Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

DEPARTMENT OF MECHATRONICS
VI SEMESTER B.TECH. MECHATRONICS
END SEMESTER EXAMINATIONS, MAY 2024
SUBJECT: DATABASE MANAGEMENT SYSTEM [MTE 4055]
(Date:6/5/2024)

Time: 3 Hours **MAX. MARKS: 50**

Instructions for the Candidates:
- Answer **ALL** questions.
- Data did not provide any, may be suitably assumed.

Q. No		M	CO	PO	LO	BL
1a	Classify the following scenarios as instances of either classification or prediction tasks. Substantiate your classification. **SCENARIO 1** ◦ A bank loan officer needs analysis of her data in order to learn which loan applicants are 'safe' and which are 'risky'. **SCENARIO 2** ◦ A marketing manager at XYZ corp needs data analysis to help guess if a customer with a given profile will purchase a computer. **SCENARIO 3** ◦ A medical researcher needs to analyze cancer data to predict which of the three specific treatments a patient should receive. **SCENARIO 4:** ◦ The sales manager would like to predict how much a given customer will spend during a sale.	**4**	5	1,2, 3	2	4
1b	For the given relations r and s, Obtain *r*: $\begin{array}{\|c\|c\|}\hline A & B \\ \hline \alpha & 1 \\ \alpha & 2 \\ \beta & 1 \\ \hline \end{array}$ *s*: $\begin{array}{\|c\|c\|}\hline A & B \\ \hline \alpha & 2 \\ \beta & 3 \\ \hline \end{array}$ a. $r \cup s$ b. $r - s$ c. $r \cap s$	**3**	2	1,2, 3	2	3
1c	Consider the relational database given below. *employee* (*person name*, *street*, *city*) *works* (*person name*, *company name*, *salary*) Give an expression in the relational algebra to express each of the following queries: a. Find the names of all employees who live in city "Miami". b. Find the names of all employees whose salary is greater than $100,000. c. Find the names of all employees who live in "Miami" and whose salary is greater than $100,000.	**3**	2	1,2, 3	2	4

