Roll Number: _____

Thapar Institute of Engineering and Technology, Patiala
Department of Computer Science and Engineering

BTECH (Auxi Semester)

Course Code: UCM003
Course Name: DATABASE MANAGEMENT SYSTEM (MINOR)

26 Feb 2024
Time: 3 Hours, M. Marks: 100

Name of Faculty: Dr. Anurag Tiwari

Note: Attempt all questions with proper justification. Assume missing data, if any, suitably.

Q1.	Define Database Management System (DBMS) and discuss its role in modern computing environments. Explain the advantages and disadvantages of using a DBMS compared to traditional file-based systems.	5+5 Marks
Q2.	Explain the three-schema architecture of a DBMS and discuss the purpose and components of each schema.	10 Marks
Q3.	Define and compare the following data models: Hierarchical, Network, Relational, and Object-oriented	10 Marks
Q4.	Discuss the basic concepts of the Entity-Relationship (ER) model, including entities, attributes, relationships, and cardinality.	10 Marks
Q5.	Define functional dependency and explain its role in database design. Discuss the different anomalies that can occur in database design and how normalization helps in addressing them.	10 Marks
Q6.	Discuss the concept of conflict serializability. What are the different types of conflicts that can occur between transactions? Provide examples.	10 Marks
Q7.	Consider the following database: | Employee_ID | Name | Department | Position | Salary | |---|---|---|---|---| | 101 | John Doe | HR | Manager | 60000 | | 102 | Jane Smith | Engineering | Engineer | 50000 | | 103 | Alice Lee | Sales | Sales Rep | 45000 | | 104 | Bob Johnson | HR | Assistant | 40000 | | 105 | Emily Brown | Engineering | Senior Eng | 55000 | [1] Given the set of functional dependencies: {Employee_ID → Salary, Department → Position, Employee_ID, Department → Salary} Find the cover for this set of functional dependencies.	4*5 =20 Marks

	[2] {Employee_ID → Salary, Department → Position, Department, Position → Salary Find a minimal cover for this set of functional dependencies. [3] Consider the set of functional dependencies: {Employee_ID → Salary, Department → Position, Department, Position → Salary Determine if the functional dependency Department → Position is redundant in th set. If it is, remove it and provide the revised set of FDs. [4] Given the set of functional dependencies: {Employee_ID → Salary, Department → Position, Department, Position → Salary} Determine if the functional dependency Department → Salary i necessary for the set to cover all dependencies. If it is, include it in the set. I not, explain why it's not required.	
Q8.	Consider the following dataset. salesman salesman_id | name | city | commission 5001 | James Hoog | New York | 0.15 5002 | Nail Knite | Paris | 0.13 5005 | Pit Alex | London | 0.11 5006 | Mc Lyon | Paris | 0.14 5003 | Lauson Hen | | 0.12 5007 | Paul Adam | Rome | 0.13 customer customer_id | customer_name | city | grade | salesman_id 3002 | Nick Rimando | New York | 100 | 5001 3005 | Graham Zusi | California | 200 | 5002 3001 | Brad Guzan | London | | 3004 | Fabian Johns | Paris | 300 | 5006 3007 | Brad Davis | New York | 200 | 5001 3009 | Geoff Camero | Berlin | 100 | 3008 | Julian Green | London | 300 | 5002 3003 | Jozy Altidor | Moncow | 200 | 5007 order order_no | purch_amt | order_date | customer_id | salesman_id 70001 | 150.5 | 2016-10-05 | 3005 | 5002 70009 | 270.65 | 2016-09-10 | 3001 | 70002 | 65.26 | 2016-10-05 | 3002 | 5001 70004 | 110.5 | 2016-08-17 | 3009 | 70007 | 948.5 | 2016-09-10 | 3005 | 5002 70005 | 2400.6 | 2016-07-27 | 3007 | 5001 70008 | 5760 | 2016-09-10 | 3002 | 5001 70010 | 1983.43 | 2016-10-10 | 3004 | 5006 70003 | 2480.4 | 2016-10-10 | 3009 | 70012 | 250.45 | 2016-06-27 | 3008 | 5002 70011 | 75.29 | 2016-08-17 | 3003 | 5007 [1] Show all the winners in Physics for 1970 together with the winner of Economics for 1971. [2] Show all the winners of Nobel prize in the year 1970 except the subject Physiology and Economics. [3] Find all the details of the Nobel winners for the subject not started with the letter 'P' and arranged the list as the most recent comes first, then by name in order. [4] Find the name and price of the cheapest item(s). [5] Display all the customers, who are either belongs to the city New York or not had a grade above 100.	5*4= 20 Marks