



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

Programme Name & Branch : B.Tech(CSE)
Course Code : BCSE302L
Course Name : Database Systems
Faculty Name(s) : SWATHI J.N, MOHAN KUMAR P, NAGARAJA RAO A, LYDIA JANE G , NAVAMANI T M, ANAND BIHARI, SARASWATHI PRIYADHARSHINI A, VASANTHI P, KRISHNA RANI SAMAL K, KONATHAM SUMALATHA, THANGARAMYA K, DEEPIKA J, SAURABH AGRAWAL, DEEPA D, SUDHAKAR K, ARPITA GHOSH, MAHESWARI B, SARASWATHI U, ANUSHA R
Class Number(s) : VL2025260101324/1328/1381/1385/1388/1373/ 1371/ 1396/ 1368/1363/1357/1351/1347/1343/1333/1375/1391/1378
Date of Examination : 06 - 10 - 2025
Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- MO- Module; M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes:
CO2. Develop a database project depending on the business requirements, considering various design issues.
CO3. List the concepts of indexing and accessing methods.
CO4. Explain the concept of a database transaction processing and comprehend the concept of database facilities including concurrency control, backup and recovery.

Q. No	Question	MO	M	CO	BL
1.	Given a relation schema R (ABCDE) with a set of FDs, let $F = \{A \rightarrow BC, BC \rightarrow A, BCD \rightarrow E, E \rightarrow C\}$. (i) Is the given relation present in the BCNF or not? If not then decompose into BCNF. (ii) Is that the decomposed relation preserving the functional dependencies? If no then list the functional dependencies that are not preserved and state the reason.	3	10	2	5
2.	A sequential file is ordered on EmployeeID. The file has 1,00,000 records, block size = 1,000 bytes, record size = 100 bytes. (i) Determine the number of records that can be stored in a single block and calculate the total number of blocks required to store the entire file of records. (ii) If 2,000 new employee records are inserted randomly, estimate the numbers of block splits or reorganizations are expected? (iii) Suppose a primary index is built with one index entry per block. Compute the number of index blocks required. Assume index entry size = 10 bytes for key and 4 bytes for pointer. (iv) Suggest an alternative file organization to reduce insertion cost, and justify the answer.	4	10	3	3
3.	Assume the following relations: BOOKS(BId, Title, Publisher, Year), STUDENTS(StId, StName, Major, Age) AUTHORS(AName, Address), borrows(BId, StId, Date), has-written(BId, AName), describes(BId, Keyword)	4	10	3	3



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<p>Consider the above schema and write the following queries into relational algebra expressions.</p> <ul style="list-style-type: none"> (i) List the names of all authors of the books that have been borrowed by the student named 'Smith'. (ii) Retrieve the titles of all books that contain both the keywords 'database' and 'programming'. (iii) List the names of all students who are older than 30 and whose major is not Computer Science. (iv) Retrieve the titles of all books published by McGraw-Hill prior to the year 1990. 				
<p>4. Consider the following Schema EMP(ENO, ENAME, TITLE, DNO, SALARY) PROJ(PNO, PNAME, LOCATION, BUDGET) ASG(ENO, PNO, DUR, ROLE) Construct an Initial Query Tree and Optimized Query Tree using Heuristic Query Optimization Techniques for the SQL query given below:</p> <p>Select ENAME From PROJ P, ASG G, EMP E Where G.ENO=E.ENO And G.PNO=P.PNO And E.ENAME < > 'Mohan Prakash' And P.PNAME='AI-Based Resume Screener' And (G.DUR=12 Or G.DUR=36)</p>	4	10	3	2
<p>5. Time T1 T2</p> <p>t1 Begin Transaction t2 Read(A) t3 A = A + A % 20 t4 Write (A) _____ Begin Transaction t5 _____ Read(A) t6 _____ A = A * 1.15 t7 _____ Write (A) t8 _____ Read(B) t9 _____ B = (B + A) * 1.04 t10 _____ Write (B) t11 _____ Commit</p> <p>t12 Read(B) t13 B = B + 20 t14 Write (B) t15 Commit</p> <p>Assume that the initial value of A and B is 200 and 150.</p> <p>Find the answer of following:</p> <ul style="list-style-type: none"> (i) What is the value of A and B after the concurrent execution of both transactions? (ii) Check whether any conflict present or not. If yes then identify the operation. (iii) Which ACID property/properties are at risk in this schedule? Explain. (iv) Which anomaly occurs here? 	5	10	4	2