<table>
<tr><td>2a</td><td>For the Weather data given below, obtain the Decision tree.
<table><tr><th>Outlook</th><th>Temperature</th><th>Humidity</th><th>Windy</th><th>Play?</th></tr><tr><td>sunny</td><td>hot</td><td>high</td><td>false</td><td>No</td></tr><tr><td>sunny</td><td>hot</td><td>high</td><td>true</td><td>No</td></tr><tr><td>overcast</td><td>hot</td><td>high</td><td>false</td><td>Yes</td></tr><tr><td>rain</td><td>mild</td><td>high</td><td>false</td><td>Yes</td></tr><tr><td>rain</td><td>cool</td><td>normal</td><td>false</td><td>Yes</td></tr><tr><td>rain</td><td>cool</td><td>normal</td><td>true</td><td>No</td></tr><tr><td>overcast</td><td>cool</td><td>normal</td><td>true</td><td>Yes</td></tr><tr><td>sunny</td><td>mild</td><td>high</td><td>false</td><td>No</td></tr><tr><td>sunny</td><td>cool</td><td>normal</td><td>false</td><td>Yes</td></tr><tr><td>rain</td><td>mild</td><td>normal</td><td>false</td><td>Yes</td></tr><tr><td>sunny</td><td>mild</td><td>normal</td><td>true</td><td>Yes</td></tr><tr><td>overcast</td><td>mild</td><td>high</td><td>true</td><td>Yes</td></tr><tr><td>overcast</td><td>hot</td><td>normal</td><td>false</td><td>Yes</td></tr><tr><td>rain</td><td>mild</td><td>high</td><td>true</td><td>No</td></tr></table></td><td>4</td><td>5</td><td>1,2, 3</td><td>2</td><td>4</td></tr>
<tr><td>2b</td><td>Choose the best attribute for the above weather data, by computing the information gain. Hence draw the final decision tree.</td><td>3</td><td>5</td><td>1,2, 3</td><td>2</td><td>4</td></tr>
<tr><td>2c</td><td>Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.</td><td>3</td><td>3</td><td>1,2, 3</td><td>2</td><td>6</td></tr>
<tr><td>3a</td><td>Cluster the following seven points (with (A,B) representing locations) into two clusters.
<table><tr><th>Subject</th><th>A</th><th>B</th></tr><tr><td>1</td><td>1.0</td><td>1.0</td></tr><tr><td>2</td><td>1.5</td><td>2.0</td></tr><tr><td>3</td><td>3.0</td><td>4.0</td></tr><tr><td>4</td><td>5.0</td><td>7.0</td></tr><tr><td>5</td><td>3.5</td><td>5.0</td></tr><tr><td>6</td><td>4.5</td><td>5.0</td></tr><tr><td>7</td><td>3.5</td><td>4.5</td></tr></table></td><td>4</td><td>6</td><td>1.2. 3</td><td>2</td><td>5</td></tr>
<tr><td>3b</td><td>Explain the ACID properties in database transactions</td><td>3</td><td>5</td><td>1,2, 3</td><td>2</td><td>5</td></tr>
<tr><td>3c</td><td>Generate Sql query for the statements given below
• Insert a new department called "Marketing" into the "departments" table.
• Update the salary of employees in the "sales" department by increasing it by 10%.</td><td>3</td><td>4</td><td>1,2, 3</td><td>2</td><td>3</td></tr>
<tr><td>4a</td><td>Construct FP tree for the data set given below.
<table><tr><th>Transaction ID</th><th>Items</th></tr><tr><td>T1</td><td>I1, I3, I4</td></tr><tr><td>T2</td><td>I2, I3, I5, I6</td></tr><tr><td>T3</td><td>I1, I2, I3, I5</td></tr><tr><td>T4</td><td>I2, I5</td></tr><tr><td>T5</td><td>I1, I3, I5</td></tr></table></td><td>5</td><td>5</td><td>1,2, 3</td><td>2</td><td>3</td></tr>
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<tr><td>4b</td><td>List the entire instructor relation (in Sql) in descending order of salary. If several instructors have the same salary, then order them in ascending order by name. The attributes of instructor are : id, name, dept_name and salary</td><td>3</td><td>4</td><td>1,2, 3</td><td>2</td><td>4</td></tr>
<tr><td>4c</td><td>Explain organizational responsibilities in informing individuals about the types of data collected and its usage within a database?</td><td>2</td><td>1</td><td>1,2, 3</td><td>18</td><td>5</td></tr>
<tr><td>5a</td><td>For a minimum support threshold of 2, determine the most frequent item sets using the Apriori algorithm for the list of transactions shown below. Also find the association rules if threshold confidence is 50%
<table><tr><th>Itemsets</th></tr><tr><td>{1,2,3,4}</td></tr><tr><td>{1,2,4}</td></tr><tr><td>{1,2}</td></tr><tr><td>{2,3,4}</td></tr><tr><td>{2,3}</td></tr><tr><td>{3,4}</td></tr><tr><td>{2,4}</td></tr></table></td><td>5</td><td>5</td><td>1,2, 3</td><td>2</td><td>3</td></tr>
<tr><td>5b</td><td>CREATE TABLE Products (
ProductID INT PRIMARY KEY,
ProductName VARCHAR(255),
Price DECIMAL(10,2) CHECK (Price >= 0)
);
Identify the above query, clearly indicating the table and its attributes along with the primary key.</td><td>3</td><td>4</td><td>1,2, 3</td><td>2</td><td>4</td></tr>
<tr><td>5c</td><td>For the set of relations shown below compute: Π Name (σAge>25 (User))
User<table><tr><th>Id</th><th>Name</th><th>Age</th><th>Gender</th><th>OccupationId</th><th>CityId</th></tr><tr><td>1</td><td>John</td><td>25</td><td>Male</td><td>1</td><td>3</td></tr><tr><td>2</td><td>Sara</td><td>20</td><td>Female</td><td>3</td><td>4</td></tr><tr><td>3</td><td>Victor</td><td>31</td><td>Male</td><td>2</td><td>5</td></tr><tr><td>4</td><td>Jane</td><td>27</td><td>Female</td><td>1</td><td>3</td></tr></table></td><td>2</td><td>2</td><td>1,2, 3</td><td>2</td><td>3</td></tr>
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