

Exam.	Regular (New Course)		
Level	BE	Full Marks	60
Programme	BCT	Pass Marks	24
Year / Part	III / I	Time	3 hrs.

Subject: - Database Management Systems (ENCT 301)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. Describe major drawbacks of file processing system that led to the development of DBMS. [3]
2. Draw an ER diagram for an online pharmacy that manages medicines supplied by manufacturers and distributed via warehouses. The pharmacy also records online sales of medicines through a virtual shopping cart. Medicines have a unique Drug_ID, price, generic name, and expiration date. Manufacturers have a name, location, contact number, and website. Warehouses have a warehouse code, address, and contact phone. Customer details include name, address, email, and phone number. Assume any other necessary attributes and relationships to make the system complete.

Explain how you can convert a many to many relationship in an ER diagram to a relational schema diagram along with an illustrative example. [6+3]

3. Consider the following relational database model: [3×2]

FARMER (FarmerID, FarmerName, Address, Phone)
FARM (FarmID, Location, Area, FarmerID)
CROP (CropID, CropName, Season)
CULTIVATION (FarmID, CropID, Year, QuantityProduced)
MARKET (MarketID, MarketName, City)
SALE (SaleID, FarmID, CropID, MarketID, SaleDate, Amount)

Write relational algebra expressions for the following queries:

- a) Retrieve the names of farmers who cultivate crops during the "Winter" season.
 - b) Find the farm locations where no crop cultivation has been recorded.
 - c) List the CropID and CropName of crops that are cultivated in more than one farm.
4. Considering the same database in question 3, write SQL expressions for the following queries: [3×2]
 - a) Display the crop name and total quantity produced for each crop, showing only those crops whose total production exceeds 1,000 units.
 - b) Consider there is a database user FarmOfficer. Grant insert and update privilege and Revoke delete privilege from FarmOfficer on FARMER table.
 - c) Write stored procedure to insert a new record in FARMER table using an INSERT SQL query.
 5. How do you convert an un-normalized database schema to 3NF? Explain in detail with the help of an example. [4]
 6. In a given relational schema(A,B,C,D,E) we have the following FDs
 - $A \rightarrow B$
 - $B \rightarrow ACE$
 - $C \rightarrow D$

Find attribute closure of AB. Using the concept of attribute closure, determine the combination of keys that best fit to be candidate keys. [2+3]

7. Explain the steps of query processing along with suitable diagram. Compare Cost-based optimization and Heuristic optimization. [4+2]
8. Explain the working of B+ tree index along with suitable example. Differentiate between static hashing and dynamic hashing along with examples. [4+2]
9. Explain the state transition diagram for database transactions. [3+4]
Consider a schedule having 4 transaction having data items A, B and C ordered as
R1(A); R2(A); W1(A); R3(B); W2(A); R4(C); W3(B); R1(C); W4(C)
Check whether the schedule is conflict serializable or not.
10. How does Log Based Recovery help in recovering from DBMS crashes? Explain with an example. [4]
11. Write short notes of NoSQL and distributed databases. [2+2]
