

**PANJAB UNIVERSITY CHANDIGARH- 160014 (INDIA)**

(Estd. under the Panjab University Act VII of 1947-enacted by the Govt. of India)



**FACULTY OF SCIENCE**

**SYLLABI**

**FOR**

**M. Sc. INFORMATION TECHNOLOGY  
(SEMESTER SYSTEM)**

**EXAMINATIONS 2014 - 2015**

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**PANJAB UNIVERSITY, CHANDIGARH**  
**Outlines of Tests, Syllabi and Courses of Reading for M. Sc. Information Technology**  
**(Two Year Degree Programme) for Session 2014 – 2015.**

Paper Code	Paper Name	Theory/ Practical Lectures	Univ. Exam Marks	Int. Exam Marks	Exam Hours
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**FIRST YEAR**

**FIRST SEMESTER**

MS-39	Computer Graphics	6	80	20	3
MS-40	Software Engineering	6	80	20	3
MS-41	Analysis and Design of Algorithm	6	80	20	3
MS-42	Operating System Concepts	6	80	20	3
MS-43	Minor Project Based on MS-39	6	80	20	3
MS-44	Minor Project Based on MS-41 (Using C/C++)	6	80	20	3

**SECOND SEMESTER**

MS-45	Advance Java and Network Programming	6	80	20	3
MS-46	Emerging Trends in Computing	6	80	20	3
MS-08	Electronic Commerce and Tools	6	80	20	3
MS-47	Artificial Intelligence	6	80	20	3
MS-27	SEMINAR	2	-	50	-
MS-48	Minor Project Based on MS-45 & MS-08	6	80	20	3
MS-49	Minor Project Based on MS-47	6	80	20	3

**SECOND YEAR**

**THIRD SEMESTER**

MS-32	.NET Framework and C#	6	80	20	3
MS-50	Linux System Administration	6	80	20	3
MS-51	Software Testing and Management	6	80	20	3
MS-14	System Approach to Management and Optimization Techniques	6	80	20	3
MS-18	SEMINAR	2	-	50	-
MS-33	Minor Project Based on MS-32	6	80	20	3
MS-52	Minor Project Based on MS-50	6	80	20	3

**FOURTH SEMESTER**

MS-21	<b>Major Project</b> The project period will be of 6 months duration. The project will involve development of application/system software in industrial/commercial/ scientific environment		320	80	
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## GUIDELINES FOR SUBMISSION OF PROJECT REPORT (MS-21)

### **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.

## SEMESTER I

**Paper Code: MS – 39**

**Paper Title: Computer Graphics**

**Maximum Marks: 80**

**Number of Lectures: 90**

**(45 minutes duration)**

<b>L</b>	<b>P</b>
<b>6</b>	<b>8</b>

**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:

1. Giloi, W.K.:Interactive Computer Graphics; Prentice-Hall India Ltd.
2. Newman, W., Sproul, R.F.: Principles of Interactive Computer Graphics, McGraw- Hill.
3. Rogers, D.F.: Procedural Elements for Computer Graphics, McGraw-Hill.
4. Foley, J.D., Van Dam A.: Fundamentals of Interactive Computer Graphics, Addison-Wesley.
5. Hearn, D., Baker P.M: Computer Graphics, Prentice-Hall.
6. Roy, Plastock, Theory & Problems of Computer Graphics, Schaum Series
7. Hearn, D., Baker P.M: Computer Graphics, Prentice-Hall.
8. Dave Shreiner, Mason W., Jackie N., Tom Davis; The OpenGL Programming Guide – The Red Book, Addison-Wesley.

**Paper Code: MS – 40**

**Paper Title: Software Engineering**

**Maximum Marks: 80**

**Number of Lectures: 90**

**(45 Minutes duration)**

<b>L</b>	<b>P</b>
<b>6</b>	<b>0</b>

**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:

- 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 Software Engineering:** Definition, Software Engineering Paradigms, Software Engineering goals, Characteristics of well-engineered software, Software Process Models: Waterfall Model, Prototyping Model, Spiral Model, RAD, Agile Models, Fourth Generation Techniques; Software Inspection, Preview and Inspection Procedures, Inspection

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.
4. **Software Metrics:** Role of Metrics and Measurement, Types of Software Metrics: Product Metrics, Software Size Metrics, Object-Oriented Metrics, Software Quality Metrics, Process Metrics, People Metrics, Software Productivity and Quality, Size-oriented Metrics, Function Oriented Metrics.

