

**K. J. Somaiya Institute of Technology, Sion, Mumbai-22**

(Autonomous College Affiliated to University of Mumbai)

Subject Code: ITC303 Subject Name: Database management system

Date: 01/03/2024

Feb/March 2024 Supplementary Examination  
(B.Tech.) Program: Information Technology

Examination: SY Semester: III

Course Code: ITC303 and Course Name: Database Management System

Duration: 2.5 Hours

Max. Marks: 60

**Instructions:**

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

	Question	Max. Marks	CO	BT Level
QU-1	Solve any <b>SIX</b> questions out of eight:	<b>12</b>		
i)	What is data redundancy, and which characteristics of the file system can lead to it?	2	CO1	1
ii)	Consider a Students(SID, Name, Age, Grade) relation and write the relational algebra query for: "Select all students who are 20 years old."	2	CO3	1
iii)	What is physical data independence?	2	CO1	1
iv)	What is a recursive relationship? Give an example.	2	CO2	2
v)	What type of integrity is enforced when a primary key is declared?	2	CO4	2
vi)	Explain the difference between an ORDER BY clause and a GROUP BY clause.	2	CO4	2
vii)	What is a partial dependency? With which normal form is it associated?	2	CO5	5
viii)	List the significant benefits of concurrent execution of multiple transactions.	2	CO6	2
QU-2	Solve any <b>FOUR</b> questions out of six.	<b>16</b>		
i)	Discuss scenarios in which using a database is not advisable.	4	CO1	2
ii)	Explain the difference between a weak and a strong entity set.	4	CO2	2
iii)	Discuss the two main types of constraints on specializations and generalizations.	4	CO3	2
iv)	<p>Emp(<i>eid: integer, ename: string, age: integer, salary: real</i>)                      Works(<i>eid: integer, did: integer, pct.time: integer</i>)                      Dept(<i>did: integer, budget: real, managerid: integer</i>)</p> <p>Consider the above relational schema and write the following SQL queries.</p>	4	CO4	3

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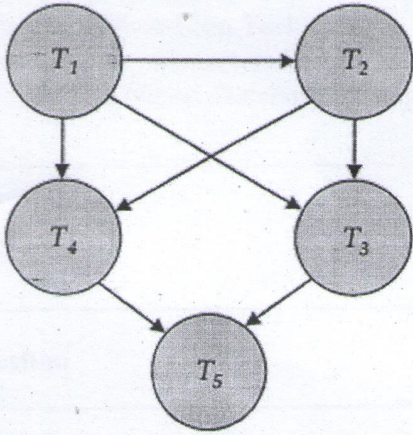
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	<p>i. Create Works and Dept relations, including appropriate versions of all primary and foreign key integrity constraints.</p> <p>ii. Write the SQL statement required to create the Emp relation and add a constraint on Emp that will ensure that every employee makes at least ₹10,000.</p>															
v)	Explain 1NF, 2NF and 3NF with suitable example.	4	CO5	2												
vi)	Define a deadlock and discuss the strategies for deadlock avoidance.	4	CO6	2												
QU-3	Solve any <b>TWO</b> questions out of three.	16														
i)	Describe overall architecture of DBMS with diagram.	8	CO1	2												
ii)	<p>Distinguish between Functions and Procedures in SQL, and write a function that reveals the faculty's designation determined by their salary. The criteria for associating a specific designation with salary are as follows:</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>SR</th> <th>Designation</th> <th>Salary</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Assistant professor</td> <td>&lt; 90000</td> </tr> <tr> <td>2</td> <td>Associate Professor</td> <td>&lt; 150000</td> </tr> <tr> <td>3</td> <td>Professor</td> <td>≥ 200000</td> </tr> </tbody> </table>	SR	Designation	Salary	1	Assistant professor	< 90000	2	Associate Professor	< 150000	3	Professor	≥ 200000	8	CO4	3
SR	Designation	Salary														
1	Assistant professor	< 90000														
2	Associate Professor	< 150000														
3	Professor	≥ 200000														
iii)	<p>Given the relation scheme: R{Truck(T), Capacity(C), Date(Y), Cargo(G), Destination(D), Value(V)} with the following FDs {T → C, TY → G, TY → D, CG → V}.</p> <p>i) Is the decomposition of R into R1{TCD} and R2{TGDVY} dependency-preserving decomposition? Justify.</p> <p>ii) Is the decomposition of R into R1{TCD} and R2{TGDVY} lossless? Justify.</p> <p>iii) Find a lossless join and dependency-preserving decomposition of R into 3NF.</p> <p>iv) If the 3NF decomposition is not in BCNF, find a BCNF decomposition of R.</p>	8	CO5	3												
QU-4	Solve any <b>TWO</b> questions out of three.	16														
i)	Illustrate the concepts of generalization, specialization, and aggregation in the Extended Entity-Relationship (EER) model with suitable example.	8	CO2	4												
ii)	Consider the precedence graph of Figure-1. Is the corresponding schedule conflict serializable? Explain your answer.	8	CO6	2												

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	<p>Figure-1: Precedence graph.</p> 			
<p>iii)</p>	<p><i>employee</i> (<u>person_name</u>, street, city) <sup>8</sup>  <i>works</i> (<u>person_name</u>, company_name, salary)  <i>company</i> (<u>company_name</u>, city) <sup>11</sup>  <i>manages</i> (<u>person_name</u>, manager_name)</p> <p>Figure-1: Relational Database Schema.                  Consider the relational database of Figure-1, where the primary keys are underlined. Give an expression in the <b>relational algebra</b> to express each of the following queries:</p> <ol style="list-style-type: none"> <li>Find the names of all employees who work for "DITTO".</li> <li>Find the names and cities of residence of all employees who work for "First Bank Corporation".</li> <li>Find the names, street addresses, and cities of residence of all employees who work for "First Bank Corporation" and earn more than ₹10,000.</li> <li>Assume the companies may be located in several cities. Find all companies located in every city in which "Small Bank Corporation" is located.</li> </ol>	<p>8</p>	<p>CO3</p>	<p>3</p>

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