

SVKM'S NMIMS
MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING/
SCHOOL OF TECHNOLOGY MANAGEMENT

Academic Year: 2023-2024

Program/s: B TECH/MBA TECH/B.Tech Integrated

Year: II/IV Semester: IV/VIII

Stream: DS/Comp Engg/Comp Sci/AI/AIML/AIDS/CSBS/CSEDS 7057/ALL STREAMS

Subject: Database Management Systems

Time: 3 hrs (10.00am to 1.00pm)

Date: 23 / 04 / 2024

No. of Pages: 6

Marks: 100

Final Examination/Re-Examination (2022-23)

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

- 1) Question No. 1 is compulsory.
- 2) Out of remaining questions, attempt any 4 questions.
- 3) **In all 5 questions to be attempted.**
- 4) All questions carry equal marks.
- 5) **Answer to each new question to be started on a fresh page.**
- 6) **Figures in brackets on the right hand side indicate full marks.**
- 7) **Assume Suitable data if necessary.**

Q1		Answer briefly:																										
CO4; SO-1; BL-1	a.	What do you understand by transaction? Describe the state diagram of a transaction.	[5]																									
CO3; SO-6; BL-3	b.	Consider the relation $R = (A, B, C, D, E)$ with the following FDs: $F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$. Find the closure of ABD. State whether ABD is candidate key or not? Justify your answer.	[5]																									
CO2- ; SO-6; BL-3	c.	Considering two relations given below provide the output of following query: Select * from Customer full outer join Transaction using (CustNumber) <table><tr><th colspan="3">Transaction</th></tr><tr><th>Transa ction No</th><th>CustNumber</th><th>amount</th></tr><tr><td>T1</td><td>C1</td><td>1000</td></tr><tr><td>T2</td><td>C2</td><td>2000</td></tr><tr><td>T3</td><td>C5</td><td>3000</td></tr></table> <table><tr><th colspan="2">Customer</th></tr><tr><th>Cust Number</th><th>Customer Name</th></tr><tr><td>C1</td><td>Pradhan</td></tr><tr><td>C2</td><td>Joy</td></tr><tr><td>C3</td><td>Raksha</td></tr></table>	Transaction			Transa ction No	CustNumber	amount	T1	C1	1000	T2	C2	2000	T3	C5	3000	Customer		Cust Number	Customer Name	C1	Pradhan	C2	Joy	C3	Raksha	[5]
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CO4- ; SO-1; BL-2	d.	State any five applications where use of Database Management System is helpful	[5]
Q2 a CO1-; SO-1; BL-3		<p>i. List the drawbacks of file system and explain how it can be overcome in DBMS</p> <p>ii. Map following Entity Relationship (ER) Diagram into relational schema and provide proper justification. Identify primary keys and foreign keys in the relational schema</p> <pre> graph LR student[student] -- submit --> submission[submission] submission -- complete --> assignment[assignment] submission --- submit_date([submit_date]) submission --- version([version]) submission --- data([data]) assignment --- shortname([shortname]) assignment --- due_date([due_date]) assignment --- url([url]) student --- username([username]) </pre>	[10]
Q2 b CO2-; SO-1; BL-5		<p>Consider a social media database with the following schema:</p> <p>User (username, age, country)</p> <p>WatchHistory (username, movieID, timestamp)</p> <p>Movie (movieID, title, genre, release_year)</p> <p>Construct the relational algebra expressions for the following statements</p> <ol style="list-style-type: none"> Find the usernames of users who live in country "India". Retrieve the titles of all movies released after the year 2022. Find the usernames of users who are from the "India" and have watched movies released after the year 2022. Find the usernames, ages, and countries of users who have watched movies with the genre "Comedy" 	[10]
Q3 a CO2-; SO-1; BL-6		<p>Consider the following schema for Order Database:</p> <p>SALESMAN (Salesman_id, Name, City, Commission)</p> <p>CUSTOMER (Customer_id, Cust_Name, City, Grade, Salesman_id*)</p> <p>ORDERS (Ord_ID, Purchase_Amt, Ord_Date, Customer_id*, Salesman_id*)</p> <p>Construct the SQL queries for the following operations</p> <ol style="list-style-type: none"> Create a view that finds the salesman name with city Hyderabad and Commission less than 10,000 [2] Find the details of all customers with Customer_id 'C101' and minimum purchase amount is 50,000/-. [2] 	[10]