### UNIT - III

5. **Software Project Planning & Scheduling:** Objectives, Decomposition techniques, Problem based estimation, Process based estimation, Cost estimation, Cost estimation Models: Single Variable Model, COCOMO Model; Software Risks, Risk Assessment.
6. **Software Design:** Design Objectives, Design Principles, Concepts, Design Process, Design Methodologies: Structured Design, Modular Design, Object Oriented Design, User Interface Design and its elements, GUI & its Characteristics, Elements of GUI.

### UNIT - IV

7. **System Administration and Training:** User Manual, Implementation, Documentation, Operation Plans, Maintenance and its types: Corrective Maintenance, Adaptive Maintenance, Preventive Maintenance, Perfective Maintenance.
8. **Hardware and Software Selection:** Hardware Acquisition, Benchmarking, Vendor Selection, Software Selection, Performance and Acceptance Criteria, Site Preparation.

### REFERENCES

1. Pressman : Software Engineering, Tata-McGraw Hill Publishing House.
2. Sommerville, I: Software Engineering, Pearson Education.
3. Jalota, Pankaj: An integrated approach to Software Engineering, Narosa Publishing Company.
4. Gill S. Nasib : Software Engineering, Khanna Publication.
5. Ali Behforooz : Software Engineering Fundamentals, Oxford University Press. Frederick J.H

**Paper Code: MS – 41**

**Paper Title: Analysis and Design of Algorithm**

**Maximum Marks: 80**

**Number of Lectures: 90**

**(45 Minutes duration)**

<b>L</b>	<b>P</b>
<b>6</b>	<b>8</b>

### 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 ( $O$ ,  $\omega$ , and  $\Theta$ ,  $o$ ) 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:**

1. Horowitz, Ellis and Sahni, Sartaj: Fundamentals of Computer Algorithms, Galgotia Publications.
2. Aho, A.V., Hopcroft, J.E., Ullman, J.D.: The Design and Analysis of Computer Algorithms, Addison-Wesley.
3. Bentley, J.L.: Writing Efficient Programs, Prentice-Hall India, Eastern Economy Edition.
4. Goodman, S.E. & Hedetniemi: Introduction to the Design and Analysis of Algorithms, McGraw-Hill Book Comp.
5. Knuth, D. E.: Fundamental of Algorithms: The Art of Computer Programming, Vol.-1, Naresh Publ.House.
6. Brassad, Gilles and Bartley, Paul: Fundamentals of Algorithms, Prentice Hall of India.
7. Mark Allen Weiss: Data Structure and Algorithms Analysis in C++, Pearson Education

**Paper Code: MS – 42**  
**Paper Title: Operating System Concepts**  
**Maximum Marks: 80**  
**Number of Lectures: 90**  
**(45 Minutes duration)**

<b>L</b>	<b>P</b>
<b>6</b>	<b>0</b>

**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.
2. **Process Management:** Process, Process state, Process Control Block; Process scheduling: Scheduling queues, Schedulers, Context switch; Operation on process: Process creation and termination; interrupt mechanism, threads, Scheduling Algorithms: Pre-emptive and non pre-emptive scheduling, FCFS, SJFS, RRS, priority scheduling, Multilevel queue scheduling, Multilevel feedback queue scheduling, Inter process communication: Shared memory systems, Message passing systems.

#### **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, Dining 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:**

1. Galvin P.B., Silberschatz A., Gagne G.: Operating System Concepts, Wiley Publications.
2. Deitel, H.M.: An Introduction to Operating System, Addison-Wesley Publishing Company.
3. Milenkovic, M.: Operating System - Concepts and Design, McGraw-Hill International Editions.
4. Madnick and Donovan: Operating System, McGraw-Hill Publishing Company.
5. Hansen P. Brineh: Operating System Principles, Prentice-Hall India.

