Dr. A.P.J. ABDUL KALAM UNIVERSITY, INDORE

MCA, Second -Semester

MCA 201 Data Base Management System

UNIT I

Introduction: Advantage of DBMS approach, various view of data, data independence, schema and subschema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture.
ER model: basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and gene ralization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.

UNIT II

Domains, Relations and Keys: domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys.
Relational Algebra & SQL: Features of good relational database design,Codd's rule, The structure, relational algebra with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate f unctions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL.
PL/ SQL programming:working with stored procedures,triggers,cursor
Database Integrity: general idea. Integrity rules, domain rules, a ttribute rules, relation rules, Database rules, assertions, triggers, integrity and SQL.

UNIT III

Functional Dependencies and Normalization: basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreduci ble set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first, second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and fourth normal form, Join dependency and fifth normal form.

UNIT IV

Transaction, concurrency and Recovery: basic concepts, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, basic idea of serializability, basic idea of concurrency control, basic idea of deadlock, failure classification, storage structure types, stable storage implementation, data access, recovery and atomicity - log based recovery, deferred Database modification, immediate Database modification, checkpoints. Distributed Database: basic idea, distributed dat a storage, data replication, data fragmentation: horizontal, vertical and mixed fragmentation.

UNIT V

Emerging Fields in DBMS: object oriented Databases -basic idea and the model, object structure, object class, inheritance, multiple inheritance, object i dentity, data warehousing - terminology, definitions, characteristics, data mining and it's overview, Database on www, multimedia

Databases-difference with conventional DBMS, issues, similarity based retrieval, continuous media data, multimedia data formats , video servers.
Storage structure and file organizations: overview of physical storage media, magnetic disk performance and optimization, basic idea of RAID, file organization, organization of records in files, basic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization
Network and hierarchical models: basic idea, data structure diagrams, DBTG model, implementations, tree structure diagram, implementation techniques, comparison of the three models.

BOOKS

1. A Silberschatz, H .F Korth, Sudersan "Database System Concepts" –, MGH Publication.
2. C.J Date "An introduction to Database Systems" –6th ed.
3. Elmasri & Navathe "Fundamentals of Database systems" – III ed.
4. B.C. Desai. "An introduction to Database systems" BPB
5. Raghurama Krishnan "Database Systems" TMH

MCA 202 -Computer Network

UNIT I

Introduction: Computer Network, Layered Network Architecture -Review of ISO -OSI Model., Transmission Fundamentals -, Communication Media -Conductive Metal (Wired Cable), Optical Fiber lin ks, Wireless Communication -Radio links, Setellite Links, Communication Services & Devices, Telephone System., Integrated Service Digital Network (ISDN)., Cellular Phone., ATM. Network Security, Virtual Terminal Protocol, Overview of DNS, SNMP, email, WWW, Multimedia.

UNIT II

Data Security and Integrity: Parity Checking Code, Cyclic redundancy checks (CRC), Hemming Code, Protocol Concepts –, Basic flow control, Sliding window protocal -Go-Back-N protocol and selective repeat protocol, Protocol correctness - Finite state machine

UNIT III

Local Area Network: Ethernet : 802.3 IEEE standard, Token Ring : 802.5 IEEE standard, Token Bus : 802.4 IEEE standard, FDDI Protocol, DQDB Protocol, Inter Networking, Layer 1 connections- Repeater, Hubs, Layer 2 connections - Bridges, Switches, Layer 3 connections - Routers, Gateways.

UNIT IV

Wide Area Network: Introduction, Network routing, Routing Tables, Types of routing, Dijkstra's Algorithm, Bellman -Ford Algorithm, Link state routing, Open shortest path first, Flooding, Broadcasting, Multicasting, Congestion & Dead Lock, Internet Protocols, Overview of TCP/ IP, Transport protocols, Elements of Transport Protocol, Transmission control protocol (TCP), User data-gram protocol (UDP).

UNIT V

Wireless Broadband Networks Techn ology Overview, Platforms and Standards: Wireless broadband fundamentals and Fixed Wireless Broadband Systems, Platforms - Enhanced Copper, Fibre Optic and HFC, 3G Cellular, Satellites, ATM and Relay Technologies, HiperLAN2 Standard, Global 3G CDMA Standar d, CDMA Harmonization G3G Proposal for Protocol Layers

