UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April/May 2018

Course: Database Management Systems   **Semester: II**
Program: B.Tech CSE (All IBM Branches)
Time: 03 hrs.   **Max. Marks: 100**

Instructions: All questions are compulsory.

SECTION A

S. No.		Marks	CO
Q 1	Differentiate between WHERE and HAVING clause in SQL. Define various aggregate functions used in SQL.	4	CO1
Q 2	What are the different types of failures that can occurs in database.	4	CO1
Q 3	What do you mean by normalization? What are the various anomalies that need to be taken care of?	4	CO2
Q 4	"The fundamental part of any DBMS is query processing and optimization." Categories the multiple design dimensions based on Query Processing techniques.	4	CO4
Q 5	What is DB2 catalog?	4	CO4

SECTION B

Q 6	Explain why it is still necessary to have at least some familiarity with file processing systems even though it has become evident that traditional file processing systems have a number of shortcomings and limitations.	10	CO2
Q 7	What are the pitfalls in relational database design? With a suitable example, explain the role of functional dependency in the process of normalization.	10	CO1
Q 8	Consider a relation R(A, B, C, D, E) with FD's { AB → C, CD → E, C → A, C → D, D → B } List all the functional dependencies that violate 2NF, 3NF, BCNF. If any, then decompose R accordingly. Also answer that after BCNF conversion is dependency preserving or not?	10	CO3
Q 9	Write the SQL Queries for the following: Employee(EmpId, ename, designation, salary) i. Write a query to change designation of employees who have designation as 'Manager' to 'Advisors' and having salary either 30000, 25000, 15000. ii. Write a query to display the average salary of employees of a particular designation. iii. Write a query to display those employee details whose name begin with 'A' and ends with 'S' and having salary in the range 30000 to 50000.	10	CO2

	iv. Write a query to delete the records of the employees who have empid greater than 205. v. Write a query to add a new record for employee where only empid, ename is provided. OR Suppose you are given a relation R with four attributes ABCD. For each of the following sets of FDs (1,2,3) given below, 1. {C → D, C → A, B → C} 2. {B → C, D → A} 3. {ABC → D, D → A} assuming those are the only dependencies that hold for R, do the following for each FDs: i. Identify the candidate key(s) for R. ii. Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF). iii. If R is not in BCNF, decompose it into a set of BCNF relations that preserve the dependencies.		
	SECTION-C		
Q 10	Consider the following information about a university database: • Professors have an SSN, a name, an age, a rank, and a research specialty. • Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget. • Graduate students have an SSN, a name, an age, and a degree program (e.g., M.S. or Ph.D.). • Each project is managed by one professor (known as the project's principal investigator). • Each project is worked on by one or more professors (known as the project's co-investigators). Professors can manage and/or work on multiple projects. • Each project is worked on by one or more graduate students (known as the project's research assistants). • When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one. • Departments have a department number, a department name, and a main office. • Departments have a professor (known as the chairperson) who runs the department.	**20**	**CO5**

	• Professor's work in one or more departments and for each department that they work in, a time percentage is associated with their job. • Graduate students have one major department in which they are working on their degree. • Each graduate student has another, more senior graduate student (known as a student advisor) who advises him or her on what courses to take. Design and draw an ER diagram that captures the information about the university. Use only the basic ER model here; that is, entities, relationships, and attributes. Be sure to indicate any key and participation constraints.		
Q 11	Consider the following schemas: Suppliers (Sid: integer, sname: string, address: string) Parts (pid: integer, pname: string, color: string) Catalog (sid: integer, pid: integer, cost: number) The key fields are underlined, and the domain of each field is listed after the field name. Therefore sid is the key for Suppliers, pid is the key for Parts, and sid and pid together form the key for Catalog. The Catalog relation lists the prices charged for parts by Suppliers. State what the following queries compute:	**20**	**CO2**

1. $\pi_{sname}(\pi_{sid}((\sigma_{color='red'}Parts) \bowtie (\sigma_{cost<100}Catalog)) \bowtie Suppliers)$

2. $\pi_{sname}(\pi_{sid}((\sigma_{color='red'}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers))$

3. $(\pi_{sname}((\sigma_{color='red'}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers)) \cap$

   $(\pi_{sname}((\sigma_{color='green'}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers))$

4. $(\pi_{sid}((\sigma_{color='red'}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers)) \cap$

   $(\pi_{sid}((\sigma_{color='green'}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers))$

5. $\pi_{sname}((\pi_{sid,sname}((\sigma_{color='red'}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers)) \cap$

   $(\pi_{sid,sname}((\sigma_{color='green'}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers)))$

OR

Sate the following questions:

a) The table shown below is susceptible to update anomalies. Explain insertion, deletion, and modification anomalies from the table with example.

b) Describe and illustrate the process of normalizing the table shown below to 3NF. State any assumptions you make about the data shown in this table.

c) Explain BCNF with example.

staffNo	dentistName	patientNo	patientName	appointment date	time	surgeryNo
S1011	Tony Smith	P100	Gillian White	12-Aug-03	10.00	S10
S1011	Tony Smith	P105	Jill Bell	13-Aug-03	12.00	S15
S1024	Helen Pearson	P108	Ian MacKay	12-Sept-03	10.00	S10
S1024	Helen Pearson	P108	Ian MacKay	14-Sept-03	10.00	S10
S1032	Robin Plevin	P105	Jill Bell	14-Oct-03	16.30	S15
S1032	Robin Plevin	P110	John Walker	15-Oct-03	18.00	S13

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