## SEMESTER II

**Paper Code: MS – 45**

**Paper Title: Advance Java and Network Programming.**

**Maximum Marks: 80**

**Number of Lectures: 90**

**(45 minutes duration)**

<b>L</b>	<b>P</b>
<b>6</b>	<b>4</b>

**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.
8. **Java Server Pages:** Introduction, JSP Architecture, JSP Elements: Implicit Objects, Comments, Directives, Action Elements, Scripting Elements., developing simple Web Applications.

### **REFERENCES:**

1. Schildt, Herbert: The Complete Reference Java 2, TMH.
2. Ivan Bayross: Web Enabled Commercial Application Development using Java 2.0, BPB.
3. Cornell, Gary and Horstmann Cay S.: Core Java, Vol I and Vol II, Sun Microsystems Press.

4. Keogh, James: J2EE: The Complete Reference.
5. Martin Bond, Debbie Law, Andy Longshaw, Dan Haywood, Peter Roxburgh: SAMS: Teach Yourself J2EE in 21 days, Pearson.
6. Java 6 Programming Black Book, Kogent Solution Inc., Dream Tech Press.

**Paper Code: MS – 46**

**Paper Title: Emerging Trends in Computing**

**Maximum Marks: 80**

**Number of Lectures: 90**

**(45 minutes duration)**

<b>L</b>	<b>P</b>
<b>6</b>	<b>0</b>

**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:**

- 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. **Parallel Computing:** Introduction and use, Flynn's Classical Taxonomy: SISD, SIMD, MISD, MIMD; Parallel Computer Memory Architectures: Shared Memory, Distributed Memory, Hybrid Distributed-Shared Memory; Parallel Programming Models: Shared Memory Model, Threads Model, Distributed Memory/Message Passing Model, Data Parallel Model, Hybrid Model, SPMD and MPMP, Introduction to Parallel Virtual Machine and Message Passing Interface, Supercomputers.
2. **Cloud Computing:** Introduction and use, Architecture, Service Models: infrastructure as a service, platform as a service, and software as a service; **Grid computing:** Introduction and benefits, virtual organisations, grid Architecture and its relationship to other distributed technologies, grid application areas.

#### **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.
2. Joshy Joseph, Craig Fellenstein : Grid Computing, Pearson Education,
3. Han, Jiawei and Kamber Micheline: Data Mining Concepts and Techniques, Elsevier
4. Kamal, Raj, Mobile Computing, Oxford Higher Education.
5. Perkins, Mobile Computing, Pearson Education.
6. Gill, Nasib Singh: Software Engineering: Software reliability, Testing and Quality Assurance. Khanna book publishing
7. Barry Wilkinson, Michael Allen, Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers, Pearson Education.
8. Zarek Nabrzyski, Jennifer M. Schopf, Jan Weglarz: Grid Resource Management - State of the Art and Future Trends, Kluwer Academic Publishers.
9. Anahory, Sam and Murray, Dennis: Data Warehousing in the real world-A practical guide to building decision support systems, Pearson Education Asia.
10. Jochen Schiller: "Mobile Communications", PHI/Pearson Education.

**Paper Code: MS - 08**

**Paper Title: Electronic Commerce and Tools**

**Maximum Marks: 80**

**Number of Lectures: 90**

**(45 minutes duration)**

L	P
6	4

**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.
2. **Electronic Commerce:** An Introduction, Architectural Framework for E-Commerce, Traditional Approach vs E-Commerce, Anatomy of E-Commerce Applications, Electronic Commerce and media Convergence, E-Commerce Consumer & Organization Applications, problems and opportunities in e-commerce, legal issues, future of e-commerce.

## UNIT - II

3. **Electronic Payment Methods:** Types of Electronic Payment Systems, Digital Token Based Electronic Payment Systems, Smart cards and Electronic payment Systems, Credit Card-Based Electronic Payment Systems, Risk and Electronic payment Systems, Designing Electronic Payment Systems.
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

1. KalaKota, Ravi & Whinston, Andrew B.: Frontiers of Electronic Commerce; Addison Wesley.
2. Mary Sumner: Enterprise Resource Planning, Pearson Education.
3. Bajaj, Kamlesh & Nag, Debjani: E-Commerce-The Cutting Edge of Business; Tata McGraw- Hill.
4. Rajesh Ray: Enterprise Resource Planning – Text and cases, TMH.
5. Minoli, Daniel & Minoli, Emma: Web Commerce Technology Handbook; Tata McGraw Hill.
6. Kosiur, David: Understanding E-Commerce; Microsoft Press.