BOOKS

1. A.S.Tanenbaum, "Computer Network", 4th addition,PHI
2. Forouzan "Data Communication and Networking 3ed", TMH
3. J.F.Hayes, "Moduling and Analysis of Computer Communication Networks", Plenum P ress
4. D.E.Comer, "Internetworking with TCP/ IP", Volume Ist & IInd, PHI
5. Willium Stalling, "Data & Computer communications",Maxwell Macmillan International Ed.
6. D.Bertsekas and R.Gallager,"Data Networks", 2nd Ed. ,PHI.
7. G.E. Keiser ,"Local Area Netw orks ", McGraw Hill, International Ed.
8. Joh R. Vacca, "Wireless Broadband Networks Handbook 3G, LMDS and Wireless Internet" Tata McGraw -Hill, 2001

MCA 203 Software Engineering and UML

UNIT I Introduction

Software Engineering parad igms – Waterfall Life cycle model – Spiral Model – Prototype Model– Software Requirement - Requirements Elicitation Techniques – Initial Requirements Document — SRS Document – Requirements Change Management - Project Management

UNIT II Software Design

Abstraction – Modularity – Software Architecture – Cohesion – Coupling – Various Design Concepts and notations – Development of Detailed Design & Creation of Software Design Document - Dataflow Oriented design – Designing for reuse – Programming standards.

UNIT III Software Metrics 9

Scope – Classification of metrics – Measuring Process and Product attributes – Direct and Indirect measures – Reliability – Software Quality Assurance – Standards.
Need of Software Estimation – Function Point – Risk Management

UNIT IV Software Testing And Maintenance 9

Software Testing Fundamentals – Software testing strategies – Black Box Testing – White Box Testing – System Testing – Functional Testing – Structural Testing – Regression Testing - Testing Tools – Test Case Management –
Challenges of Software Maintenance – Types of Maintenance. Software Maintenance Organization – Maintenance Report

UNIT V Unifie d Modeling Langauge

Introduction to UML : Use Case Approac,: Identific ation of Classes and Relationships, Identifying State and Behavior, Use Case DiagramClass Diagram – State Diagram - Sequence ' Diagram – Activity Diagram – Deployment Diagrams Case Study - LMS

Books:

1. Roger S. Pressman, "Software Engineering: A Practit ioner's Approach, Tata McGraw - Hill Education, 8 th Edition, 2015.
2. I. Sommerville, "Software Engineering", Sixth Edition, Addison Wesley -Longman, 2004.
3. Pankaj Jalote, " An Integrated approach to Software Engineering", Second Edition, Springer Verlag, 1997.
4. Timothy C. Lethbridge and Robert Laganiere, "Object – Oriented Software Engineering, Practical Software Development using UML and Java", Tata McGraw Hill Publishing Company Limited, Second Edition, 2004

MCA 204 Algorithm Design

UNIT I LINEAR DATA STRUC TURES

Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double Ended Queue - Applications of stack – Evaluating Arithmetic Expressions - Other Applications - Applications of Queue - Linked Lists - Singly Linked List - Circularly L inked List - Doubly Linked lists – Applications of linked list – Polynomial Manipulation.

UNIT II NON -LINEAR DATA STRUCTURES

Binary Tree – expression trees – Binary tree traversals – applications of trees – Huffman Algorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree - Splay Trees – Heap- Heap operations - -Binomial Heaps - Fibonacci Heaps - Hash set.

Searching, Hashing and Sorting: requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search,

Hashing -basics, methods, collision, resolution of collision, chaining; Internal sorting - Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell so rt, heap sort, tree sort.

UNIT III GRAPHS

Representation of graph - Graph Traversals - Depth-first and breadth -first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra's algorithm – Bellman -Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms. Basic idea of AVL tree - definition, insertion & deletion operations, basic idea of B - tree- definition, order, degree, insertion & deletion operations, B+ -Tree- definitions, comparison with B-tree

UNIT IV ALGORITHM DESIGN AND ANALYSI S

Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Quick Sort - Binary Search - Greedy Algorithms – Knapsack Problem – Dynamic Programming – Optimal Binary Search Tree - Warshall's Algorithm for Finding Transitive Closure.

UNIT V ADVANCED ALGORITHM DESIGN AND ANALYSIS

Backtracking – N-Queen's Problem - Branch and Bound – Assignment Problem - P & NP problems – NP-complete problems – Approximation algorithms for NP -hard problems – Traveling salesman problem -Amortized Analysis

Books

1. Ullman "Analysis and Design of Algorithm" TMH
2. Goodman "Introduction to the Design & Analysis of Algorithms, TMH -2002.
3. Aho, "Data Structure & Algorithms

MCA 205 Object oriented Programming with JAVA

UNIT I

OOP concepts – Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism,

The Java Environment: Setting Class path; Data types; Operators - precedence and associativity; Type conversion; Control and Iterative statements; Modular programming methods;.

Object Oriented Programming in Java: Class; Objects; Packages; Scope and lifetime; Access Modifiers; Constructors; Copy constructor; this pointer; finalize () method; Arrays; Memory allocation and garbage collection

Inheritance: Inheritance basics, method overriding, dynamics method dispatch, abstract classes.

