



Reg. No. : .....

Name : .....

**Fifth Semester B.Tech. Degree Examination, September 2014**  
**(2008 Scheme)**  
**(Special Supplementary)**  
**08.503 : DATABASE DESIGN (R)**

Time : 3 Hours

Max. Marks : 100

PART – A



Answer all questions :

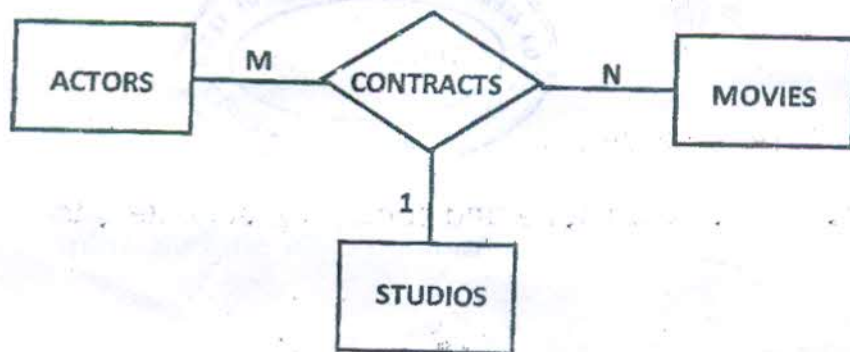
1. List out any four roles of database administrator.
2. Illustrate multi-valued attribute, derived attribute and composite attribute with suitable real examples.
3. How does a *B-Tree* differ from a *B<sup>+</sup>-Tree*? Illustrate with an example.
4. What is the significance of foreign key? Illustrate with an example.
5. Explain and illustrate how *natural join* is different from *equi-join*.
6. Express division operation using *project*, *Cartesian product* and *difference* operators. Justify your answer.
7. Illustrate the significance of *First Normal Form* with a suitable example.
8. Draw a state diagram and discuss the typical states that a transaction goes through during execution.
9. What is the significance of system log?
10. Why are exclusive/share locks preferable over binary locks? **(10×4=40 Marks)**



## PART – B

## Module – I

11. Consider the following E-R diagram that shows a scenario where actors sign contracts with studios to act in movies produced by the studios.
- Describe the meaning of the relationship CONTRACTS.
  - If the relationship cardinality between CONTRACTS and STUDIOS is  $P$ , where  $P$  is a positive integer and  $N$  is replaced by 1, how does the meaning of the ER diagram differ ?
  - Explain how the ER diagram can be converted to one with binary relationships only. Draw the resulting ER diagram.



OR

12. Consider a disk with block size  $B = 512$  bytes. Suppose that we maintain a file of 30000 fixed length records, each of size 100 bytes. The records are ordered according to a key field of size 15 bytes. Block pointer is 6 bytes long and record pointer is 7 bytes long. Suppose that we construct a primary index for this data file. Calculate the following :
- The blocking factor and the number of file blocks.
  - The index blocking factor of primary index file.
  - The number of first level index entries and the number of first level index blocks.
  - The number of levels if we build a *multi-level* index.
  - The number of block accesses needed to retrieve a record from the file using the multi level index of (iv), given a key value.





### Module – II

13. Consider the following relational schema. Primary keys are underlined and foreign keys bear the *same* name as primary keys. In addition, *advisor* and *hod* are foreign keys referring to *empld* of Faculty and *preReqld* is a foreign key referring to *courseId* of *course*. A semester can be odd or even.

Student (rollNo, name, degree, year, sex, advisor)

Department (deptNo, name, hod, phone)

Faculty(empld, name, sex, deptNo, yearofJoining, phone)

Course (courseId, cName, deptNo)

Enrollement (rollNo, courseId, semester, year)

Teaching (empId, courseId, classRoom)

Pre-requisite (courseId, preReqId)



Express the following queries in relational algebra :

- i) Find the list of courses (names) offered by “Mathematics” department.
- ii) Find the list of courses (names) taught by the advisor of the student with roll number “CS12B090”.
- iii) Find the professors using “CS24” class room in the current semester (year 2012 and odd semester). Get their employee-Id and names.
- iv) Find the students who have enrolled for the *all* the courses taught by their advisor in the odd semester of the year “2011” and get their roll numbers.
- v) Get name(s) of the senior-most professor(s) in the “CSE” department.
- vi) Suppose that we are interested in getting the pre-requisites at *all* levels of a specific course, that is, for a given course C, pre-requisites of C, pre-requisites of each of those pre-requisites and so on. Can you formulate the query in relational algebra ? If yes, give the query. If not, give the reason.

OR



14. a) Consider a relation  $R(A, B, C, D)$  with FDs  $AB \rightarrow C$ ,  $C \rightarrow D$  and  $D \rightarrow A$ .
- Which are the non-trivial FDs that follow from the given FDs ?
  - What are the keys and super keys of  $R$  ?
- b) Given a relational schema  $REL(P, Q, R, S, T, U, V, W)$  with  $(P, Q)$  as key and  $T \rightarrow (U, V)$ ,  $W \rightarrow (P, Q)$  and  $Q \rightarrow (R, S)$  as functional dependencies of  $REL$ , convert  $REL$  into the *highest* possible normal form.

### Module – III

15. a) Discuss concurrency control based on time-stamp ordering.
- b) Briefly discuss recoverable, serial and serializable schedules. Illustrate each with suitable example.

OR

16. a) What is meant by *write-ahead logging* ? What is its significance ?
- b) What are the differences between the two log-based recovery schemes : *immediate update* and *deferred update* ? What are the similarities ? (3×20=60 Marks)