

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 2020- 2021

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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 2020- 2021.

FIRST YEAR					
FIRST SEMESTER					
Paper Code	Paper Name	Theory & Practical Lectures	Univ. Exam. Marks	Int. Exam. Marks	Exam. Hours
MS-66	Linux Administration and Programming	6	80	20	3
MS-61	Software Engineering	6	80	20	3
MS-62	Computer Algorithms	6	80	20	3
MS-42	Operating System Concepts	6	80	20	3
MS-63	Minor Project Based on 66	6	80	20	3
MS-64	Minor Project Based on 62	6	80	20	3
SECOND SEMESTER					
MS-45	Advance Java and Network Programming	6	80	20	3
MS-65	E- Commerce and Emerging Trends	6	80	20	3
MS-60	Advanced Database System and MySQL	6	80	20	3
MS-67	Artificial Intelligence	6	80	20	3
MS-27	SEMINAR	2	-	50	
MS-56	Minor Project Based on MS-45& MS-60	6	80	20	3
MS-68	Minor Project Based on MS-67	6	80	20	3
SECOND YEAR					
THIRD SEMESTER					
MS-32	.NET Framework and C#	6	80	20	3
MS-69	Theory of Computation	6	80	50	3
MS-39	Computer Graphics	6	80	20	3
MS-14	Systems 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-59	Minor Project Based on MS- 39	6	80	20	3
FOURTH SEMESTER					
MS-21	Major Project		320	80	

The project period will be of 6 months duration.

The project will involve development of application/system software in industrial/ commercial/ scientific environment

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 - 66

Paper Title: Linux Administration and Programming

Maximum Marks: 100 (External : 80 + Internal : 20)

Time : 3 Hrs.

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 for Linux server administration
- Write the shell programs, PERL programs and C-program with system calls

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:** Functions of an operating system, Linux's History, different flavors of Linux, Minimum System Requirements for installing Linux: Using LILO; Linux's fdisk.
2. **Using Linux:** Starting and Stopping your Linux System, Linux Shutdown Commands, Login, Passwords; Linux Error Messages, Search Paths, Input and Output Redirection, Man pages, Wildcards: * and ?, Environment Variables, process Commands: ps, kill, su command; GREP pattern searching command, vi text-editor.

UNIT-II

3. **Using the File System :** Files Overview, Common types of files, file and directory management commands, Absolute and relative filenames; pwd, cd, rm, cat, mkdir, mv, cp;, Important directories in the Linux file System: / , /home, /bin, /usr, /usr/bin, /usr/spool, /dev, /usr/bin, /sbin, /etc.
4. **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; Bourne Again Shell (BASH): Command-line Completion, Wildcards, Command History, Aliases, Pipelines, setting shell prompts, Job control, Customizing bash, bash variables.

UNIT-III

5. **Shell Programming:** Creating and Running Shell Programs, Using variables, Positional Parameters and other built-in Shell Variables; importance of quotation marks, test Command, Conditional Statements: if Statement, case Statement; Iteration Statements: for Statement, while Statement, until Statement, shift Command, select Statement, repeat Statement, Functions.

- 6. Linux for System Administrators:** System Administration Basics, The root Account, Starting and Stopping the System; Mounting File Systems: Mounting a Device, Creating a New file System, Un-mounting file Systems, Checking file Systems, Compressing files with gzip and compress: Using tar, Backups, Setting the Login Message, Setting of DNS, Ping, WWW, and e-mail.

UNIT-IV

- 7. 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.
- 8. System Calls:** C as System Programming Language, I/O system calls – umask(); create(); open(); read(); write(); lseek(); dup(); link(); access(); chmod(); chown(); Process management system calls; fork(); getpid(); getppid(); exit(); wait(); sleep() ; Signal system calls – kill(); signal().

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 – O'Reilly.
7. Stones, Richard and Mathew Neil: Beginning Linux Programming, 3rd Edition, Wrox.
8. Jones, Tim: GNU/Linux Application Programming, Wiley India Pvt. Ltd.

