GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY, ODISHA, GUNUPUR
(GIET UNIVERSITY)
B. Tech (Third Semester - Regular) Examinations, November – 2024
23BCSPC23001– Database Management Systems
(Computer Science and Engineering)

Time: 3 hrs   Maximum: 60 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A   (2 x 5 = 10 Marks)

Q.1. Answer *ALL* questions	CO #	Blooms Level
a. Define Data Independence. What are the types of Data Independence?	CO1	K2
b. What are the unary operations in Relational Algebra?	CO2	K2
c. How is Boyce-Codd's normal form found to be stricter than the third normal form?	CO3	K4
d. What are two pitfalls (problems) of lock-based protocols? Explain.	CO4	K4
e. What is the use of RAID?	CO5	K2

PART – B   (10 x 5 = 50 Marks)

Answer *ALL* the questions

	Marks	CO #	Blooms Level
2. a. List and describe the components of database management system with neat diagram.	10	CO1	K1

(OR)

	Marks	CO #	Blooms Level
b. Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Each insurance policy covers one or more cars, and has one or more premium payments associated with it. Each payment is for a particular period of time set of customers, and the date when the payment was received. Represent all the components, Cardinality ratio and constraints of E-R diagram.	10	CO1	K3

	Marks	CO #	Blooms Level
3.a. Consider the following relational schema:	10	CO2	K3

Employee(empno,name,office,age)
Books(isbn,title,authors,publisher)
Loan(empno,isbn,date)

Write the following queries in relational algebra and explain them.

i) Find the names of employees who have borrowed a book Published by XYZ Ltd.   (2.5 M)
ii) Find the names of employees who have borrowed all books Published by XYZ Ltd.   (2.5 M)
iii) Find the names of employees who have borrowed more than five different BOOKS Published by XYZ Ltd.   (2.5 M)
iv) For each Publisher, find the names of employees who have borrowed more than five books from that Publisher.   (2.5 M)

(OR)

	Marks	CO #	Blooms Level
b. Discuss Tuple relational Calculus and Domain relational calculus with examples	10	CO2	K2

4. a. Consider the following database relation Book containing the attributes   10   CO3   K4
   Book–id
   Subject–Category–of–book
   Name–of–Author
   Nationality–of–Author

   i)Book–id is assumed to be the primary key. What is the highest normal form satisfied by this relation? Explain in detail.
   ii) Suppose the attributes Book–title and Author–address are added to the relation, and the primary key is changed to {Name–of–Author, Book–title}. What will be the highest normal form satisfied by the relation?

   (OR)

   b. i. An agency called Instant Cover supplies part-time/temporary staff to hotels in   10   CO3   K4
   Scotland. The table below lists the time spent by agency staff working at various hotels. The national insurance number (NIN) is unique for every staff member. This table is susceptible to update anomalies. Provide examples of insertion, deletion, and update anomalies and explain.

NIN	ContractNo	Hours	eName	hNo	hLoc
1135	C1024	16	Smith J.	H25	East Killbride
1057	C1024	24	Hocine D.	H25	East Killbride
1068	C1025	28	White T.	H4	Glasgow
1135	C1025	15	Smith J.	H4	Glasgow

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

5.a. Consider the following two transactions: 10   CO6   K4
   T1: read(A);
   read(B);
   if A = 0, then B := B + 1;
   write(B).
   T2: read(B);
   read(A);
   if B = 0, then A := A + 1;
   write(A).
   Add lock and unlock instructions to transactions T1 and T2 so that they observe the two-phase locking protocol. Can the execution of these transactions result in a deadlock? Illustrate and Explain.

   (OR)

   b. Define Recoverable schedules and Cascadeless schedules. Discuss the different   10   CO6   K2
   types of recovery techniques.

6.a. Construct a B+ tree to insert the following key elements (the order of the tree is   10   CO5   K6
   3): 5, 3, 4, 9, 7, 15, 14, 21, 22, 23 and show the steps in a tree format for deleting the elements in sequence as 9 and 22.

   (OR)

   b. Explain about static and dynamic hashing with an example.   10   CO5   K2

--- End of Paper ---