detailed information; Introduction to different types of Data marts; Metadata Repository; Types of OLAP Servers: ROLAP vs MOLAP vs HOLAP; Database Schema: Starflake schemas, Identifying facts and dimension, designing fact tables, designing dimension tables, Designing starflake schema, Multidimensional schema;

UNIT-III
4. Data Mining :Introduction to data mining technology, KDD versus data mining, goals of data mining, Steps of Data Mining Process, Tools for Data Mining; Introduction to Data
Mining Algorithms: Clustering, Classification and Prediction; Data Mining Applications: Financial Data Analysis, Biological data analysis, Intrusion Detection;

UNIT-IV

5. **Mobile Computing**: Definition, Guided Transmission, Unguided Transmission; Mobile computing architecture, Mobile Devices, Mobile System Networks: Cellular, WLAN, Ad hoc networks; Introduction to: GSM, CDMA, GPRS, EDGE; Introduction to Mobile Databases; Mobile Applications; Mobile Application Languages; features of Mobile Operating system: Palm OS, Symbian, Android.

REFERENCES:
1. M. Sasikumar, Dinesh Shikhare, P. Ravi Prakash: Introduction to Parallel Processing, PHI.
3. Han, Jiawei and Kamber Micheline: Data Mining Concepts and Techniques, Elsevier
9. Anahory, Sam and Murray, Dennis: Data Warehousing in the real world-A practical guide to building decision support systems, Pearson Education Asia.

Paper Code: MS - 08
Paper Title: Electronic Commerce and Tools
Maximum Marks: 80
Number of Lectures: 90
(45 minutes duration)

Objectives: This course enables students to know fundamentals of Electronic Commerce applications and issues. After the completion of this course, student will be able to
- Create a portfolio of the steps required to start-up an on-line business e.g. Consultant fees, hardware and software fees, license fees, etc.
- Explain the steps required to set-up your E-commerce website for advertising purposes.

Note:
i. The Question Paper will consist of Four Units.
ii. Examiner will set total of **NINE** questions comprising **TWO** questions from each Unit and **ONE** compulsory question of short answer type covering whole syllabi.
iii. The students are required to attempt **ONE** question from each Unit and the Compulsory question.
iv. All questions carry equal marks unless specified.
UNIT - I
1. **Internet as a Network infrastructure:** Architecture and components of Internet; Internet Services; ISPs at Local / National / Global Level; Domain Name Registration; Internet Administration; Internet Protocol Suite.

UNIT - II
4. **Consumer Oriented Applications:** Mercantile Process Model; Mercantile Model from the Consumer’s perspective; Mercantile Model from the Merchant’s perspective.

UNIT - III
5. **Electronic Data Interchange (EDI):** EDI and its applications in business; Legal, Security and Privacy issues in EDI; EDI standardization; EDI software implementation; Internet based EDI; Internal Information Systems; Work-flow Automation and Coordination; The corporate digital library: Types of Digital Documents; Corporate Data Warehouses.
6. **Enterprise Resource Planning:** The Emergence of ERP Systems, Business benefits of ERP, ERP Modules and design alternatives, challenges of ERP implementation, Business Process Re-engineering, ERP system development process.

UNIT - IV
7. **Issues in E-commerce:** The legal and policy environment of E-Commerce; Intellectual Property, advertising and consumer protection; Copyright Law; Patent Law; Network Security and Firewalls; Client-Server Network Security Threats; Data and Message Security; Encrypted Documents and E-mail;
8. **Security Technologies:** Cryptography, Public Key Algorithms, Private Key Algorithms, Hashing techniques, Certification and key Distribution, Cryptographic Applications, Encryption, Digital Signature; Public Key Certificates.

REFERENCES
4. Rajesh Ray: Enterprise Resource Planning – Text and cases, TMH.
Objectives: The paper enables students to understand Artificial Intelligence techniques and the language LISP. After the completion of this paper, student will be able to

- Apply standard AI techniques to solve problems.
- Characterize the Knowledge Acquisition
- Differentiate various expert systems
- Write programs of AI using LISP

Note:

i. The Question Paper will consist of Four Units.
ii. Examiner will set total of NINE questions comprising TWO questions from each Unit and ONE compulsory question of short answer type covering whole syllabi.
iii. The students are required to attempt ONE question from each Unit and the Compulsory question.
iv. All questions carry equal marks unless specified.

UNIT - I

1. Artificial Intelligence (AI) : Introduction and Applications, History of AI from Alan Turing and developments in AI, application areas; Criteria for success; Problem Characteristics; Problem representation-State space representation, problem reduction representation, production system; Introduction to agents, intelligent software systems, Applications, Intelligent architectures, components of intelligent agent based distributed systems.


UNIT - II


UNIT - III


UNIT - IV

7. **Introduction to LISP**: Symbolic expressions, creating, Appending and modifying lists, Defining functions, Predicates, Conditionals, Recursion, Iteration, Lambda Expressions, Use of Advanced functions like MAPCAR, REMOVE-IF, COUNT-IF.

**REFERENCES:**

2. George F Luger; William A. Stubblefield: Artificial Intelligence; Structures and Strategies for Complex problem solving, Pearson Education.
6. Bharti & Chaitany: Natural Language Processing, PHI.
7. Russel, Sturat & Norviig, Peter: Artificial Intelligence; A modern Approach; Person Education Pvt. Ltd.
Objectives: This course aims at making a student capable of developing console, windows and web applications using C# on .NET platform.