**Paper Code: MS - 47**  
**Paper Title: Artificial Intelligence**  
**Maximum Marks: 80**  
**Number of Lectures: 90**  
**(45 minutes duration)**

<b>L</b>	<b>P</b>
<b>6</b>	<b>8</b>

**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.
- 2. Search and Control Strategies:** Data driven and goal driven search; Uninformed search-Breadth -first Search and Depth-First Search methods; Heuristic Search Techniques - Hill Climbing, Best first Search, A\*, AO\*, Constraint satisfaction and means-ends analysis techniques.

#### **UNIT - II**

- 3. Knowledge Representation :** Information and Knowledge, Knowledge Acquisition and Manipulation, Issues in knowledge representation, Knowledge Representation Methods, Propositional Logic and First Order Predicate Logic, conversion to clausal form, Unification and Resolution Principle; Horn's Clauses, Semantic networks, Partitioned Semantic Nets, Frames, Scripts and Conceptual Dependencies.
- 4. Game Playing:** Minimax Search Procedure, Adding Alpha-Beta Cutoffs.

#### **UNIT - III**

- 5. Expert Systems :** Definition and Applications, Characteristics of Expert systems, Architecture of a typical expert system, Expert system Shells, Building an Expert System, Case studies of Expert Systems like MYCIN, Specific application of AI.
- 6. Natural Language understanding and Processing:** Complexity of the problem, Syntactic processing, Semantic Analysis, Pragmatic processing, Introduction to Perception and Action.

## 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:

1. Rich Elaine and Knight Kevin: Artificial Intelligence; Tata-McGraw Hill Company, New Delhi.
2. George F Luger; William A. Stubblefield: Artificial Intelligence; Structures and Strategies for Complex problem solving, Pearson Education.
3. Patterson, Dan W.: Introduction to Artificial Intelligence and Expert Systems, Prentice-Hall of India Pvt. Ltd., New Delhi.
4. Winston, P.H. and Horn, B.K.P.: LISP; Addison-Wesley Pub. Co.
5. Sangal, Rajeev: LISP Programming; Tata McGraw Hill Pub. Co. Ltd., New Delhi.
6. Bharti & Chaitany: Natural Language Processing, PHI.
7. Russel, Sturat & Norviig, Peter: Artificial Intelligence; A modern Approach; Person Education Pvt. Ltd.

## SEMESTER - III

**Paper Code: MS - 32**

**Paper Title: .NET FRAMEWORK AND C#**

**Maximum Marks: 80**

**Number of Lectures: 90**

**(45 minutes duration)**

<b>L</b>	<b>P</b>
<b>6</b>	<b>8</b>

**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.
4. **I/O and Object Serialization:** I/O: System. I/O, Streams, TextWriter, TextReader, BinaryWriter, Binary Reader, File Stream, File; Serialisation: Binary, SOAP, XML and Custom Serialisation.

### UNIT-III

5. **Writing Windows Forms Applications and Deploying Windows Forms Applications:** Writing Windows Forms Applications: Understanding Windows Forms, Window form controls, Menus, MDI Forms, Using Inheritance in Windows Forms, Using Common Dialog Controls, Deploying Windows Forms Applications: Introduction to deployment, Click Once deployment, Creating an Installation Package for project.
6. **Writing ASP .NET applications and Deploying ASP .NET Applications:** Introduction to ASP.NET, Using Validation Controls, Managing State in ASP.NET Web Applications, Deploying ASP.NET Applications with Windows Installer.

### 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:

1. Jones, Bradley L.: Sams Teach Yourself C# in 21 Days.
2. Balagurusamy, E.: Programming in C#, Tata McGraw-Hill.
3. Liberty, J.: Programming C#, O'Reilly.
4. Schildt, Herbert: The Complete Reference: C#, Tata McGraw-Hill.
5. Robinson: Professional C#, Wrox Press.
6. Jason Beres: SAMS Teach Yourself Visual Studio.Net in 21 days.
7. Watsel, Nagel, Pedersen, Reid, Skinne, White: Beginning Microsoft Visual C#, Wrox Publications.

