EX/ET/T/415D/2019

B.E. ELECTRONICS & TELE-COMM.ENGG.EXAM., 2019

(4TH Year, 1st Semester Examination, 2019)

DATABASE MANAGEMENT SYSTEM

Time: Three Hours **Full Marks: 100**

(Answer Any Five Questions)

1. (a) What is weak entity type ? What will be the schema for representing such entity type in a database table ? What is derived attributes? 2+2+1
   (b) Explain in brief 3 level architecture of database management system.
   (c) Discuss the advantages and disadvantages of using DBMS approach as compared to using conventional file system.
   (d) Explain different types of keys are used in DBMS. (4×5=20)

2. (a) Design an E-R diagram for an IT training group database that will meet the information Needs for its training program. Clearly indicate the Entities, relationships, mapping cardinalities and the Key Constraints.
   The description of the environment is as follows:
   (i) The Company has 12 instructors and can handle up to 100 trainees for each training session.
   (ii) The Company offers five advanced technology courses, each of which is taught by a team of 2 or more Instructors .
   (iii) Each Instructor is assigned to a maximum of two teaching teams or may be assigned to do research.
   (iv)Each trainee undertakes one advanced technology course per training session.
   (b) Draw the UML diagrams equivalent to the E-R diagrams constructed for above Question no2 (a). (10× 2=20)

3. (a)Consider the relational database:
   EMPLOYEE (Empname, Street, City)
   WORKS (Empname, Companyname, Salary)
   COMPANY (Companyname, City)
   MANAGES (Empname, Managername)

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Write the following queries in relational algebra for (i),(ii) & (iii),tuple calculus for (iv) and Domain Calculus for(v).

(i)Find the names, street addresses and cities of residence of all employees who work for 'NM Corporation' and earn more than 200,000 per Annum.

(ii)Find the name of all employees in the database who live in the same city as the company for which they work.

(iii) Find the average, maximum and minimum salary for each company.

(iv) Find the managername who manages the company 'NM Bank Corporation' and live in 'Arnold's Street'.

(v) Find the names of all employees who work for 'Kotac Bank Corporation'.

(5× 2=10)

(b) Write the following quires in SQL considering the above relational database(Q.3(a)) .

(i)Find the names and street addresses of all employees who work for ' KK & MP Corporation' and earn less than 150,000 per Annum .

(ii)Find the name of all employees in the database who live in the same cities as the company for which they work.

(iii) Find the number of employees working and their average for each company.

(iv) Find the maximum salary of the employees who manages 'NM Bank Corporation'.

(v) Update the citiy of employees who work for 'Kotac Bank Corporation' . (5× 2=10)

4. (a) What is the advantages of normalization? Describe the anomalies.

(b) What is BCNF. How it is differ from 3NF.Why it is consider as stronger than 3NF?

(c) Consider a relation R(A,B,C,D,E) and FDs are:

A->D, AB->C.

Is the relation is 2NF? If not make it 2NF.

(d) Consider the relation R(A,B,C,D,E,F,G,H) and FDs are as follows:

CH->G, A->BC

B->CFH,

F->A & F->EG.

Find out which is the candidate key? (4×5 =20)

5. (a) Define Functional dependency .Explain partial function dependency and non-transitive dependency with example. (6)

(b) A relation R(A,B,C,D,E,P,G) satisfy the following functional dependencies:

AB->CD,

DE->P ,

C->E,

P->C,

B->G.

What is the NF? Normalize the relation to 2NF and 3 NF. Identify the primary key and

Foreign Key in 3NF relation. (2+6+2=10)

(c) Given relation R (A,B,C,D,E,F,G) satisfies the following FDs:

A->B,

BC->DE,

AEF->G. Compute the closure of $\{A,C\}^+$.Is the functional dependency ACF->DG implied by this set ? (2+2=4)

6. (a) Explain the different level of RAID technology and explain its features.

(b) Explain the various Indexing schemes used in database environment.

(10+10=20)

7. (a) Consider insertion sequence :

8 , 5 , 1 , 7 , 3 , 12 , 9 , 6 , 20 , 13. Take order 4.Construct B+ tree.

(b) State Armstrong's axioms.

(c) A relation R (A,B,C,D,E,G) has the following set of functional dependencies:

AB- >C, AC- >B, AD ->E

B->D, BC->A, E->G .Is the decomposition of R in R1(A,B) ,R2(B,C), R3(A,B,D,E) Dependency preserving and lossless decomposition? (8+4+8=20)

8. Write Short Notes on any four of the following: (4×5=20)

a) Security features in DBMS.
b) UML.
c) Relational Calculus.
d) Normalization.
e) DBA.
(f) Integrity constraints in DBMS.
(g) Nested loop Join.