Paper Code: MS - 61

Paper Title: Software Engineering

Maximum Marks: 100 (External : 80 + Internal : 20)

Time : 3 Hrs.

Number of Lectures: 90 (45 Minutes duration)

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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 goals, Characteristics of well-engineered software, Software Process Models: Waterfall Model, Prototyping Model, Spiral Model, RAD, Agile Modelling.
2. **Software Requirement Specification (SRS):** Software Requirements, Definition of SRS, Characteristics of SRS, Components of SRS, Designing of SRS.
3. **System Analysis:** Principles of Structures Analysis, DFDs, E-R Diagrams, Data Dictionary.

UNIT - II

4. **Software Design:** Design Objectives, Design Principles, Concepts, Design Process, Design Methodologies: Structured Design, Modular Design, Object Oriented Design, User Interface Design and its elements and its Characteristics.
5. **Software Project Planning & Scheduling:** Objectives, Decomposition techniques, Planning and Scheduling Tools: GANTT Chart, PERT Chart, Critical Path Method and Work Breakdown Structure; Cost estimation, Cost estimation Models: Single Variable Model, COCOMO Model; Software Risks, Risk Assessment.

UNIT - III

6. **Software Metrics:** Role of Metrics and Measurement, Types of Software Metrics: Product Metrics, Software Size Metrics: LOC and Function Points, Process Metrics, People Metrics.
7. **System Maintenance and Reliability:** Maintenance and its types; Factors Affecting Software Reliability, Software Reliability vs Hardware Reliability, Software Reliability Metrics.

UNIT-IV

8. **Software Testing Techniques:** Introduction to Software Testing Process, Objectives of Software Testing. BBT & its Techniques: Boundary Value Analysis, Equivalence Class Testing, and Cause- Effect Graph, White-Box Testing and its Techniques: Domain and Boundary Testing, Logic Based Testing, Data Flow Testing and Basic Path Testing.
9. **Software Testing Strategies:** Characteristics, Integration Testing, Functional Testing, Object Oriented Testing, Alpha and Beta Testing.

REFERENCES:

1. Pressman : Software Engineering, Tata-McGraw Hill Publishing House.
2. Sommerville, I: Software Engineering, Pearson Education.
3. Rajib Mall: Fundamentals of Software Engineering, PHI Learning Pvt. Limited
4. Jalota, Pankaj: An integrated approach to Software Engineering, Narosa Publishing Company.
5. Ali Behforooz : Software Engineering Fundamentals, Oxford University Press. Frederick J.H
6. William E. Perry, WILEY: Effective methods for Software Testing
7. Gill, Nasib Singh: Software Engineering: Software reliability, Testing and Quality Assurance. Khanna Book Publishing

Paper Code: MS - 62

Paper Title: Computer Algorithm

Maximum Marks: 100 (External : 80 + Internal : 20)

Time : 3 Hrs.

Number of Lectures: 90 (45 Minutes duration)

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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. Introduction to Data Structures:** Definition, Types of Data Structures, Stacks and its operations(Push, Pop), Queue and its operations (Insert, Delete), Tree (Binary Tree, General Tree and its Traversal), Graph(Types and its Traversal).
- 2. Algorithms and Analysis:**Definition; Analysing algorithms; space and time complexity, Asymptotic Notation (O , Ω , θ) practical complexities, Best, average and worst case performance of algorithms, examples, Recursive algorithms, Introduction to recurrence relations.

UNIT – II

- 3. Divide and Conquer:** General method, Binary search, Merge sort, Quick sort, Selection problem, Strassen's matrix multiplication and analysis of these problems.
- 4. 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.

UNIT - III

- 5. Dynamic Programming:** General method, Optimal binary search trees, 0/1 Knapsack, the traveling salesperson problem, Single Source Shortest Path Problem (Bellman Ford Algorithm), All pair shortest path problem (Floyd's Algorithm).
- 6. Back Tracking:** General method, N queen's problem, Graph coloring, Hamiltonian cycles, Analysis of these problems.

