POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2019
Programme: BE Full Marks: 100
Course: Database Management System Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) What do you understand by Data Independence? How is Schema different from Instance? Justify with some suitable examples. 7
   b) How does UML diagram assist during data modeling? Draw an E-R diagram for a Gandaki Auto Vehicle Shop System including primary key, weak entity, composite attribute, derived attribute and multivalued attributes in your ER diagram 8
2. a) How Relational Algebra is different from Relational Calculus? Define TRC and DRC. 7
   b) Consider a simple relational database of Hospital Management System. (*Underlined attributes represent Primary key attributes*) 8

   Doctors (DoctorID, DoctorName, Department, Address, Salary)
   Patients (PatientID, Patent Name, Address, Age, Gender)
   Hospitals (PatientID, Doctor ID, HostpitalName, Location)

   Write down the SQL statement for the following:

   i. Display ID of Patient admitted to hospital at Pokhara and whose name ends with's'.
   ii. Delete the record of Doctors whose salary is greater than average salary of doctors.
   iii. Increase the salary of doctors by 18.5% who works in OPD department.
   iv. Find the average salary of Doctors for each address who have average salary more than 55K.
3. a) Define Normalization. Explain about 1NF, 2NF & 3NF. 7
   b) What do you mean by decomposition of relational schema? Suppose we are given Schema R = {A,B,C,G,H,I} and set of functional 8

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1. a) Explain the concept of DBMS and its applications tracing the evolution. 7
   b) Construct an ER diagram for keeping records for Library Management Systems. 8
2. a) Using the following schema represent the following queries using Relational algebra : 8

   PROJECT (Project num, ProjectName, ProjectType, ProjectManager)
   EMPLOYEE (Empnum, Empname)
   ASSIGNED_TO (Projectnum, Empnum)

   i) Find Employee details working on a project name starts with 'L'
   ii) List all the employee details who are working under project manager "Rohan"
   iii) List the employees who are still not assigned with any project.
   iv) List the employees who are working in more than one project.

   b) Write the SQL statements for the following queries by reference of **Hotel_details** relation: 7

hotel_id	hotel_name	estb_year	hotel_star	hotel_worth
1	Hyatt	2047	Five	15M
2	Hotel Ktm	2043	Three	5M
3	Fulbari	2058	Five	20M
4	Yak and Yeti	2052	Four	11M
5	Hotel Chitwan	2055	Three	7M

   i. Create a database named hotel & table relation.
   ii. Create a view named Price which shows hotel name & its worth.
   iii. Modify the data so that Hotel Chitwan is now four star level.
   iv. Delete the records of all hotels having worth more than 9M.

dependencies F={A→ B,A→ C, CG→ H, B→H, CG→I}. Find the closures of functional dependency F.

4. a) What is Access control mechanism in database? Explain different types of access control mechanism. 8
   b) Diagrammatically illustrate and discuss the steps involved in processing a query. 7
5. a) Construct a B+ tree for the following set of key values: (2,3,5,7,11,17,19,23,29,31) Assume that the tree is initially empty and values are added in ascending order where the pointer number is Four 8
   b) What is Crash Recovery? What are the problems due to crash? How the problems can be avoided, explain any one briefly. 7
6. a) When does deadlock occurs? Explain two-phase commit protocol with example. 7
   b) What are data fragmentations? State the various fragmentations with examples.
7. Write short notes on: **(Any two)** 2×5
   a) ACID property
   b) QBE
   c) Object Relational Model

3. a) What are store procedures? Explain equi Join, natural join, left and right outer join with examples. 8
   b) Differentiate between Functional Dependency and Multi Valued Dependency? Explain closure set of functional dependencies with example. 7
4. a) Define third normal form. Convert the following 2NF relation into 3NF(consider **Name** as primary key) 8

Name	Address	Phone	Salary	Post
Gill	KTM	456789	20000	Engineer
Van	BKT	654321	20000	Engineer
Robert	KTM	456789	20000	Engineer
Brown	BKT	654321	10000	Overseer
Albert	KTM	454545	10000	Officer

   b) What is security and integrity violations? Explain the need of access control, Authorization and Authentication. 7
5. a) What is query cost estimation? Explain cost based & heuristic based choice of evaluation plan for query optimization. 7
   b) Create a B+ tree of order 4 with following data: 8
   (4, 9, 16, 25, 1, 20, 13, 15, 10, 11, 12) of order 4. Assume that, tree is initially empty and values are added in ascending order.
   Also, show the formation of tree after the deletion of 16.
6. a) What is concurrency control? Describe ACID property of transaction. 8
   b) Define recovery. When the two transactions are said to be in deadlock state? How these deadlocks can be addressed. 7
7. Write short notes on: **(Any two)** 2×5
   a) Architecture of Distributed Database
   b) Role of Database administrator
   c) Dense and Sparse Index