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- Q.5 i. Explain the inference rules for functional dependencies. 4  
ii. What are the features of good relational database design? Explain various anomalies that can arise in a relational database with example. 6  
OR iii. What is normalization? Explain normal form with example. 6
- Q.6 Attempt any two:
- i. Define transaction. Explain ACID properties with the help of an example. 5  
ii. Explain state transition diagram. Explain, when a transaction is said to be failed. 5  
iii. Explain the two-phase locking protocol with the help of an example. What are its advantages? 5

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Total No. of Questions: 6

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Enrollment No.....



Faculty of Science  
End Sem (Even) Examination May-2018  
BC3CO13 Database Management Systems

Programme: B.Sc.(CS)

Branch/Specialisation: Computer Science

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. Which of these DBMS languages is employed by end users and programmers to manipulate data in the database? 1  
(a) Data definition language (b) Data presentation language  
(c) Data manipulation language (d) Data translation language
- ii. Which of the following levels deals with the physical representation of the database on the computer? 1  
(a) Internal level (b) Conceptual level  
(c) External level (d) None of these
- iii. Entity is a\_\_\_\_\_ 1  
(a) Object of relation (b) Present working model  
(c) Thing in real world (d) Model of relation
- iv. Which of the following is a single valued attribute? 1  
(a) Register\_number (b) Address  
(c) SUBJECT\_TAKEN (d) Reference
- v. Which of the following keys describes a field, or a combination of fields, that has a unique value? 1  
(a) Secondary key (b) Foreign key  
(c) Primary key (d) Alternate key
- vi. The relational model is based on the branches of 1  
(a) Engineering (b) Mathematics  
(c) Science (d) Social science
- vii. Functional Dependencies are the types of constraints that are based on\_\_\_\_\_ 1  
(a) Key (b) Key revisited (c) Superset key (d) None of these

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- viii. Which normal form is considered adequate for normal relational database design? **1**  
 (a) 2NF (b) 5NF (c) 4NF (d) 3NF
- ix. \_\_\_\_\_ means that the data used during the execution of a transaction cannot be used by a second transaction until the first one is completed. **1**  
 (a) Consistency (b) Atomicity (c) Durability (d) Isolation
- x. A transaction is delimited by statements (or function calls) of the form\_\_\_\_\_. **1**  
 (a) Begin transaction and end transaction  
 (b) Start transaction and stop transaction  
 (c) Get transaction and post transaction  
 (d) Read transaction and write transaction

- Q.2 i. Define the term database. What do you mean by Database Management System? **2**
- ii. Explain DBMS catalog and metadata. **3**
- iii. Differentiate between data administrator and database administrator. **5**
- OR iv. Explain the various functional components of a DBMS with the help of suitable diagram. **5**

- Q.3 i. What is an E-R model? What are its advantages? **2**
- ii. Design an E-R diagram for a COMPANY database as per the requirements given below. Make appropriate assumption to complete the specification. **8**  
 (a) The company stores the information about the currently working employees. The information includes employee number, name, gender, salary, and date of birth, date of joining, address and phone number. Each employee works for a department on a particular project for a particular number of hours.  
 (b) The information about departments includes department number and department name. Each department controls some projects currently running in the company. Also each department is managed by a particular employee who becomes the manager for that department. This employee also supervises all the other employees in that department.

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- (c) The project information includes project number, project name and its description.
- (d) An employee can work for only one department; however, department have any number of employees. A department is managed by only one manager and manager can manage only one department. A department can control any number of projects; however, one project can be handled by only one department. A number of employees can work on any number of projects.

Specify the key attributes of each entity type, role names and mapping cardinalities.

- OR iii. Explain the various types of attributes. What are the various situations in which an attribute can use a null value? **8**

- Q.4 i. What are the various set operations in relational algebra? Explain with examples. **3**

- ii. What is the outer join? Explain how does it differ from the inner join? **7**

- OR iii. Consider the following relation schema: BRANCH (**BID**, Bname, City, Phone) ACCOUNT(**AcNo**, name, Atype, **BID**, Bal) TRANSACTION(**TId**, Tdate, Ttype, **AcNo**, Amt) write query in Relation algebra. **7**

- (a) Retrieve the ID and name of all the branches located in Indore city.  
 (b) Retrieve the ID, type and amount of all the transactions of withdrawal type.  
 (c) List the account number and type of all accounts opened in the branch having ID B0101.  
 (d) List the account number and name of account holders withdrawing an amount greater than 10,000 On 31<sup>st</sup> march, 2018.  
 (e) Calculate the average balance of account present in the ABC bank in Indore.  
 (f) List the account number and name of account holders having saving account in the city Bhopal.  
 (g) List the maximum and minimum balance of accounts in each city.

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