

Bachelor of Computer Science and Engineering Examination, 2014
(3rd Year, 1st Semester)
Database Management Systems

Full marks: 100

Time: 3 hours

Attempt any five questions

- 1) a) In the context of relational model, define a relation for both the cases, attributes are ordered and unordered. 5
- b) Define relational database. 2
- c) Consider the following relations:
 COURSE(courseid, coursename) STUDENT(roll, name) ENROLLMENT(roll, courseid) i) Write down the relational algebra and relational calculus expression to find out the course names in which JOHN has enrolled. 6
- ii) Write down the relational algebra expression to find the number of students enrolled in each course. 2
- d) Consider a relation ITEM(icode, iname, quantity, min_level). Updating the relation is allowed only if the updated quantity does not fall below min_level. How will you ensure it? 5
- 2) a) In the context of ER diagram, explain entity type, relationship type and disjoint constraint. 5
- b) A system stores roll, name and address of all the students. For the hostels, information like hostel id, location, and name of warden is stored. A student is either a day scholar or a hostel boarder. In case he is a hostel boarder, system must keep track in which room and hostel he stays. A student must get enrolled in one and only one curriculum. In a curriculum, number of subjects is taught. System maintains the subject details. There may be common subjects in number of curriculums. In a curriculum, a subject is taught by one faculty and it may be changed in different sessions. System keeps the track of who teaches what in different curriculum and sessions. 8
- Draw the ER/EER diagram for the system described.
- c) System stores roll and name of the students where roll is unique for each student. Each student submits options for enrollment in various subjects by mentioning subject name and preference number for the subject. Draw the ER diagram and write the SQL statements to create the necessary tables. 7

- 3) a) What is weak entity type? How will you implement it? 4
 b) Write down the functions of DDL precompiler and database manager. 4
 c) What is loss-less decomposition? 3
 d) Explain multilevel indexing. 4
 e) What are spurious and dangling tuples? 5

4) a) What is partial dependency? 2

b) A system keeps the information of all the medical representatives along with the visits they make with the doctors. Following information is to be stored:

(represent_name, represent_address, represent_phone and for each doctor the representative meets consider, doctor_name, doctor_specialisation, doctor_phone, date_visit)

A representative may visit number of doctors in a day and number of representatives may meet a doctor in a day. Also assume the following FDs:

represent_name → represent_address, represent_phone

doctor_name → doctor_specialisation, doctor_phone

represent_name, doctor_name → date_visit

- i) Mention the problem of storing the whole data in a single schema. 4
 ii) Normalize the schema up to 3NF showing the steps. Indicate also the PKs and FKs. 7
 c) BCNF may not be dependency preserving -- Explain. 3
 d) Define MVD. 4

5) Consider the following tables:

STUDENT (roll, name)

ASSIGNMENT (assign_id, due_date)

SUBMISSION (roll, assign_id, sub_date, score)

Write down the SQL statements for the following:

- a) Find out the number of assignments submitted by each student. 4
 b) Delete the records from STUDENT who have not submitted any assignment. 4
 c) For each student, display roll and assign_id of the assignments not submitted by him. 4
 d) Find the assign_id with maximum average score. 4
 e) Find the name of the student(s) with highest total score. 4

if some values are not allowed, i.e. if some one is not submitting any entry, there will be an entry

- 6) a) Describe the ACID properties and states of a transaction. 6
 b) Consider a table that stores the detailed marks of all the students in an examination. A question may have many parts. The table is as follows.
 RESULT (roll, question_no, part_no, score)

A student may attempt any number of questions. But, score wise best five is considered to compute total score. Write a PL/SQL block, to store information in the table SUMMARY (roll, total_score) based on the data in RESULT table.

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c) What is a view? What operations can be done with a view?

4

7) a) Compare ordered and unordered file.

3

b) Primary index is sparse – Explain.

3

c) Consider a relation EMP (ecode, ename, basic, dt_jn, dcode). Tuples are ordered on dcode.

Finding the details of a particular employee and finding the employees of a particular department are very frequent operations. What measures will you take to make the operations efficient? — 2

4

d) Explain the steps of query processing?

4

e) Two large relations are to be joined occasionally. None of them are sorted on joining attribute.

No index on the join attribute is available. Describe an optimal strategy. — 3

6

8) a) What are the advantage of steal/no force approach of transaction processing?

3

b) Deadlock may occur in two phase locking protocol – illustrate. Also explain, whether deadlock can occur or not in time stamp based protocol. — 3

7

c) What happens when checkpoint occurs? Explain checkpoint based recovery for deferred database updation policy in concurrent environment. — 3

7

d) Define conflicting instruction in a schedule.

3