

**VIT**Vellore Institute of Technology
(Deemed to be University) under section 3 of UOE Act, 1986

REG.NO.:

SLOT: A2

**SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
WINTER SEMESTER 2025-2026**

Programme Name & Branch : B. Tech (CSE and BS)
Course Code and Course Name : CBS1007 & Database Systems
Faculty Name(s) : Prof. Anbarasi M & Prof. Rajasekar VR
Class Number(s) : VL2025260502069 & VL2025260502070
Date of Examination : 15.3.2026
Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction(s):

- Answer All Questions

Course Outcomes

- Analyse and apply the principles and practices of good database design.
- Use the concepts of data normalization to analyse, measure and evaluate the performance of a database application
- Construct efficient SQL queries to retrieve and manipulate data as required.

Q. No	Question	Module	Marks	CO	BL
1.	Consider the following decompositions for the relation schema R (StudentID, StudentName, DeptID, DeptName, CourseID, CourseName, FacultyID, FacultyName, RoomNo, Grade). Determine whether each decomposition has (1) the dependency preservation property, and (2) the lossless join property, with respect to F. Functional Dependencies F={ {StudentID → StudentName, DeptID}, {DeptID → DeptName}, {CourseID → CourseName, FacultyID, RoomNo}, {FacultyID → FacultyName}, {StudentID, CourseID → Grade} R1(StudentID, StudentName, DeptID) R2(DepID, DeptName) R3(CourseID, CourseName, FacultyID, RoomNo) R4(FacultyID, FacultyName) R5(StudentID, CourseID, Grade)	3	10	CO3	BL5
2.	a. Let the relation R be R (M, N, O, P, Q) and the given set of FDs be F = {M→P, NO→MP, O→N, Q→M, Q→P}. Find the minimal cover of F. (5M) b. Considering F1 and F2 be two sets of functional dependencies, Let F1 = {A→B, C→DE, B→EC} F2 = {A→B, A→C, B→D, C→E} Check whether the functional dependencies are equivalent. (5M)	3	10	CO3	BL4
3.	a. Consider the following relations: Employee(EID, Name, DeptID) Department(DepID, Location) Two SQL queries are given below. Query A SELECT Name FROM Employee WHERE DeptID IN (SELECT DeptID FROM Department WHERE Location = 'Chennai'); Query B SELECT E.Name FROM Employee E JOIN Department D ON E.DeptID = D.DeptID WHERE D.Location = 'Chennai';	4	10	CO6	BL5



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i) Determine whether the two queries are equivalent. Justify your answer with appropriate reasoning.(2.5M) ii) Explain the conditions under which these two queries may produce different results.(2.5M) b. Consider the following relations: Student(SID, Name, DeptID) Department(DeptID, DeptName) Two relational algebra queries are given. Query A: $\sigma_{DeptName \neq 'CSE'}(Student \bowtie Department)$ Query B: $(\sigma_{DeptName \neq 'CSE'}(Student)) \bowtie Department$ i) Determine whether the two queries are equivalent.(2.5M) ii) Justify your answer by explaining the reason based on relational algebra operations and attribute availability. (2.5M)				
4. Consider the following relations: Doctor(SSN, FirstName, LastName, Specialty, PhoneNum) Patient(SSN, FirstName, LastName, Address, DOB, PrimaryDoc_SSN) Medicine (TradeName, UnitPrice, GenericFlag) Prescription(Id, Date, Doctor_SSN, Patient_SSN) Prescription_Medicine(Prescription Id, TradeName, NumOfUnits) i) List the first and last name of patients whose primary doctor named 'John Smith'. ii) List the first and last name of doctors who are not primary doctors to any patient. iii) List the SSN of distinct patients who have 'Aspirin' prescribed to them by doctor named 'John Smith'. iv) List the trade name of generic medicine with unit price less than \$50.	4	10	CO4	BL3
5. Consider the following transaction schedules involving transactions T1, T2, and T3. Schedule S3: $R_1(X), W_2(X), W_1(X), R_2(X), R_3(X), C_2, A_1, C_3$ Schedule S4 $R_1(X), W_1(X), R_2(X), C_1, W_2(X), C_2$ i) Determine whether the schedules S3 and S4 are recoverable schedules. Justify your answer. ii) Check whether the schedules S3 and S4 are cascadeless schedules. Explain your reasoning. iii) Identify whether a cascading rollback occurs in schedule S3. Support your answer with explanation. iv) Identify all the conflicting operations present in schedules S3 and S4.	5	10	CO4	BL4
