Subject Name: Data Base Management Systems

UNIT - I

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|  |  | Level |
| 1. | a) Draw Separate ER Models for Following information:  01. Each Project is managed by one professor (Project, Professor  Are Entities).  02. Professors can manage and/or work on multiple projects.  03. Each Album is composed by One Musician and Each  Musician composes only one album. (6M)  b)Explain in detail Three Tier schema architecture of DBMS (4M) | H |
| 2. | a) Discuss the main characteristics of the database approach and  specify how it differs from traditional file systems (5M)  b) Briefly explain Class Hierarchies in ER model and Identify  Hierarchies in University Database (5M) | M |
| 3. | a) What is a data model? What is a relational data model? What is data independence and how does a DBMS support it?(6M)  b) Write about Weak Entity and Participation  constraint  (4M) | M |
| 4. | a) The main steps in database design. What is the goal of each step? In which step is the ER model mainly used.      (6M)  b) Who is a DBA? What are the responsibilities of a DBA?(4M) | M |
| 5. | a) What is data abstraction? Explain about different  levels of data abstraction.(5M)  b) Explain different database languages with examples.(5M) | M |
| 6. | a) Briefly explain the architecture of Data Base Manage System[10M]  b) Explain physical schema and logical schema with example [4M] | M |
| 7. | a) Define the concept of aggregation. Give two examples of where this  concept is useful.(5M)  b)Explain different levels of abstraction in a DBMS(5M) |  |
| 8. | a)Why is designing a data base for a large enterprise especially hard?(5M)  b)Explain different kinds of key constraints(5M) | H |
| 9. | A university data base contains information about professors and courses. Professor teaches courses .Draw an ER Diagram for the following situation  i)Professors can teach the same course in several semesters and each offering must be recorded  ii) Every Professor must teach some course.  iii)Every Professor teaches exactly one course(no more, no less)  iv) Professor can teach the same course in several semesters and only the most recent such offering needs to be recorded.  v)Professor can teach the same course in several semesters and only the most recent such offering needs to be recorded(10M) | H |
| 10. | a) Draw an ER diagram for the Hospital management system .Assume your own entities (Minimum 5 entities), attributes and relations. Explain in details (6M)  b)Writes short notes on the following (4M)  i)Transaction Control Statements (TCS) ii)Data Control Language (DCL) | H |
| 11. | a)Write short notes on the following (6M)   i)Data Manipulation Language (DML) ii)Data Definition Language  (DDL)  b) Explain different mapping cardinalities in ER model(4M) | M |
| 12. | a)Explain conceptual data base design with E-R model(4M)  b) How does DBMS provide data abstraction? Explain the concept of data independence(6M) | M |

