BCSE 3rd Year 2nd Semester Examination, 2019

Database Management Systems

Full marks: 100   **Time: 3 hours**

Group A[CO1]:15 Marks

1) a)   i) Define a relation in relational model.   3
         ii) What is a DML pre-compiler?   2

OR

  b)   i) Define foreign key and mention its implication on referencing relation.   3
       ii) What is the model based constraints in relational model?   2

2) a) Consider the following relations:
      ITEM (ICODE, INAME, PRICE)
      ORDER (ORDER_ID, ORDER_DT)
      ORDER_DETAILS (ORDER_ID, ICODE, QTY)
      i) Write down the relational algebra expression to find out the ORDER_IDs
      with requests for three or more different items.   3
      ii) Write down the relational calculus expression to find out the ORDER_IDs
      with requests for all items.   3
  b) Specify the conditions so that intersection can be applied on two relations.   2
  c) Express natural join in terms of basic relational algebra operations.   2

Group B[CO2]:25 Marks

3) a) What is ER diagram? Define entity type and relationship type.   5
  b) An academic programme (say, UG CSE, UG ETCE etc.) covers number of
subjects. Same subject may be taught in multiple programmes. Each subject has
number of outcomes (*i.e* what a student will learn). For each subject there are
number of questions and each question is related to one outcome. There may be
multiple questions for an outcome. There is a fixed set of golden attributes common
to all programmes. Outcomes of the subjects are related to one or more golden
attributes. The system must be able to find the subjects for a programme, outcomes
of a subject, questions for a subject and corresponding outcome, correspondence
between subject outcome and golden attribute.
Draw the ER diagram for the system. Indicate the structural constraints.   10

4) a)   i) Consider one to one relation between two entity types. Comment on the possible ways of implementing the relationship.   5

ii) Define weak entity type and how will you implement it in your database? 5

OR

b)   i) Define single and multi valued attribute, composite attribute, derived attribute.   4

ii) Consider, A is a generalized entity type and B, C, D are the specialized ones. Discuss about the possible implementations assuming disjoint specialization. 6

Group C[CO3]:25 Marks

5) Each student has unique roll number. A relation stores following information for each student: roll, name, date of birth, dept code and dept name in which he/she studies and (semester number, score) for each semester. Further assume the following FDs:

roll $\rightarrow$ name, date of birth, dept code

dept code $\rightarrow$ dept name

roll, semester number $\rightarrow$ score

a) Normalize the schema up to 3NF. Indicate primary and foreign key at each step.
b) Also discuss whether the final decomposition is lossless or not, decomposition preserving or not.   9+6

6) a)   i) What is Functional dependency? R(A,B,C,D,E,F) satisfies the following FDs: A$\rightarrow$ BC   D$\rightarrow$ F   CD$\rightarrow$ E

Find out a candidate key.   5

ii) Why is normalization required?   5

OR

b)   i) Consider two FD sets F1={X$\rightarrow$Y, X$\rightarrow$Z} and F2={X$\rightarrow$Y, Y$\rightarrow$Z}. Explain, are they equivalent?   3

ii) BCNF may not be dependency preserving -- Explain.   3

iii) Define multi-valued dependency.   4

Group D[CO4]:20 Marks

7) Consider the following tables:
STUDENT(ROLL, NAME)
SUBJECT(SCODE, SNAME, FM, PM)
RESULT(ROLL, SCODE, MARKS).
FM and PM in SUBJECT table denote full marks and pass marks for the subject respectively. RESULT contains records only if a student appears in the subject.
Write down the SQL statement for the following:

i) Create the RESULT table with necessary foreign keys and indicated primary key. Assume data type as per your choice.
ii) For each subject, show subject name and number of students passed.
iii) For each student show name and his/her total marks in the descending order of total marks and list will have only those students with total marks more than 400.
iv) Delete the rows from SUBJECT if no student appears in examination for the subject.   3x4

8) a) i) What is trigger?   3
        ii) Assume the tables: DEPT(DCODE, DNAME, MAX_CNT) EMP(ECODE, ENAME)
Write a trigger to add tuple in EMP such that it will be allowed only if number of employees in the department does not exceed corresponding MAX_CNT.   5

OR

b)   i) What is the use of PL/SQL in oracle?   2
        ii) Explain NO_DATA_FOUND and TOO_MANY_ROWS exceptions.   3
        iii) Discuss the attributes of explicit cursor in PL/SQL. 3

Group E[CO5]: 15 Marks

9) a) i) Describe the steps for query processing.   4
        ii) Show that incorrect summary problem does not happen in two phase locking protocol.   5
        iii) Why steal-no force approach is preferred for transaction management? 3
        iv) Compare primary and secondary indexing.   3

OR

b) i) Describe transaction states and transition.   4
   ii) Discuss the security feature of DBMS.   3
   iii) When can one use merge join and hash join strategy? Also mention number of block accesses required for the two cases.   4
   iv) What is the use of checkpoint in log based recovery? What happens at the time of checkpoint operation?   4