UNIT - IV

- 7. Branch-And-Bound:** General Method, 0/1 Knapsack, Traveling Salesperson problems.
- 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. Lipschutz, Seymour, 1986: Theory & Problems of Data Structures, Schaum Series.
2. Horowitz, Ellis and Sahni, Sartaj: Fundamentals of Computer Algorithms, Galgotia Publications.
3. Aho, A.V., Hopcroft, J.E., Ullman, J.D.: The Design and Analysis of Computer Algorithms, Addison-Wesley.
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, NareshPubl.House.
6. Brassad, Gilles and Bartley, Paul: Fundamentals of Algorithms, Prentice Hall of India.

Paper Code: MS - 42

Paper Title: Operating System Concepts

Maximum Marks: 100 (External : 80 + Internal : 20)

Time : 3 Hrs.

Number of Lectures: 90 (45 Minutes duration)

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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, Peterson's solution; 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. Brinch: Operating System Principles, Prentice-Hall India.

SEMESTER II

Paper Code: MS - 45

Paper Title: Advance Java and Network Programming.

Maximum Marks: 100 (External : 80 + Internal : 20)

Time : 3 Hrs.

Number of Lectures: 90(45 minutes duration)

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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 Prepared Statement, 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, PeterRoxburgh: SAMS: Teach Yourself J2EE in 21 days, Pearson.
6. Java 6 Programming Black Book, Kogent Solution Inc., Dream Tech Press.

Paper Code: MS – 65

Paper Title: E-Commerce and Emerging Trends

Maximum Marks: 100 (External : 80 + Internal : 20)

Time : 3 Hrs.

Number of Lectures: 90 (45 minutes duration)

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Objectives: This course enables students to be familiar with Fundamentals of Electronic Commerce and Emerging Technologies such as Parallel Computing, Cloud Computing, Grid Computing, Mobile Computing, and Concept of Big Data.

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. **Electronic Commerce:** Traditional Commerce vs Electronic Commerce, Types of E-Commerce, E-Commerce infrastructure: Hardware and Software requirements, **Electronic Data Interchange (EDI):** EDI enabled procurement process and its benefits; Components of EDI system: EDI standards, EDI software, communication networks; **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.

2. **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; Digital Signatures.

UNIT-II

4. **Business Intelligence:** Introduction to Business Intelligence, Digital data and its types – structured, semi-structured and unstructured, Introduction to Online Transaction Processing (OLTP), Online Analytical Processing (OLAP), Different OLAP architectures: MOLAP, ROLAP, HOLAP, Comparison of OLTP and OLAP. BI Definitions and need, BI Component Framework, Business Applications of BI.

5. **Case Studies:** Supply Chain management, Banking, Online Reservation Systems, Online Publishing

UNIT-III

6. **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.

7. **Cloud Computing:** Introduction and use, Architecture, Service Models: infrastructure as a service, platform as a service, and software as a service;

UNIT-IV

8. Grid computing: Introduction and benefits, virtual organisations, grid Architecture and its relationship to other distributed technologies, grid application areas.

9. 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. Ravi KalaKota and Andrew B. Whinston: Frontiers of Electronic Commerce, Addison Wesley 1996
2. Kamlesh K. Bajaj and Debjani Nag: E-Commerce The Cutting Edge of Business, McGraw Hill Education.
3. R. N. Prasad and Seema Acharya , Fundamentals of Business Analytics , Wiley 2011
4. M. Sasikumar, Dinesh Shikhare, P. Ravi Prakash: Introduction to Parallel Processing, PHI.
5. Barry Wilkinson, Michael Allen, Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers, Pearson Education.
6. Joshy Joseph, Craig Fellenstein : Grid Computing, Pearson Education.
7. ZarekNabrzyski, Jennifer M. Schopf, Jan Weglarz: Grid Resource Management - State of the Art and Future Trends, Kluwer Academic Publishers.
8. Kamal, Raj, Mobile Computing, Oxford Higher Education.
9. Perkins, Mobile Computing, Pearson Education.
10. Jochen Schiller: "Mobile Communications", PHI/Pearson Education.