**Paper Code: MS - 50**

**Paper Title: Linux System Administration**

**Maximum Marks: 80**

**Number of Lectures: 90 (45 minutes duration)**

<b>L</b>	<b>P</b>
<b>6</b>	<b>8</b>

**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:**

- 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 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

- 4. Using the File System :** Files Overview, Common types of files, filenames, Directories, Parent directories and sub-directories, The root directory, The home directory; Navigating the Linux file System: pwd command, Absolute and relative filenames; cd command, Creating and Deleting files: Cat, Creating Directories, Moving and Copying files, Moving and Copying with Wildcards, Moving Directories, Removing files and directories, Fear of Compression: The Zipless file, Important directories in the Linux file System: / , /home, /bin, /usr, /usr/bin, /usr/spool, /dev, /usr/bin, /sbin, /etc.
- 5. File and Directory Permissions:** File and Directory ownership, User and ownership, Groups, Changing group ownership, File Permissions, UMASK Setting, Changing File Permission, Changing directory permissions; Bash: What is Shell? How the Shell gets Started, The most common Shells; The Bourne Shell: Command-line Completion, Wildcards, Command History, Aliases, Input Redirection, Output Redirection, Pipelines Shell, Prompts, Job control, Customizing bash, bash commands, bash variables.

## UNIT-III

- 6. Linux - tcsh :** An Introduction to tcsh, Command completion, Wildcards, Command History, Aliases, Input and Output Redirection, Pipelines, Prompts, Job Control; Key Bindings, Correcting Spelling Errors, Pre-commands, Change directory Commands, Monitoring Logins and Logouts, Customizing tcsh, tcsh Command Summary, tcsh variables.
- 7. Shell Programming:** Creating and Running Shell Programs, Using variables: Assigning a value to a variable, Accessing the value of a variable, Positional Parameters and other Built-In Shell Variables; The Importance of Quotation Marks: The test Command, The tcsh Equivalent of the test command, Conditional Statements: if Statement, case Statement; Iteration Statements: for Statement, while Statement, until Statement, shift Command, select Statement, repeat Statement, Functions.
- 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

- 9. PERL:** Creating and Executing Perl Programs, Handling Data in Perl: Variables, Numbers, Strings, File Operators: Arrays, Perl Programming Constructs: Statement Blocks, If Statements, unless Statements, for Statements, for each Statements, while Statements, until Statements, Functions: Passing Arguments to Functions, Using Return Values; Perl Operators.
- 10. Linux for System Administrators:** System Administration Basics, The root Account, Starting and Stopping the System, Using LILO to Boot, Shutting Down Linux; Mounting File Systems: Mounting a Device, Creating a New file System, Un-mounting file Systems, Checking file Systems, Using a file as Swap Space; Compressing files with gzip and compress: Using tar, Backups, Setting up your System: Setting the System Name, Using a Maintenance Disk, Forgetting the root Password, Setting the Login Message.
- 11. Networking & Network Services:** Setting of DNS, Ping, WWW, e-mail.

## REFERENCES:

1. Tim Parker: Linux Unleashed, Techmedia Publishing House.
2. Norton, P.: Complete guide to LINUX, Techmedia.
3. Komarinski, M.: LINUX System Administration Handbook, AW.
4. John Goerzen: Linux Programming Bible, IDG Books, New Delhi.
5. Venkateshmurthy, M.G.: Introduction to Unix & Shell Programming, Pearson Education.
6. Linux Network Administration Guide by Tery Dawson, Gregor N. Purdy, Tony Bautts, Oreilly.

**Paper Code : MS – 51**  
**Paper Title : Software Testing and Management**  
**Maximum Marks : 80**  
**Number of Lectures :90**  
**(45 minutes duration)**

<b>L</b>	<b>P</b>
<b>6</b>	<b>0</b>

**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**

1. **Testing Process:** An overview, Software Testing, Objectives of Software Testing, Software Testing Process, Static and Dynamic Analysis, STEP Methodology, Elements of STEP and STEP Architecture.
2. **Metrics for Software:** Importance of Metrics to Software Project, Software Quality Metrics, Software Metrics: Product Metrics: Software Size Metrics, Control Complexity Metrics, Object Oriented Metrics, Software Quality Metrics.

