Integral University, Lucknow  
Department of Computer Application  

STUDY AND EVALUATION SCHEME  

Master of Computer Application (MCA)  

w.e.f. Session 2015-16  

<table>
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<tr>
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**Year II\textsuperscript{nd} Sem IV\textsuperscript{th}**  

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Elective I
1. IMCA-402 (1) Data Warehousing and Data Mining
2. IMCA-402 (2) Cloud Computing
3. IMCA-402 (3) Big Data Analytics
4. IMCA-402 (4) Advanced Concepts in Database System

Elective II
1. IMCA-404 (1) Cryptography and Network Security
2. IMCA-404 (2) ERP Systems
3. IMCA-404 (3) Storage Technology and Management
4. IMCA-404 (4) Real Time Systems
UNIT-I
**Introduction to Distributed Systems:** Introduction, System Architecture, Issues in Distributed System; Global Knowledge, Naming, Scalability, Compatibility, Process Synchronization, Security, Theoretical Foundation for Distributed Systems

**Limitation Of Distributed Systems:** Absence of Global Clock and Shared Memory, Lamport’s Logical Clock, Vector Clocks, Causal Ordering of Messages, Global State, Termination Detection. [9]

UNIT-II
**Distributed Mutual Exclusion:** Introduction, Classification of Mutual Exclusion Algorithms, Requirement of Mutual Exclusion algorithms, Non-Token Based and Token based algorithms. Comparative Performance Analysis.

**Distributed Deadlock Detection:** System Model, Resource Vs Communication Deadlock, Deadlock Handling Strategies: Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Resolution, Centralized and Distributed Deadlock Detection algorithms. [9]

UNIT-III
**Agreement Protocols:** Introduction, System Model.

**Classification Of Agreement Problem:** Byzantine Agreement problem, Consensus problem, Interactive Consistency problem, Solution to Byzantine Agreement problem, Application of Agreement problem.

**Distributed File Systems:** Introduction, Architecture. Building Mechanism: Mounting Caching, Hints, Bulk Data Transfer, and Encryption. Design Issues: Naming and Name Resolution, Caches on Disk or Main Memory, Writing Policy. [9]

UNIT-IV
**Distributed Shared Memory:** Introduction, Architecture And Motivation, Algorithm for Implementing DSM, Memory Coherence, Coherence Protocols.


UNIT V
REFERENCES:

UNIT-I
Dss-Uses, Definition, Operational Database, Introduction to Data Warehousing, Data-Mart, Concept of Data-Warehousing, Multi Dimensional Database Structures, Client/Server Computing Model and Data Warehousing. Parallel Processors and Cluster Systems, Distributed DBMS Implementations. [8]

UNIT-II
Data Warehousing , Data Warehousing Components, Building a Data Warehouse, Warehouse Database, Mapping the Data Warehouse to a Multiprocessor Architecture, DBMS Schemas for Decision Support, Data Extraction, Cleanup and Transformation tools, Metadata. [8]

UNIT-III
Business Analysis, Reporting and Query Tools, Applications, Online Analytical Processing (OLAP), Patterns and Models, Statistics, Artificial Intelligence. [8]

UNIT-IV
Knowledge Discovery, Data Mining, Introduction to Data-Mining, Techniques of Data-Mining, Decision Trees, Neural Networks, Nearest Neighbor and Clustering, Genetic Algorithms, Rule introduction, Selecting and using the right technique. [8]

UNIT-V
Multimedia Data-Mining, Multimedia-Databases, Mining Multimedia Data, Data-Mining and the World Wide Web, Web Data-Mining, Mining and Meta-Data, Data Visualization and Overall Perspective, Data Visualization, Applications of Data-Mining [8]

REFERENCES:
1. Berson, “Data Warehousing, Data-Mining and OLAP”, TMH
5. Margaret H. Dunham, “Data-Mining. Introductory and Advanced Topics”, Pearson Education
UNIT-I

**Introduction to Cloud Computing:** Defining Cloud Computing

**Cloud Types:** The NIST Model, Cloud Cube Model, Deployment Models and Service Models.


UNIT-II

**Cloud Computing Architecture:** Comparison with Traditional Computing Architecture (Client/Server), Cloud Computing Stack, Connecting to the Cloud.