	<div>iii. Count the customers with grades above Bangalore's average. [3]</div> <div>iv. Find the name and numbers of all salesman who had more than one customer. [3]</div>																																											
<div>Q3 b</div> <div>CO3-;</div> <div>SO-6;</div> <div>BL-5</div>	<div>Consider a table personal_details as given below. Identify the normal form of the given table? Justify your answer. Convert the table personal_details into the highest Normal Form</div> <table><tr><th>P_id</th><th>Fname</th><th>Lname</th><th>Email</th><th>City</th><th>State</th><th>Zip code</th></tr><tr><td>G243</td><td>Seema</td><td>Shaikh</td><td>seema@gmail.com</td><td>Chennai</td><td>Tamil Nadu</td><td>421568</td></tr><tr><td>D548</td><td>Vinod</td><td>Kapoor</td><td>vk@gmail.com</td><td>Noida</td><td>Uttar Pradesh</td><td>465218</td></tr><tr><td>A284</td><td>Rick</td><td>Gauge</td><td>rickg@gmail.com</td><td>Bangalore</td><td>Karnataka</td><td>439546</td></tr><tr><td>K924</td><td>Nupur</td><td>Shah</td><td>nshah@gmail.com</td><td>Noida</td><td>Uttar Pradesh</td><td>465339</td></tr><tr><td>H479</td><td>Firoz</td><td>Khan</td><td>khanf@gmail.com</td><td>Mumbai</td><td>Maharashtra</td><td>400194</td></tr></table>	P_id	Fname	Lname	Email	City	State	Zip code	G243	Seema	Shaikh	seema@gmail.com	Chennai	Tamil Nadu	421568	D548	Vinod	Kapoor	vk@gmail.com	Noida	Uttar Pradesh	465218	A284	Rick	Gauge	rickg@gmail.com	Bangalore	Karnataka	439546	K924	Nupur	Shah	nshah@gmail.com	Noida	Uttar Pradesh	465339	H479	Firoz	Khan	khanf@gmail.com	Mumbai	Maharashtra	400194	<div>[10]</div>
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<div>Q4a</div> <div>CO1-;</div> <div>SO-1;</div> <div>BL-6</div>	<div>Universal Recorders has decided to hire you as a database designer and you need to create a database about musicians who perform on its albums. Design a conceptual schema for Universal and draw an ER diagram for your schema. Also, convert ER diagram into relational schema.</div> <div>Be sure to indicate all key and cardinality constraints and any assumptions that you make.</div> <div><div>a. Each musician that records at Universal studio has an SSN, a name, an address, and a phone number.</div><div>b. Each instrument that is used in songs recorded at Universal has a name (e.g., guitar, synthesizer, flute) and a musical key (e.g., C, B-flat, E-flat).</div><div>c. Each album that is recorded on the Universal label has a title, a copyright date, a format (e.g., CD or MC), and an album identifier.</div><div>d. Each song recorded at Universal has a title and an author.</div></div>	<div>[10]</div>																																										

