

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

April – May 2024

B.Tech. Program: Computer Engineering Scheme II-B

Regular Examination: SY Semester: IV

Course Code: CEC403 and Course Name: Database Management System

Date of Exam: 18/05/2024

Duration: 02.5 Hours

Max. Marks: 60

Instructions:

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

		Max. Marks	CO	BT level
Q.1	Solve any six questions out of eight:	12		
i)	State any four advantages of DBMS over File System	2	CO1	U
ii)	Explain concept of aggregation in EER with example	2	CO2	U
iii)	Explain following relational algebra operators with example: 1) Rename Operator 2) Division Operator	2	CO3	U
iv)	Using example, specify mapping steps for specialization concept of EER model to relational model	2	CO3	U
v)	Explain DEFAULT constraint with example	2	CO4	U
vi)	Illustrate condition to check the relation is in 3NF with proper example	2	CO5	U
vii)	Explain significance of precedence graph in serializability concept	2	CO6	U
viii)	Explain use of following locks in lock based protocol for concurrency control: a) Shared Locks b) Exclusive Locks	2	CO6	U
Q.2	Solve any four questions out of six.	16		
i)	Explain three levels of data abstraction in database systems in detail.	4	CO1	U
ii)	Draw various symbols used for representation in ER diagram: a) Entity – Weak entity and Strong entity b) Attributes – Simple attribute, key attribute, multivalued attribute, derived attribute, composite attribute c) Relationship d) Participation Constraint – Total, partial e) Cardinality constraint – 1:1, 1:m, m:1, m:n	4	CO2	U

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iii)	<p>Write below relational algebra queries with output for following tables:</p> <p>a) Natural Join b) Left Outer Join c) Right Outer Join d) Full Outer Join</p> <table border="1"> <thead> <tr> <th colspan="3">Employee</th> </tr> <tr> <th>EmpID</th> <th>EmpName</th> <th>DeptID</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Alice</td> <td>10</td> </tr> <tr> <td>2</td> <td>Bob</td> <td>20</td> </tr> <tr> <td>3</td> <td>Charlie</td> <td>10</td> </tr> <tr> <td>4</td> <td>David</td> <td>30</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Department</th> </tr> <tr> <th>DeptID</th> <th>DeptName</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>HR</td> </tr> <tr> <td>20</td> <td>Marketing</td> </tr> <tr> <td>30</td> <td>Development</td> </tr> <tr> <td>40</td> <td>Sales</td> </tr> </tbody> </table>	Employee			EmpID	EmpName	DeptID	1	Alice	10	2	Bob	20	3	Charlie	10	4	David	30	Department		DeptID	DeptName	10	HR	20	Marketing	30	Development	40	Sales	4	CO3	Ap
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iv)	<p>Explain following Data Definition Language (DDL) commands with proper syntax and example.</p>	4	CO4	U																														
v)	<p>Explain the condition to check the following relation R(A, B, C, D, E) with functional dependency set $FD = \{ A \rightarrow B, B \rightarrow E, C \rightarrow D \}$, is in 2NF or not? If not convert it into 2 NF.</p>	4	CO5	Ap																														
vi)	<p>Check whether the given schedule S is conflict serializable or not $S : R1(A), R2(A), R1(B), R2(B), R3(B), W1(A), W2(B)$ i) List all conflicting operations and determine relation between transactions (02M) ii) Draw precedence graph(01M) iii) Comment on if it is conflict serializable or not. If yes specify serial schedule (01M)</p>	4	CO6	Ap																														
Q.3	<p>Solve any two questions out of three.</p>	16																																
i)	<p>For the following given database, write SQL queries. EmployeeInfo (EmpID, EmpFname, EmpLname, Department, Project, Address, DOB, Gender) EmployeePosition (EmpID, EmpPosition, DateOfJoining, Salary) Apply and construct following SQL queries: a) To fetch the EmpFname from the EmployeeInfo table in upper case and use the ALIAS name as EmpName. (02 M) b) To retrieve the EmpFname and EmpLname in a single column as "FullName". The first name and the last name must be separated with space. (02 M) c) To fetch all the records from the EmployeeInfo table ordered by EmpLname in descending order and Department in the ascending order. (02 M) d) To fetch details of all employees excluding the employees with first names, "Sanjay" and "Sonia" from the EmployeeInfo table. (02 M)</p>	8	CO4	Ap																														

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ii)	Explain concept of 3NF and BCNF with suitable examples	8	CO5	U
iii)	Explain working of Time-stamp based ordering protocol used in concurrency control with its advantages and limitations	8	CO6	U
Q.4	Solve any two questions out of three.	16		
i)	<p>Apply mapping-rules to below ER model and convert it into Relational Model which should include following rules with proper explanation:</p> <ul style="list-style-type: none"> • Mapping of strong and weak entity (02 M) • Mapping of 1:1, 1:N, M:N cardinality and participation (04M) • Mapping of relationships (02 M) 	8	CO3	Ap
ii)	<p>Explain features of Extended ER Model with proper examples:</p> <ol style="list-style-type: none"> Specialization and Generalization Aggregation Subclass and superclass 	8	CO2	U
iii)	<p>Explain two approaches of modification used in log based recovery</p> <ol style="list-style-type: none"> Immediate database modification(04M) Deferred database modification (04M) 	8	CO6	U