Paper Title : Advanced Database System and MySQL

Paper Code: MS-60

Maximum Marks: 100 (External : 80 + Internal : 20)

Time : 3 Hrs.

Number of Lectures: 90 (45 Minutes duration)

Objectives:

The course aims at providing the students through insight on few DBMS principles and practices. Students will learn and implement the operations for making and using databases with help of SQL and PL/SQL.

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. **Database Management Systems:** Definition, Characteristics, Advantages of Using DBMS Approach, Classification of DBMSs, Data Models, Database Schema and Instance, Three Schema Architecture, Data Independence – Physical and Logical data Independence.
2. **Entity- relationship model:** Entities, Relationships, Representation of entities, attributes, Representation of relationship set, Generalization, aggregation.
3. **Normalization:** Functional Dependency, Full Functional Dependency, Partial Dependency, Transitive Dependency, Normal Forms– 1NF, 2NF, 3NF, BCNF, Multi-valued Dependency.

UNIT - II

4. **Relational Algebra and Relational Calculus:** Relational Algebra: Operations- Union, Intersection, Difference, Cartesian product, Projection, Selection, Division and relational algebra queries; Relational Calculus: Tuple oriented and domain oriented relational calculus and its operations.
5. **Transaction and Concurrency control:** Concept of transaction, ACID properties, Serializability, States of transaction, Concurrency control: Locking techniques, Time stamp based protocols, Granularity of data items, Deadlock.

UNIT - III

6. **MySQL:** Introduction; Why MySQL; Tools provided with MySQL; MySQL Architectural Terminology; Databases: Creating, Selecting, Dropping and Altering Databases; Tables: Creating, dropping, Altering, Indexing Tables; Adding new rows, Retrieving Information, Deleting or Updating Existing rows; Obtaining MySQL Metadata; Joins; Subqueries; Views; Multiple Tables Deletion and Updation; Foreign Keys and Referential Integrity; MySQL Data Types; Sequences.

UNIT - IV

10. **Data Warehousing:** Introduction; Features; Data modeling for Data Warehousing; Building Data warehouse; Comparison between Data Warehouse and DBMS Metadata; Problems and issues in Data Warehouse.
11. **Data Mining:** Overview; Goals of Data Mining; Techniques: Association rules(Market Basket Algorithm, Apriori Algorithm); Classification: Decision Tree, Induction Algorithm; Applications of Data Mining.

References:

1. Elmarsi&Navathe, "Fundamentals of Database Systems" 4th Edition, 2004.
2. Jiawei Han and MichelineKamber, "Data Mining: Concepts and Techniques", Elsevier.
3. William H. Inmon, "Building the Data Warehouse",Fourth Edition, Willey.
4. C.J.Date "Introduction to database system", 8th Edition, Galgotia Publications, 2004.
5. Paul DuBois, "MySQL Developer's Library", Fourth Edition, Addison Wesley.
6. Bipin C. Desai, An Introduction to Database System
7. Silberschatz, Korth, Sudershan "Database System Concepts" 4th Edition, McGraw Hill Education, 2002.
8. Ivan Bayross, "SQL/PLSQL: The Programming Language of Oracle, 3rd Revised Edition, 2006

Paper Code: MS - 67

Paper Title: Artificial Intelligence

Maximum Marks: 100 (External : 80 + Internal : 20)

Time : 3 Hrs.

Number of Lectures: 90 (45 minutes duration)

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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 PROLOG.

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, Resolution: Definition, Conversion to ClauseForm, Resolution in Propositional and Predicate Logic, 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. Definition of Neurons, Communication and Learning in Neural Networks, Definition of Fuzzy / Logic set.

- 6. Natural Language understanding and Processing:** Complexity of the problem, Syntactic processing: Grammars and Parsers, Augmented Transition Networks; Semantic Analysis: Semantic Grammars, Case Grammars; Discourse and Pragmatic processing: Using Focus in Understanding, Modeling Beliefs; Introduction to Perception : Vision using Low-Level and High-Level Image Features and Action: Navigation and Manipulation.

