



SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2026-2027

Programme Name & Branch : II Year - B.Tech. [BCE,BCB,BAI,BBS,BDS]

Course Code and Course Name: BACSE202-Database Systems

**Faculty Name(s) : Dr. GOVINDA K, Dr. SARITHA MURALI, Dr. KALAIVANI
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**Class Number(s) : VL2026270101647, VL2026270101657, VL2026270103316
VL2026270101659, VL2026270101661, VL2026270101666,
VL2026270101669, VL2026270101672, VL2026270101674,
VL2026270103002, VL2026270101681, VL2026270101685,
VL2026270101689, VL2026270101696, VL2026270101701,
VL2026270101705, VL2026270103067**

Date of Examination : 27/09/2026

Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes
CO 2: Illustrate various binary data representations for fixed and floating point data. Validate efficient algorithm for arithmetic operations.
CO 3: Gain insight into transaction management, concurrency control, and recovery mechanisms in databases.
CO 5: Apply database design principles to create scalable and maintainable data models for real-world systems.

Q. No	Question	Module	Marks	CO	BL
1.	A university maintains a database to manage information about its courses, instructors, classrooms, and examinations. The information is stored in the following universal relation: COURSE_INFO(A, B, C, D, E) The following functional dependencies have been identified based on the organization's business rules: • $A \rightarrow D$: Attribute A uniquely determines D. • $CD \rightarrow B$: The combination of C and D determines B. • $B \rightarrow E$: Attribute B uniquely determines E. • $DE \rightarrow A$: The combination of D and E determines A. As the database is being redesigned to reduce redundancy and improve data consistency, the database administrator wants to	2	10	5	3



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	determine whether the relation satisfies Boyce-Codd Normal Form (BCNF). - Analyze the COURSE_INFO relation and determine whether it is in BCNF. If it is not in BCNF, identify the functional dependencies that violate BCNF and decompose the relation into a set of BCNF relations. - After decomposition, determine whether all the original functional dependencies are preserved. If any functional dependencies are not preserved, identify them and explain why they cannot be enforced directly using the decomposed relations.				
2.	A hospital management system uses Extendible Hashing to efficiently store and retrieve book records based on their unique Book ID. The system initially creates an empty hash structure and inserts the Book IDs in the order given below: 12, 7, 25, 14, 30, 5, 18, 22, 9, 27, 3, 16, 11, 20, 29 Assume that each hash bucket can store a maximum of 2 records. Apply Extendible Hashing to insert the above Book IDs into the storage in the given order. Show the directory, global depth, local depth of each bucket, and bucket contents after every split.	3	10	2	4
3.	Construct a B+ tree of order 4 by inserting the following 12 city names in the given alphabetical order: Chennai, Delhi, Hyderabad, Jaipur, Kolkata, Mumbai, Noida, Pune, Raipur, Surat, Thane, Vadodara After constructing the B+ tree: - Delete Mumbai and show the resulting B+ tree. - From the resulting tree, delete Jaipur and show the resulting B+ tree after the deletion. Assume the following properties for the B+ tree of order 4: - Each internal node can have a maximum of 4 child pointers. - Each leaf node can contain a maximum of 3 keys. - Each non-root leaf node should normally contain a minimum of 2 keys.	3	10	2	3
4.	Consider the following database schema: STUDENT(SID, SNAME, DEPT, YEAR, CGPA) COURSE(CID, CNAME, CREDITS, FACULTY) ENROLL(SID, CID, SEMESTER, GRADE) Construct the Initial Query Tree and the Optimized Query Tree using heuristic query optimization techniques for the following SQL query: SELECT S.SNAME FROM STUDENT S, ENROLL E, COURSE C WHERE S.SID = E.SID AND E.CID = C.CID AND S.SNAME <> 'Rahul' AND C.CNAME = 'Database Systems' AND (E.SEMESTER = 'Odd' OR E.SEMESTER = 'Even');	3	10	2	3
5.	Consider the following schedules S1 and S2 involving four transactions T1, T2, T3 and T4. Using a precedence graph, determine whether each schedule is conflict serializable. If a schedule is conflict serializable, determine its equivalent serial schedule.	4	10	3	4



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i) Schedule S1

T1	T2	T3	T4
			R(X)
R(Y)			
	R(X)		
		W(Y)	
W(X)			
	W(Y)		
		R(X)	
			W(Y)

ii) Schedule S2

T1	T2	T3	T4
R(A)			
	R(A)		
W(B)			
	W(B)		
		R(B)	
	W(C)		
		W(C)	
			R(C)