Interfaces : Defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces.

UNIT-II

Multithreading and Exception Handling: Basic idea of multithreaded pro gramming; The lifecycle of a thread; Creating thread with the thread class and runnable interface; Thread synchronization; Thread scheduling; Producer -consumer relationship; Daemon thread, Selfish threads; The try, catch and throw; throws Constructor and finalizers in exception handling;

Applets: Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTML Tags for applet.

UNIT-III

Input/Output : Exploring Java I/O, Directories, stream classes The Byte stream : Input stream, output stream, file input stream, file output stream, print stream, Random access file, the character streams, Buffered reader, buffered writer, print writer, serialization.

JDBC: JDBC-ODBC bridge; The connectivity model; The driver manager; Navigating t he resultset object contents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

Collections: The collections framework, collection interfaces, collection classes.

UNIT-IV

AWT Fundamentals: The class hierarchy of window fundame ntals; The basic user interface components , Frame, Layout managers, flow layout etc.

The Java Event Handling Model : Java's event delegation model , Event class hierarchy; Adapter classes; Event classes action and different Events

SWINGS: Introduction, Hie rarchy of swing components. Containers, Top level containers - JFrame, JWindow, JDialog, JPanel, JButton, JToggleButton, JCheckBox, JRadioButton, JLabel,JTextField, JTextArea, JList, JComboBox, JScrollPane.

UNIT-V

Introduction of Web Designing: HTML basi cs

Servlets Overview, Servlet Lifecycle: init(), service(),destroy(), Generic Servlet,Servlet Request, and Servlet Response, http Servlet Request, http Servlet Response and http Servlet, Request - response, headers, GET, POST

JSP: JSP architecture, JSP tags and JSP expressions, Fixed Template Data ,Lifecycle of a JSP, Model View Controller (MVC), Data Sharing among servlets & JSP, Request, application, session and page scope, JSP implicit objects, isElignore attribute, buffer and auto flush attributes, info attribute ,errorPage and is errorPage attributes, is Thread safe Attribute, extends attribute, language attribute, Including files and applets in jsp Pages, using java beans components in JSP documents.

Struts Framework: Struts Architecture, Struts classes ActionForward, ActionForm, ActionServlet, Action classes, Understanding struts config. xml, Understanding Action Mappings, Struts flow with an example application.

BOOKS

1. Naughton & Schildt “The Complete Reference Java 2”, Tata McGraw Hill
2. Deitel “Java- How to Program:” Pearson Education, Asia
3. Horstmann & Cornell “Core Java 2” (Vol I & II) , Sun Microsystems
4. Ivan Bayross “Java 2.0” : BPB publications 5. Ivor Horton’s “Beginning Java 2, JDK 5 Ed., Wiley India. Note : Paper is to be set unit w ise with internal choice.
5. Internet and World Wide Web – How to program by Dietel and Nieto PHI/ Pearson Education Asia.
6. Jakarta Struts Cookbook, Bill Siggelkow, S P D O’Reilly for chap 8
7 An Introduction to web Design and Programming –Wang Thomson
8 Web Applications Technologies Concepts - Knuckles,John Wiley

MCA 206 Java and OOPS lab

1) Write a Java program to determine maximum from given 100 numbers.
2) Write a Java program to calculate the factorial of a given numbers.
3) Java program to check whether a given character is alphabet or not.
4) Java program to find sum of all digits.
5) Write a Java program to add two binary numbers.
6) Write a Java program for switch statement.
7) Write a Java program to print perfect numbers
8) Write a Java program to convert a decimal number to binary number.
9) Write a Java program for Parameterized Constructor.
10) Write a Java program using while loop, do while loop, "for" loop.
11) Write a Java program to check whether number is Armstrong or not.
12) Write a Java program for Hierarchical Inheritance.
13) Write a Java program for abstract class and for interface.
14) Write a Java program to declare, initialize and display the contents of an array of5 integer values. Also show in Java how the length of array can be found.
15) Write a program to accept a string and count total capital and small letters in string.
16) Write a Java program to print following output:
    0,1,1,2,3…..(20 such items)
17) Write a Java program for method overloading and for method overriding.
18) Write a Java program to design a class Student that has three data member name ; Roll no; Marks in five subject and member function to assign streams on the basis of table given below

	Average marks	**Stream**
1)	90% or more	Computer
2)	80-90%	Electronics
3)	75-80%	Mechanical
4)	70-75%	Chemical
5)	60-70%	Civil

MCA 207 DBMS lab

PRACTICAL LIST

1. Create the following Databases.

Salesmen

SNUM	SNAME	CITY	COMMISSION
1001	Piyush	London	12 %
1002	Sejal	Surat	13 %
1004	Miti	London	11 %
1007	Rajesh	Baroda	15 %
1003	Anand	New Delhi	10%

SNUM : A unique number assigned to each salesman.