UNIT - IV

- 7. AI Language PROLOG:** Features of Prolog, Elementary Data Types, Compound objects in Prolog, Writing simple program in Prolog, Understanding Default flow control of the Prolog Program, Controlling Program Flow with cut and fail, List Manipulation, String manipulation, Arithmetic Operators and evaluation of Arithmetic expressions, Input /Output statement. Some simple example problems: Tower of Hanoi, Sorted Tree Dictionary, Sorting, Searching Graphs, Searching a Maze.

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. W.F. Clifisin and C.S. Mellish, "Programming in PROLOG", Narosa Publishing Co.
5. SanjivaNath, "Turbo PROLOG", Galgotia Publications Pvt. Ltd.
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: 100 (External : 80 + Internal : 20)

Time : 3 Hrs.

Number of Lectures: 90(45 minutes duration)

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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 Title: THEORY OF COMPUTATION

Paper Code: MS - 69

Maximum Marks: 100 (External : 80 + Internal : 20)

Time : 3 Hrs.

Number of Lectures: 90 (45 minutes duration)

Objectives:

The goal of this course is to provide students with an understanding of basic concepts of Theory of Computation.

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.

UNIT I

1. **Theory of Automata:** Definition, Description of Automata, Transition Systems, Language, Grammar, Deterministic & Non-Deterministic Finite State Machines, Equivalence of DFA and NDFA, Finite State Machine with output (Moore Machine and Meally Machine), Conversion of Moore Machine to Meally Machine & vice-versa, Minimization of Finite Automata.
2. **Formal Languages:** Chomsky Classification of Languages, Languages and their Relations, Languages and Automata.

UNIT II

3. **Regular Sets and Regular Grammars:** Regular Expressions, Finite Automata and Regular Expressions, Conversion of NDFA to DFA, Arden's Theorem, Construction of FA equivalent to Regular Expression, Equivalence of two Finite Automata, Equivalence of two Regular Expressions, Pumping lemma for Regular Sets and applications, Closure Properties of Regular Sets, Construction of Regular Grammar generating Transition System for a DFA, Construction of Transition System accepting Language for a Regular Grammar , limitations of finite state machine.

UNIT III

4. **Context Free Languages:** Context free grammar, Simplification of Context Free Grammars, Normal Forms for Context Free Grammers: Chomsky Normal Form, Greibach Normal Form, Pumping Lemma, CYK algorithm.
5. **PDA:** Push down stack machine, Design of deterministic and non-deterministic push-down stack, Parser design.

UNIT IV

6. **LR(K) Grammars:** Properties of LR(K) Grammar, Closure properties of Languages.
7. **Turing Machine:** Turing machine definition and design of Turing Machine, Church-Turing Thesis, Variations of Turing Machines, combining Turing machine, Universal Turing Machine, Post Machine, Chomsky Hierarchy, Halting problem, Post Correspondence problem.

References:

1. Mishra, K.L.P and Chandrasekaran, N.: Theory of Computer Science, Automata, Languages and Computation.
2. Lewis, Harry R. and Papadimitriou, Christos H.: Theory of Computation, Prentice Hall of India, 1996.
3. Hopcroft, John E. and Ullman, Jeffrey D.: Introduction to Automata Theory, Languages and Computation, Addison-Wesley Publishing Company Inc.
4. Brady, J.M.: Theory of Computer Science, Wiley.
5. A.V. Aho, J.E. Hopcroft and J.D. Ullman, 'Introduction to Automata, Languages and Computations, Addison Wesley, 1980.
6. M.Davis and E.J. Weyuker 'Computability, Complexity and Languages' Academic Press, 1982.

Paper Code: MS – 39

Paper Title: Computer Graphics

Maximum Marks: 100 (External : 80 + Internal : 20)

Number of Lectures: 90 (45 minutes duration)

Time : 3 Hrs.

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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, 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:** 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 – 14

Paper Title: Systems Approach to Management and Optimization Techniques

Maximum Marks: 100 (External : 80 + Internal : 20)

Time : 3 Hrs.

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:

- 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.