**Introduction to Service Models:** Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Defining Identity as a Service (IDaaS) and Defining Compliance as a Service (CaaS).

UNIT-III

**Abstraction and Virtualization:** Virtualization and Cloud Computing, Types of Hardware Virtualization: Full, Partial, and Para.

**Virtualization:** Software Virtualization, Memory Virtualization, Storage Virtualization, Data Virtualization and Network Virtualization. Load Balancing, Abstraction technique using Hypervisors, Machine Imaging.

**Capacity Planning:** Defining Baseline and Metrics, Network Capacity, Scaling.

UNIT-IV


**Securing Data:** Brokered Cloud Storage Access, Storage Location and Tenancy, Encryption, Auditing and Compliance.


UNIT-V

**Service Oriented Architecture (SOA):** Introduction to SOA, Defining SOA Communications, Managing and Monitoring SOA, Relating SOA and Could Computing.

**Cloud Based Storage:** Measuring the Digital Universe, Provisioning Cloud Storage, Exploring Cloud Backup Solutions and Cloud Storage Interoperability.
REFERENCES:

UNIT I

UNIT II

UNIT III
Hadoop: History of Hadoop, Hadoop Distributed File System (HDFS), Components of Hadoop, Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Design of HDFS, Developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce job run, Job Scheduling, Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features. [8]

UNIT IV
Hadoop Environment: Setting up a Hadoop Cluster, Cluster specification, Cluster Setup and Installation, Hadoop Configuration, Security in Hadoop, Administering Hadoop, Monitoring, Maintenance, Hadoop benchmarks, Hadoop in the cloud. [8]

UNIT V
Frameworks: Applications on Big Data Using Pig and Hive, Data processing operators in Pig, Hive services, HiveQL, Querying Data in Hive, Fundamentals of HBase and ZooKeeper, IBM InfoSphere Big Insights and Streams. Visualizations - Visual data analysis techniques, interaction techniques, Systems and applications. [8]

REFERENCES:
10. Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author), Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, 2013
UNIT-I

**Query Processing, Optimization and Database Tuning:** Algorithms for Executing Query Operations. Heuristics for Query Optimizations, Estimations of Query Processing Cost, Join Strategies for Parallel Processors, Database Workloads, Tuning Decisions, DBMS Benchmarks, Clustering and Indexing, Multiple attribute search keys, Query Evaluation Plans, Pipelined Evaluations, System Catalogue in RDBMS.

UNIT-II

**Extended Relational Model and Object Oriented Database System:** New Data Types, User Defined Abstract Data Types, Structured Types, Object Identity, Containment, Class Hierarchy, Logic based Data Model, Data Log, Nested Relational Model and Expert Database System.

UNIT-III

**Distributed Database System:** Structure of Distributed Database, Data Fragmentation, Data Model, Query Processing, Semi Join, Parallel and Pipeline Join, Distributed Query Processing in R * System, Concurrency Control in Distributed Database System, Recovery in Distributed Database System, Distributed Deadlock Detection and Resolution, Commit Protocols.

UNIT-IV


UNIT-V


REFERENCES:

1. Majumdar and Bhattacharya, “Database Management System”, TMH.
4. Data C J,” An Introduction to Database System”, Addison Wesley.
UNIT- I
Core Java: Introduction, Operators, Data Type, Variable, Arrays, Control Statements, Methods and Classes, Inheritance, Package and Interface, Exception Handling, Multithread Programming and String Handling. [8]

UNIT- II

UNIT-III
JDBC: The Connectivity Model, JDBC Drivers, Java SQL Package, Connectivity to Remote Database, Navigation in Database.
RMI: Introduction to RMI (Remote Method Invocation): A simple Client-Server application using RMI [8]

UNIT-IV

UNIT-V

REFERENCES:
1. Margaret Levine Young, “The Complete Reference Internet”, TMH.
2. Naughton, Schildt, “The Complete Reference JAVA2”, TMH.
3. Balagurusamy E, “Programming In JAVA”, TMH.
UNIT-I

UNIT-II

UNIT-III

UNIT-IV

UNIT-V

REFERENCES:
UNIT-I
Enterprise wide information system, Custom built and packaged approaches, Needs and Evolution of ERP Systems, Common myths and evolving realities, ERP and Related Technologies, Business Process Reengineering and Information Technology, Supply Chain Management, Relevance to Data Warehousing, Data Mining and OLAP, ERP Drivers, Decision support system. [8]