Note:

i. The Question Paper will consist of Four Units.
ii. Examiner will set total of NINE questions comprising TWO questions from each Unit and ONE compulsory question of short answer type covering whole syllabi.
iii. The students are required to attempt ONE question from each Unit and the Compulsory question.
iv. All questions carry equal marks unless specified.

UNIT-I
1. Introduction to .NET environment: The .NET strategy, the origins of the .NET technology, the .NET framework, the common language runtime, framework base classes, user and programs interface, visual studio .NET, .NET languages, benefits of the .NET approach.
2. Introduction to C#: Introducing C#, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations, difference between C++ and C#, difference between Java and C#.

UNIT-II
3. Object Oriented Aspects of C#: Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

UNIT-III

UNIT-IV
7. Accessing Data with ADO .NET: ADO .NET: Architecture, Components, Database, DataReader, DataAdapter, DataSet, Viewing data using Data Grid View Control, Creating Applications.
REFERENCES:

Paper Code: MS - 50
Paper Title: Linux System Administration
Maximum Marks: 80
Number of Lectures: 90 (45 minutes duration)  
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Objective: This course enables students to get familiar with Linux system, its commands, files & directories, system, shell programming, PERL programming and system administration. After the completion of this course, student will be able to:
- Work in the Linux environment
- Assign the various permissions on the files and directories
- Write the shell programs
- Work with PERL
- Administrate the Linux machine

Note:
- The Question Paper will consist of Four Units.
- Examiner will set total of NINE questions comprising TWO questions from each Unit and ONE compulsory question of short answer type covering whole syllabi.
- The students are required to attempt ONE question from each Unit and the Compulsory question.
- All questions carry equal marks unless specified.

UNIT –I
1. Introduction to Linux: What is Linux, Linux's History, Minimum System Requirements; Installing Linux: Working with Linux, Floppy-less Installation, Boot and Root Disks, Choosing Text or Graphics Installation, Setting up your Hard Drive, Formatting the Partitions, Configuration X, Selecting packages to Install, Using LILO; Partitioning the Hard Disk: Linux Swap Space Partitions, Linux's fdisk, Enabling the Swap Space for Installation, Creating the Linux File-system partition, Using LILO
2. Using Linux: Starting and Stopping your Linux System, Linux Shutdown Commands, Login, Passwords, Creating a New Login, Logging Out; Linux Error Messages, Search Paths; the who Command.
3. Basic Linux Commands: How Linux Commands Work, Command Options, Other Parameters, Input and Output Redirection, Notational conventions used to Describe Linux commands, Online help available in Linux, The Linux Man pages, Finding keywords in Man pages, The bash shell help facility; Wildcards: * and ?, Environment Variables, Process and how to Terminate them; The process status Commands: ps, The process termination command: kill, the su command, the grep command.
UNIT-II


UNIT-III


8. Editing and Typesetting: Text Editors vi, The vi Editor, Starting vi, vi modes, Inserting Text, Quitting vi, Moving the Cursor, Deleting Text, Copying and Moving Text, Searching and Replacing Text, Setting Preferences.

UNIT-IV


REFERENCES:
Objective: This paper enables students to learn software testing process and techniques, concepts of Quality Assurance, reliability and Conf. Management. After the completion of this paper, student will be able to:

- Develop error free and quality software.
- Analyze the risk management
- Differentiate between CMM levels

Note:

i. The Question Paper will consist of Four Units.
ii. Examiner will set total of NINE questions comprising TWO questions from each Unit and ONE compulsory question of short answer type covering whole syllabi.
iii. The students are required to attempt ONE question from each Unit and the Compulsory question.
iv. All questions carry equal marks unless specified.

UNIT-I

UNIT-II

UNIT-III

UNIT-IV
9. **System Configuration Management (SCM):** Basic requirements for SCM system, SCM principles, Planning and organizing for SCM, Benefits of SCM, Change management, Version and release management.


**REFERENCES:**
1. Doutsch, Wills, Hall: Software Quality Engineering: A total Technique and management Approach,

**Paper Code:** MS – 14  
**Paper Title:** Systems Approach to Management and Optimization Techniques  
**Maximum Marks:** 80  
**Number of Lectures:** 90  
*(45 minutes duration)*

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**Objective:** This course enables students to be familiar with different types of Info systems, basics of DR and its practical problems.

**Note:**
1. The Question Paper will consist of Four Units.
2. Examiner will set total of NINE questions comprising TWO questions from each Unit and ONE compulsory question of short answer type covering whole syllabi.
3. The students are required to attempt ONE question from each Unit and the Compulsory question.
4. All questions carry equal marks unless specified.

**UNIT-I**

2. **Accounting Information System:** Characteristics, sample system, subsystems for filling customer order, order replenishment stock, performing general ledger processes; features and use of Accounting Information System Package-Tally.
3. **Marketing Information System:** Basic concepts, model, subsystems including Marketing Research, Marketing Intelligence, Product, Place, Promotion and Pricing subsystems.
UNIT-II
5. Financial Information System: Model and Subsystems including Forecasting, Funds Management and Control Subsystems.
6. Human Resources Information Systems: Model and Subsystems including human resources research, human resources intelligence, HRIS Database, HRIS output.

UNIT-III

UNIT-IV
9. Special types of Linear Programming problems: Transportation and Assignment problems.

REFERENCES