	<p>e. Each musician may play several instruments, and a given instrument may be played by several musicians.</p> <p>f. Each album has a number of songs on it, but no song may appear on more than one album.</p> <p>g. Each song is performed by one or more musicians, and a musician may perform a number of songs.</p> <p>h. Each album has exactly one musician who acts as its producer. A musician may produce several albums, of course.</p>																																																	
Q4 b CO4-; SO-6; BL-3	What is NoSQL database and its different types? Why to use a NoSQL database instead of a relational database? List some advantages of NoSQL. How data is stored in a NoSQL Database?	[10]																																																
Q5 a CO1-; SO1-; BL-3	Describe Mapping Cardinalities, Weak entity sets, Generalization and specialization in ER model with an appropriate example.	[10]																																																
Q5 b CO4-; SO-6; BL-5	<p>Evaluate whether the given schedule S is conflict serializable or not</p> <table><tr><td>T1</td><td>T2</td><td>T3</td><td>T4</td></tr><tr><td></td><td>READ(X)</td><td></td><td></td></tr><tr><td></td><td></td><td>WRITE(X)</td><td></td></tr><tr><td></td><td></td><td>Commit</td><td></td></tr><tr><td>WRITE(X)</td><td></td><td></td><td></td></tr><tr><td>Commit</td><td></td><td></td><td></td></tr><tr><td></td><td>WRITE(Y)</td><td></td><td></td></tr><tr><td></td><td>READ(Z)</td><td></td><td></td></tr><tr><td></td><td>Commit</td><td></td><td></td></tr><tr><td></td><td></td><td></td><td>READ(X)</td></tr><tr><td></td><td></td><td></td><td>READ(Y)</td></tr><tr><td></td><td></td><td></td><td>Commit</td></tr></table>	T1	T2	T3	T4		READ(X)					WRITE(X)				Commit		WRITE(X)				Commit					WRITE(Y)				READ(Z)				Commit						READ(X)				READ(Y)				Commit	[10]
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Q6 a CO2-; SO-; BL-4	<p>Describe the anomalies in Relational database design with an example. Given set of FDs F over a relation R(A, B, C, D, E, F, G, H, I, J) are as follows</p> <p>$AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ$</p> <p>i. Determine all the candidate keys of R.</p> <p>ii. Find the highest normal form for the above relation.</p> <p>iii. Decompose the relation into 3NF</p>	[10]																																																

Formulate the SQL queries for the following statements. Tables are provided for your reference

- List out the details of workers with first name having character 'A'
- List out the worker's first name who have received bonus.
- Display the full names and salary of the Managers and Assistant Managers with respect to the dates on which they have been assigned the roles.
- List the number of workers for each department in descending order of the department.
- List the full name and salary of the worker who is earning the highest salary(use nested subquery)

Table - Worker

WID	FNAME	LNAME	SALARY	JOINING_DT	DEPT
101	Simran	Singh	100000	2022-02-22	HR
102	Anil	Pathak	80000	2021-05-03	Admin
103	Neha	Kadam	300000	2020-09-16	HR
104	Sameer	Sinha	500000	2022-08-30	Admin

Table - Bonus

WID	BONUS_DT	BONUS_AMT
101	2023-02-16	4000
102	2023-04-15	5000
101	2023-05-20	3000
103	2023-06-18	4500

Table - Title

WID	W_TITLE	FROM_DT
101	Manager	2023-02-15
102	Executive	2023-05-05
104	Asst. Manager	2023-06-10
103	Lead	2023-06-10

Q6 b

CO2-;
SO-6;
BL- 5

[10]

Q7 a CO1,2; SO-6; BL-3		<ul style="list-style-type: none"> i. Describe the levels of Abstraction in a DBMS [5] ii. Demonstrate at least five Relational algebra operators with examples [5] 	[10]
Q7 b CO2-; SO-1; BL-4		<ul style="list-style-type: none"> i. List different types of constraints used in SQL. Explain any four with an example. [5] ii. Construct SQL queries for the following schema [5] <ul style="list-style-type: none"> <i>person</i> (<u>driver-id</u>, name, address) <i>car</i> (<u>license</u>, model, year) <i>accident</i> (<u>report-number</u>, <u>date</u>, location) <i>owns</i> (<u>driver-id</u>, <u>license</u>) <i>participated</i> (<u>driver-id</u>, <u>license</u>, damagemount) a. SQL DDL definition for the table <i>participated</i> of this database. Identify referential-integrity constraints that should hold and include them in the DDL definition. b. Write query to insert two records in the accident table 	[10]