UNIT-II
ERP Domain, ERP benefits classification, Present global and Indian market scenario, Milestones and pitfalls, Forecast, Market players and profiles, Evaluation criterion for ERP product, ERP Life Cycle: Adoption decision, Acquisition, Implementation, Use and Maintenance, Evolution and Retirement phases, ERP Modules. [8]

UNIT- III
Framework for evaluating ERP acquisition, Analytical Hierarchy Processes (AHP), Applications of AHP in evaluating ERP, Selection of Weights, Role of consultants, vendors and users in ERP implementation; Implementation vendors evaluation criterion, ERP Implementation approaches and methodology, ERP implementation strategies, ERP Customization, ERP-A manufacturing Perspective. [8]

UNIT- IV
Critical success and failure factors for implementation, Model for improving ERP effectiveness, ROI of ERP implementation, Hidden costs, ERP success inhibitors and accelerators, Management concern for ERP success, Strategic Grid, Useful guidelines for ERP Implementations. [8]

UNIT- V
Technologies in ERP Systems and Extended ERP, Case Studies of Development and Analysis of ERP Systems, Implementations in focusing the various issues discussed in above units through Soft System approaches or qualitative Analysis tools, Learning and Emerging Issues, ERP and E-Commerce. [8]

REFERENCES:

UNIT-I

Introduction to Storage Technology: Data Proliferation and the varying value of Data with time and usage, Sources of data and States of data creation, Data Center need and its requirements, Evolution of Storage, Overview of basic Storage Management skills and activities, The five pillars of Technology, Overview of Storage Infrastructure Components, Information Lifecycle Management concept, Data categorization within an enterprise. [8]

UNIT-II


UNIT-III

Introduction to Networked Storage: Storage Domain: DAS (Direct attached Storage), Elements, Connectivity and Management, NAS(Network Attached Storage),Elements, NFS, CiFS, FTP, Filers and Appliances, Configuration and Management, SAN(Storage Area Network),Elements, FCP, ISCSI,FCIP,SAN Configuration and Management, CAS (Content Addressable storage),Elements, Connectivity and Management Storage Interfaces: SCSI, SATA, IDE, Storage Virtualization at various layers, HA Solutions, Advantages and uses. [8]

UNIT-IV


UNIT-V

REFERENCES:


IMCA-404(4) REAL TIME SYSTEMS
w.e.f. Session 2015-16

UNIT-I

UNIT-II
Task Assignment and Scheduling-Classical Uniprocessor Scheduling Algorithm, Rate Monotonic, EDF, Uniprocessor Scheduling of IRIS Tasks: Identical and Non identical Linear and Concave Reward Function, 0/1 Reward Function. Task Assignment Algorithms- Utilization Balancing, A Next-Fit Algorithm for RM Scheduling, A Myopic Offline Scheduling FAB Algorithm and Buddy Strategy. [10]

UNIT-III
Real Time Database: Real Time vs. General purpose Database, Main Memory Database, Concurrency Control issues, Real Time OS: Threads and Tasks, Kernel, Case Study of Maruti II, HART OS, VRTX. [8]

UNIT-IV

UNIT-V

REFERENCES:
UNIT-I
Introduction to Compiler: Structure of a Compiler, Lexical analysis, Syntax analysis, Intermediate code, Optimization, Bookkeeping, Error handling, Bootstrapping.
Finite Automata and Lexical Analysis: A Simple approach to the design of Lexical analyzers, Regular expressions, Finite automata, Regular expressions convert into finite automata, Minimization or Optimization of a DFA, A language for specifying Lexical analyzer, Implementation of a Lexical analyzer. [7]

UNIT-II
The Syntactic Specification of Programming Languages: Context Free Grammars (CFG), Derivation and Parse trees, Capabilities of CFG.
Basic Parsing Techniques: Parsers, Shift Reduce parsing, Operator Precedence parsing, Top down parsing, Predictive parsers. [9]