UNIT - II

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|  |  | Level |
| 1. | a) A) List and Explain how to use group functions in SQL with appropriate examples (5M)  b)Explain properties of DRC with an Example. (5M) | M |
| 2. | a) Explain different types of Join operations in Relational algebra  b) Consider the following relation : EMP (ENO, NAME, DATE\_OF\_BIRTH, SEX, DATE\_OF\_JOINING, BASIC\_PAY,DEPT) Develop an SQL query that will find and display the average BASIC\_PAY in each DEPT. | H |
| 3. | a)Consider the following relations for a database that keeps track of business trips of sales persons in a sales office:  Salesperson (Salespersonid, Name, Start-year, Dept-no)  Trip (Salespersonid, from, to, Departure-date, Return-date, trip-id) Expense (trp-id, AccountNo, Amount) Specify the foreign keys for the above schema.Then specify the following queries in relational algebra.  Give the details (all attributes of trip relation) for trip that exceeded a. 10,000/- in expenses.  Print the ‘Salespersonid’ and ‘Name’ of the salespersons who took trips to ‘delhi’.  Print the total trip expenses incurred by the salesman with Salespersonid =’504’ (6M)  b) What is view in SQL? How is it defined?(4M) | H |
| 4. | a) Consider the relational schema: Employee (empno,name,office,age)  Books(isbn,title,authors,publisher) , Loan(empno, isbn,date)  Write the following queries in relational algebra.  i.Find the names of employees who have borrowed a book  Published by McGraw-Hill.  ii.Find the names of employees who have borrowed all books  Published by McGraw-Hill. (6M)  b) Explain Aggregate operations in SQL.(4M) | H |
| 5. | a) Given two relations R1 and R2, where R1 contains N1 tuples and R2 contains N2 tuples, and N2 > N1 > 0, give the maximum and minimum possible sizes (in tuples) for the result relation produced by each of the following relational algebra expressions. In each case, state any assumptions about the schemas for R1 and R2 that are needed to make the expression meaningful. (a) R1 × R2 (b) σa=5(R1) (c) πa (R1) (d) R1/R2(5M)  b) Explain the following clauses with examples (5M)  i) From ii) Having iii) Order by iv) Group by | H |
| 6. | a) What are integrity constraints? Explain primary key constraint and foreign key constraints with suitable examples.      [6M]  b) Explain properties of TRC with an Example. (5M) | M |
| 7. | a) Consider the Sailors-Boats-Reserves DB described in the text.  s (sid, sname, rating, age)  b (bid, bname, color)  r (sid, bid, date)  Write each of the following queries in SQL.  i) Find the names of sailors who have not reserved a boat whose name contains the string “storm”. Order the names in ascending order.  ii) Find the sailor id’s of sailors with age over 20 who have not reserved a boat whose name includes the string “thunder”.  iii) Find the names of sailors who have reserved at least two boats.  (6M)  b)How do views support logical data independence (4M) | H |
| 8. | a)What is the difference between a candidate key and the primary key  for a given relation? What is a super key? (5M)  b)Distinguish between Relation Algebra and Relational Calculus(5M) | M |
| 9. | a)Consider the following schema  Suppliers(sid: integer, sname: string, address: String)  Parts(pid:integer,pname:string,color:string)  Catlog(sid:integer,pid:integer,cost:real)  i)Find the pnames of parts for which there is some supplier.  ii)Find the pnames of parts supplied by Acme Widget suppliers and no one else.  iii)For every supplier that supplies a green part and a red part, print the name and price of the most expensive part that she supplies.  iv)Find the sids of suppliers who supply only red parts (6M)  b)Define the division operation in terms of the basic relational algebra operations.(4M) | H |
| 10. | a)What is the difference between tuple relational calculus and  domain relational calculus.(5M)  b)What is an integrity constraint? Explain its enforcement by DBMS  with illustrative example.(5M) | M |
| 11. | a) What is a relation? Describe the characteristics of a relation. [6M]  b) b) Differentiate between where clause and group by clause. (4M) | M |
| 12. | a) Distinguish between independent and correlated nested queries.  Provide appropriate examples to support your explanation. (5M)  b)Explain Trigger in DBMS giving examples. [5M] | M |