#### **UNIT-II**

3. **Software Testing Techniques:** BBT & its Technique, Boundary Value Analysis, Cause-Effect Graph, white-Box Testing and its Techniques: Domain and Boundary Testing, Logic Based Testing, Data Flow Testing.
4. **Software Testing Strategies:** Characteristics, Integration Testing, Functional Testing, Object Oriented Testing, Alpha and Beta Testing.
5. **Software Quality Assurance:** Concepts and Standards, Quality Control, Quality Assurance, SQA Activities, Software Reviews, Formal Technical Reviews, Review Guidelines, Software Safety, CMM, TQM, Six Sigma, SPICE, Software Quality Assurance Metrics.

#### **UNIT-III**

6. **Quality Assurance:** Overview of Software Quality, Software Quality Attributes, Factors Affecting Software Quality, Building Software Quality Assurance Plan, Components of SQAP.
7. **Quality Management & Quality Models:** Software Quality System, Quality Management Principles, ISO 9000 Quality Standard, SEI Capability Maturity Model.

#### **UNIT-IV**

8. **Software Reliability:** Factors Affecting Software Reliability, Software Reliability vs Hardware Reliability, Software Reliability Metrics.

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.
10. **Risk Management and Change Management:** Software Risks, Risk Identification, Risk Projection, Risk Refinement, The RMMM Plan, Software Configuration Management, Baselines, Software Configuration Items, Configuration Audit, Configuration Management for Web Engineering.

**REFERENCES:**

1. Doutsch, Wills, Hall: Software Quality Engineering: A total Technique and management Approach,
2. Gill, Nasib Singh: Software Engineering: Software reliability, Testing and Quality Assurance. Khanna Book Publishing.
3. Robert T. Futrell, Donald F. Snafer, Linda I. Shafter: Quality Software Project Management Pearson Education.
4. William E. Perry, WILEY: Effective methods for Software Testing
5. D. Galin: Software Quality Assurance, Pearson Education.
6. Milind Limaye: Software Quality Assurance, McGraw-Hill.
7. A. C. Gillies: Software Quality: Theory & Practice, Cengage Learning.
8. Nina S Godbole: Software Quality Assurance – Principles and Practice, Narosa.

**Paper Code: MS – 14**

**Paper Title: Systems Approach to Management and Optimization Techniques**

**Maximum Marks: 80**

**Number of Lectures: 90**

**(45 minutes duration)**

<b>L</b>	<b>P</b>
<b>6</b>	<b>0</b>

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

**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. **Concepts of Computer Based Systems:** Data, Information, Information Systems, Model of computer based information system; Introduction to Management Information System, Decision Support System and Knowledge Based Systems.
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

- 4. Manufacturing Information System:** Model and subsystems including Accounting Information, Industrial Engineering, Inventory, Quality and Cost Subsystems.
- 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

- 7. Basics of Operations Research (OR):** Origin and Development of OR, Characteristics of OR, Models in OR, OR and Decision Making, Role of Computers in OR, Limitations of OR.
- 8. Linear Programming:** Mathematical Formulation, Graphical and Simplex method, Duality in Linear programming, Dual Simplex Method, The Revised Simplex Method, Sensitivity Analysis.

## UNIT-IV

- 9. Special types of Linear Programming problems:** Transportation and Assignment problems.
- 10. Integer Programming:** Introduction, Branch and Bound Techniques, Binary Linear Programming, Assignment & Traveling salesman problems.
- 11. Dynamic Programming:** Deterministic & Probabilistic Dynamic Programming.

## REFERENCES

1. Basandra, Suresh K. : Computer Systems Today, Wheeler Publishing
2. Murdick, R.G. & Ross J.E. & Claggtt J.R.: Information Systems for Modern Management, Prentice Hall
3. Swarup, Kanti, Gupta, P.K. & Manmohan: Operations Research, Sultan Chand & Sons.
4. Gupta, Prem Kumar & Hira, D.S.: Operations Research.
5. Rao, S. S.: Introduction to Optimization: Theory & Applications, Wiley Eastern.
6. Taha, H.A.: Operations Research – An Introduction, McMillan Publishing Company
7. S.D. Sharma: Operation Research, Sultan Chand & Sons.

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