UNIT-III
Automatic Construction of Efficient Parsers: LR Parsers, Canonical collection of LR (0) items, Constructing SLR parsing tables, Constructing canonical LR parsing tables, Constructing LALR parsing tables, Using ambiguous grammars, An automatic parser generator, Implementation of LR parsing tables, Constructing LALR sets of items. [8]

UNIT-IV
Syntax-directed Translation: Syntax-Directed Translation Schemes, Implementation of syntax directed translators, Intermediate code, Postfix notation, Parse trees and Syntax trees, Three address code, Quadruple and Triples, Translation of assignment statements, Boolean expressions, Statements that alter the flow of control, Postfix translation, Translation with a top down parser.
More about translation: Array references in arithmetic expressions, Procedures call, Declarations, Case statements.
Symbol Tables: Data structure for symbols tables, Representing scope information. [9]

UNIT-V
Run-Time Administration: Implementation of simple stack allocation scheme, Storage allocation in block structured language.
Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.
Introduction to code optimization: Loop optimization, DAG Representation of basic blocks, Value numbers and Algebraic laws, Global data-flow analysis. [7]
REFERENCES:

2. Santanu Chattopadhyay, “Compiler Design”, PHI.
UNIT I
Introduction to Computer Graphics: Definition, Application, Pixel and Frame Buffer, Raster and Random Scan display, Display devices-CRT, Color CRT Monitors, Scan Conversion of line-DDA algorithm of line drawing, Bresenham's Line Algorithm, Midpoint Circle Algorithm, Polygon Filling-Scan line polygon filling algorithm, Flood Fill Algorithm and Boundary-Fill Algorithm.

UNIT II
Segments and Display Files: Segment Table, Creating, Deleting, and Renaming Segments.
Windowing and Clipping: Window to view port transformation, Point Clipping, Line Clipping (Cohen Sutherland line clipping, Liang Barsky Line Clipping Algorithm), Polygon clipping, Sutherland and Gary Hodgman polygon clipping algorithm.

UNIT III

UNIT IV
Transformation (2D and 3D): 2-Dimensional Transformation: Translation, Rotation, Scaling, Matrix Representation and Homogeneous Coordinate, Composite Transformation including General Pivot Point Rotation, General Fixed Point Scaling, Reflection, Shearing. 3-dimensional transformation, Translation, Rotation, Scaling, Reflection, Shear.

UNIT V
3D Animation: Introduction to 3D Studio Max, Exploring the Max Interface, Controlling and Configuring the view ports, Working with Files, Importing and Exporting, Creating and Editing primitive Objects, Selecting and Setting Object properties, Transforming objects, Pivoting, Aligning, Snapping and Cloning Objects, Grouping and Linking objects.
REFERENCES:

2. Kelly L. Murdock, “3ds Max- Bible 2011”, WILEY PUBLICATIONS
List of Practicals:

1. Write a program to implement TOKENIZER.
2. Write a program using call statement and CASE statement.
3. Write a program to find out FIRST / FOLLOW of grammar.
4. Evaluate POSTFIX and PREFIX expression with the help or stack.
5. Write a program to implement Operator precedence parser.
6. Design a parser like Recursive decent parser.
7. Design Predictive parser.
8. Design LR (0) Parser.
Writing programs in Java:

1. Program for Sorting and Searching.
2. Program for Addition and Multiplication of matrices.
3. Program illustrating overloading methods and various forms of Inheritance.
4. Program to create packages in Java
5. Program to create multiple Threads in Java.
6. Understand and handle Mouse Events, Keyboard Events using Layout Manager.
7. Adding Text area, Canvas, Scroll Bars, Frames and Menus.
8. Writing Java Applets.
10. Client Server application using RMI
11. Writing Java Servlets.
12. Program using JDBC
13. Illustrating the concepts of Java Swings.
List of Practicals:

1. Implement the line drawing algorithm and circle drawing algorithm using midpoint line scan and midpoint circle scan algorithm.
2. Write a Program to implement line clipping algorithm.
3. Write a Program to implement 2D-transformation.
4. Write a Program to implement 3D-algorithm for parallel and perspective projection.
5. Write a Program to represent curve and surfaces.
6. Moving (animate) any 2D–3D object along with the axis.
7. Application on Audio- Video mixing and clip making.
9. Introduction to Flash 5.0 creating a small animation using Flash 5.0.
10. Apply animation on text using 3D– Cool.