UNIT - III

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|  |  | Level |
| 1. | a) Discuss the problems caused by redundancy and the purpose of  normalization. (6M)  b)Explain the concepts of multi valued dependencies with suitable  example(4M) | M |
| 2. | a) Explain briefly about 3NF, 4NF and BCNF with suitable  examples? (5M)  b) What is Functional Dependency? Explain types and properties of  FD’s. (5M) | M |
| 3. | a) b) Give relation schemas for the following normal forms  i) 2NF but not in 3NF ii) 3NF but not in BCNF (6M)  b) What is an objective of the normalization? (4M) | M |
| 4. | a) Explain the role of functional dependencies in normalization with  suitable examples. (6M)  b) Describe lossless join decomposition. (4M) | M |
| 5. | a) How to compute closure of set of functional dependency? Explain  with a suitable example schema.(5M)  b) What is multi valued dependency? State and explain fourth normal  form based on this concept. (5M) | H |
| 6. | a) Explain the advantages of decomposition? Discuss the problems  faced in decomposition (5M)  b) Write about decomposition preservation algorithm for all  FD’s.(5M) | M |
| 7. | a) Explain about Boyce Codd normal form with an example. [4M]  b)Discuss the need of Normalization & 1NF, 2NF, 3NF  and BCNF with suitable example.(6M) | H |
| 8. | a) Consider the universal relation R={ A,B,C,D,E,F,G,H,I} and the  set of functional dependencies F={(A,B)->{C],{A}>{D,E},  {B}->{F},{F}->{G,H},{D}->[I,J}.what is the key for  Decompose R into 2NF and 3NF relations. (6M)  b)Write a note on functional dependencies (4M) | H |
| 9. | |  | | --- | | a)Consider the schema *R* = (*A*, *B*, *C*, *D*, *E*) is given. Give a lossless-join decomposition into BCNF of schema *R.*  A → BC, CD → E, B → D, E → A | | ii. What is lossy and lossless decomposition?(6M) |   b)Explain the properties of decomposition(4M) | H |
| 10. | a) What is a minimal set of functional dependencies? Give the algorithm to find minimal cover for a given set of functional dependencies(6M)  b)What are the problems encountered if transactions are executed | H |
| 11. | a)What is Schema Refinement? Explain problems caused by  redundancy (5M)  b)What is difference between 3 NF and BCNF(5M) | M |
| 12. | a)Discuss how schema refinement though dependency analysis and  normalization can improve schemas obtained through ER  design(6M)  b)Give a necessary and sufficient condition to test whether a  decomposition is loss less join with suitable example(4M) | H |

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| UNIT - IV  . |

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| 1. | a) Explain how strict 2-phase locking is implemented. Show them with an example  b) What are the rules followed when shared/exclusive locking scheme is used ? |  |
| 2. | A)What are ACID properties? Illustrate them through suitable examples.(7M)  b) Write the context of concurrency control. Explain about lock based protocols. (7 M) |  |
| 3. | a) Define and explain the following schedules(4M)  i) Conflict equivalent ii) Serializable Schedule iii) Strict Schedule  b) Write about the need for concurrency control. Explain concurrency control without locking. (10 M) |  |
| 4. | a) Write a brief note on deadlock detection.(7M)  b) Explain about timestamp based protocols. (7 M) |  |
| 5. | a) Explain about validation based protocols of concurrent transactions  b) Write a short note on simple transaction model |  |
| 6 | a) Explain about log-based recovery.  b) Explain read-only, write-only and read-before-write protocols in serializability. |  |
| 7. | a) Write a brief note on deadlock detection. 7M  b) Explain about timestamp based protocols. 7 M |  |
| 8 | 1. Explain about validation based protocols of concurrent transactions (7M)   b) Write a short note on simple transaction model 7 M |  |
| 9 | a.What is transaction? Explain state diagram of a transaction.(6M)  b) Explain lock based protocols with example.( 8 M) |  |
| 10 | a) What is Serializabiltiy? Explain Conflict Serializability with example.(8M)  b) Explain Timestamp based protocols with example. (6 M) |  |

UNIT - V

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| 1. | a)Describe the three phases in crash recovery in ARIES. Explain each phase in detail.(10M)  b) Explain about log based recovery. (4M) |  |
| 2. | a) Explain how data is organized in hash based index. Also explain the context of using hash based index. (6M)  b) Explain about file organization and indexing. ( 8 M) |  |
| 3. | a) Illustrate with an example how concurrency is controlled using a B+ tree (5M)  b) Discuss in detail about Hash Based Indexing.. (5M) |  |
| 4. | a.)Describe the shadow paging recovery technique. Under what circumstances it does not require a log?  b)Describe the three phases of the ARIES recovery method |  |
| 5. | Distinguish between:  i) Primary and Secondary indexing. ii) Ordered indexing and hashing.(7M)  b) Explain in detail about B+ trees. (7M) |  |
| 6 | a) Explain log based recovery of immediate database modification with example.(7M)  b) Explain about recovery with concurrent transactions. (7 M) |  |