FOURTH SEMESTER   B. Tech. [SE]

MID TERM EXAMINATION   March- 2019

SE206 DATABASE MANAGEMENT SYSTEM

Time: 01:30 Hours   Max. Marks: 30

NOTE: *Attempt any 4 questions.*

Que 1. (a) Define the terms: database, DBMS and DBA.

(b) Discuss the main characteristics of the database approach and how it differs from traditional file system.   (3+4.5)

Que 2. (a) What do understand by data models? Explain various data models in detail.

(b) Explain any 3 of the following terms with example: IS-A relationship, specialization, spurious tuples, difference in super key and key.   (3+4.5)

Que 3. (a) Consider the following set of requirements for a university database that is used to keep track of student's transcripts.

a. The university keeps track of each student's name, student number, social security number, current address and phone, permanent address and phone, birthdate, sex, class (freshman, sophomore, . . ., graduate), major department, minor department (if any), and degree program (B.A., B.S., . . ., Ph.D.). Some user applications need to refer to the city, state, and zip code of the student's permanent address and to the student's last name. Both social security number and student number have unique values for each student.

b. Each department is described by a name, department code, office number, office phone, and college. Both name and code have unique values for each department.

c. Each course has a course name, description, course number, number of semester hours, level, and offering department. The value of course number is unique for each course.

d. Each section has an instructor, semester, year, course, and section number. The section number distinguishes sections of the same course that are taught during the same semester/year; its values are 1, 2, 3, . . ., up to the number of

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sections taught during each semester. e. A grade report has a student, section, letter grade, and numeric grade (0, 1, 2, 3, or 4).
Design an ER schema for this application, and draw an ER diagram for that schema. Specify key attributes of each entity type and structural constraints on each relationship type. Note: for any unspecified requirements, and make appropriate assumptions to make the specification complete.

(b) Differentiate between Relational Schema and Instance. (6+1.5)

Que 4. (a) Define Normalization, 2NF and 4NF.
(b) Consider the universal relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = {AB →C, A →DE, B →F, F →GH, D →IJ}. What is the key for R? Decompose R into 2NF, then 3NF relations. Are these Decomposition attribute preserving and Lossless decomposition?
(3+4.5)

Que 5. Consider the following relations for a database that keeps track of auto sales in a car dealership (Option refers to some optional equipment installed on an auto):

CAR(Serial-No, Model, Manufacturer, Price)
OPTIONS(Serial-No, Option-Name, Price)
SALES(Salesperson-id, Serial-No, Date, Sale-price)
SALESPERSON(Salesperson-id, Name, Phone)

a. First, specify the foreign keys for the above schema, stating any assumptions you make.

b. Then specify the following queries in relational algebra:
i. For the salesperson named 'Jane Doe', list the following information for all the cars she sold: Serial#, Manufacturer, Sale-price.
ii. List the Serial# and Model of cars that have no options.
iii. Consider the natural join operation between SALESPERSON and SALES. What is the meaning of a left outer join for these tables (do not change the order of relations). Explain with an example.
iv. List the name of salesperson who have sold all models of Audi. (Audi is a car manufacturer) (1.5+6)