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PAPER CODE V314-2102 (ESE)

**(AY:2024-25) December 2024 (ENDSEM) EXAM  
TY (SEMESTER - I)**

**COURSE NAME: DATABASE  
MANAGEMENT SYSTEMS**

Branch: IT    COURSE CODE:    ITUA31202

**(T.Y PATTERN 2020)**

**Time: [1Hr 30 Min]**

**[Max. Marks: 40]**

Instructions to candidates:

- 1) **Figures to the right indicate full marks. Use of scientific calculator is allowed**
- 2) **Use suitable data wherever required**
- 3) **All questions are compulsory. Solve any two sub question each from Questions 1 and 2**
- 4) **Solve any one sub question (2 marks) from Questions 3, 4, 5 and 6 and sub question of 4 marks is compulsory from questions 3,4,5,and 6**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) 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.	[4]	[CO1]	[3]
	b) 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.	[4]	[CO1]	[3]
	c) A weak entity set can always be made into a strong entity set by adding to its attributes the primary key attributes of its identifying entity set. Outline what sort of redundancy will result if we do so.	[4]	[CO1]	[3]
Q2	a) Give an expression in SQL for each of the following queries. employee (employee-name, street, city) works (employee-name, company-name, salary) company (company-name, city) manages (employee-name, manager-name) i) Find all employees in the database who live in the same cities as the companies for which they work. ii) Find all employees in the database who earn more than each employee of Small Bank Corporation. b) Construct the following SQL queries for this relational database. person (driver-id#, name, address) car (license, model, year) accident (report-number, date, location)	[4]	[CO2]	[3]

	<p>owns (<u>driver-id#</u>, license)</p> <p>participated (<u>driver-id</u>, <u>car</u>, <u>report-number</u>, damage-amount)</p> <p>i) Find the total number of people who owned cars that were involved in accidents in 1989.</p> <p>ii) Add a new accident to the database; assume any values for required attributes.</p> <p>c) Let a and b be relations with the schemas A(name, address, title) and B(name, address, salary), respectively. Show how to express A natural full outer join B and A Right Outer join B with it's output.</p>	[4]	[CO2]	[3]															
Q3	<p>a) Explain what is meant by repetition of information. Explain why each of these properties may indicate a bad relational database design.</p> <p style="text-align: center;">OR</p> <p>b) List all functional dependencies satisfied by the relation of following Figure</p> <table border="1" data-bbox="343 676 493 850" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>a<sub>1</sub></td> <td>b<sub>1</sub></td> <td>c<sub>1</sub></td> </tr> <tr> <td>a<sub>1</sub></td> <td>b<sub>1</sub></td> <td>c<sub>2</sub></td> </tr> <tr> <td>a<sub>2</sub></td> <td>b<sub>1</sub></td> <td>c<sub>1</sub></td> </tr> <tr> <td>a<sub>2</sub></td> <td>b<sub>1</sub></td> <td>c<sub>3</sub></td> </tr> </tbody> </table> <p>c) Suppose that we decompose the schema <math>R = (A, B, C, D, E)</math> into  <math>(A, B, C)</math>  <math>(A, D, E)</math></p> <p>Show that this decomposition is a lossless-join decomposition if the following set <math>F</math> of functional dependencies holds:  <math>A \rightarrow BC</math>  <math>CD \rightarrow E</math>  <math>B \rightarrow D</math>  <math>E \rightarrow A</math></p>	A	B	C	a <sub>1</sub>	b <sub>1</sub>	c <sub>1</sub>	a <sub>1</sub>	b <sub>1</sub>	c <sub>2</sub>	a <sub>2</sub>	b <sub>1</sub>	c <sub>1</sub>	a <sub>2</sub>	b <sub>1</sub>	c <sub>3</sub>	[2]  [2]  [4]	[CO3]  [CO3]  [CO3]	[2]  [2]  [4]
A	B	C																	
a <sub>1</sub>	b <sub>1</sub>	c <sub>1</sub>																	
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a <sub>2</sub>	b <sub>1</sub>	c <sub>3</sub>																	
Q4	<p>a) What is a recoverable schedule? Why is recoverability of schedules desirable?</p> <p style="text-align: center;">OR</p> <p>b) What is a cascadeless schedule? Why is cascadelessness of schedules desirable?</p> <p>c) Rearrange the below schedule to conflict serializable schedule.</p> <table border="1" data-bbox="480 1352 836 1622" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th><math>T_1</math></th> <th><math>T_2</math></th> </tr> </thead> <tbody> <tr> <td>read (A) write (A)</td> <td></td> </tr> <tr> <td></td> <td>read (A) write (A)</td> </tr> <tr> <td>read (B) write (B)</td> <td></td> </tr> <tr> <td></td> <td>read (B) write (B)</td> </tr> </tbody> </table>	$T_1$	$T_2$	read (A) write (A)			read (A) write (A)	read (B) write (B)			read (B) write (B)	[2]  [2]  [4]	[CO4]  [CO4]  [CO4]	[2]  [2]  [4]					
$T_1$	$T_2$																		
read (A) write (A)																			
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read (B) write (B)																			
	read (B) write (B)																		

Q.5	a) Discuss the relative advantages and disadvantage of centralized and distributed databases.	[2]	[CO5]	[2]
	OR			
	b) Explain any one Parallel Database Architectures.	[2]	[CO5]	[2]
	c) Consider a failure that occurs during 2PC for a transaction. For each possible failure, explain how 2PC ensures transaction atomicity despite the failure.	[4]	[CO5]	[4]
Q.6	a) Distinguish any 2 points between SQL and NoSQL database.	[2]	[CO6]	[2]
	OR			
	b) Explain CAP theorem Properties.	[2]	[CO6]	[2]
	c) Predict the MongoDB queries by assuming following Collection. Teacher_info(Teacher_id,Teacher_Name,Dept_Name,Sal,st-atus)	[4]	[CO6]	[3]
	1) Find Teacher_info having salary 25000.			
	2) Arrange Teacher_info status in descending order.			

Note: [BT-level-1 Remember 2 Understand 3 Apply 4 Analyze 5 Evaluate 6 Create]