SNAME : The name of salesman.

CITY : The location of salesmen.

COMMISSION: The Salemen's commission on orders.

Customers

CNUM	CNAME	CITY	RATING	SNUM
2001	Harsh	London	100	1001
2002	Gita	Rome	200	1003
2003	Lalit	Surat	200	1002
2004	Govind	Bombay	300	1002
2006	Chirag	London	100	1001

2008 Chinmay Surat 300 1007

2007 Pratik Rome 100 1004

CNUM : A unique number assigned to each customer.

CNAME : The name of the customer.

CITY : The location of the customer.

RATING : A level of preference indicator given to this customer.

SNUM : The number of salesman assigned to this customer.

Orders

ONUM AMOUNT ODATE CNUM SNUM

3001 18.69 10/03/97 2008 1007

3003 767.19 10/03/97 2001 1001

3002 1900.10 10/03/97 2007 1004

3005 5160.45 10/03/97 2003 1002

3006 1098.16 10/03/97 2008 1007

3009 1713.23 10/04/97 2002 1003

3007 75.75 10/04/97 2004 1002

3008 4723.00 10/05/97 2006 1001

3010 1309.95 10/06/97 2004 1002

3011 9891.88 10/06/97 2006 1001

ONUM : A unique number assigned to each order.

AMOUNT : The amount of an order.

ODATE : The date of an order.

CNUM : The number of customer making the order.

SNUM : The number of salesman credited with the sale.

Write queries :-

1. Produce the order no, amount and date of all orders.
2. Give all the information about all the customers with salesman number 1001.
3. Display the following information in the order of city, sname, snum and commission.
4. List of rating followed by the name of each customer in Surat.
5. List of snum of all salesmen with orders in order table without any duplicates.
6. List of all orders for more than Rs. 1000.
7. List of names and cities of all salesmen in London with commission above 10%.
8. List all customers whose names begins with a letter 'C'.
9. List all customers whose names begins with letter 'A' to 'G'.
10. List all orders with zero or NULL amount.
11. Find out the largest orders of salesman 1002 and 1007.
12. Count all orders of October 3, 1997.
13. Calculate the total amount ordered.
14. Calculate the average amount ordered.
15. Count the no. of salesmen currently having orders.
16. List all salesmen with their % of commission.
17. Assume each salesperson has a 12% commission. Write a query on the order table that will produce the order number, salesman no and the amount of commission for that order.

18. Find the highest rating in each city in the form :

For the city (city), the highest rating is : (rating)

19. List all in descending order of rating.

20. Calculate the total of orders for each day and place the result in descending order.

21. Show the name of all customers with their salesman's name.

22. List all customers and salesmen who shared a same city.

23. List all orders with the names of their customer and salesman.

24. List all orders by the customers not located in the same city as their salesman.

25. List all customers serviced by salespeople with commission above 12%.

26. Calculate the amount of the salesman commission on each order by a customer with rating above 100.

27. Find all pairs of customers having the same rating with out duplication.

28. List all orders that are greater than the average of October 4,1997.

29. Find the average commission of salesmen in London.

30. Find all orders attributed to salesmen in 'London' using both the subquery and join methods.

31 List the commission of all salesmen serving customers in 'London'.

32. Find all customers whose cnum is 1000 above than the snum of Sejal.

33 Count the no. of customers with the rating above than the average of 'Surat'.

34. Find all salesmen with customers located in their cities using ANY

and IN.

35. Find all salesmen for whom there are customers that follow them in alphabetical order.

36. Find all customers having rating greater than any customer in 'Rome'.

37 List all orders that has amount grater than atleat one of the orders from 6th October, 1997.

38. Find all orders with amounts smaller than any amount for a customer in 'London'.

39. Find all the customers who have greater rating than every customer in 'Rome

40. Create a union of two queries that shows the names, cities and ratings of all customers. Those with rating of >= 200 should display 'HIGH RATING' and those with < 200 should display 'LOW RATING'.

41 Produce the name and number of each salesman and each customer with more than one current order in the alphabetical order of names.

42. Create union of three queries. First select snum of all salesman in Surat, second, the cnum of all customers in 'Surat' and third, the onum of all orders of 3rd Oct. Retain duplicates between the last two queries but remove the duplicates between either of them and the first..

43. Remove all orders from customer Chirag from the orders table.

44.Set the ratings of all th e customers of Piyush to 400.

45. Increase the rating of all customers in Rome by 100.