



# VIT

Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

SLOT: A2 + TA2

School of Computer Science and Engineering  
CONTINUOUS ASSESSMENT TEST - II  
FALL SEMESTER 2024-2025

**Programme Name & Branch** : B.Tech CSE  
**Course Code and Course Name** : BCSE302L - Database Systems  
**Faculty Name(s)** : Dr. Sridevi S, Dr. Saraswathi Priyadharshini A, Dr. Anand Bihari, Dr. Joshva Devadas T, Dr. Jeevanajyothi Pujari, Dr. Ilayaraja V, Dr. Jyotismita Chaki, Dr. Konatham Sumalatha, Dr. Shashank Mouli Satapathy, Dr. Priyadharsini M, Dr. Akila Victor, Dr. Rajeshkannan R, Dr. Poornima N, Dr. Krishna Rani Samal K, Dr. Geetha Mary A, Dr. Karthik K, Dr. Anbarasi M, Dr. Mohan Kumar P, Dr. Navamani T M, Dr. Ramanathan L, Dr. Lydia Jane G  
**Class Number(s)** : VL2024250101691, 1603, 1736, 1554, 1683, 1560, 1549, 1649, 1539, 1716, 1522, 1533, 1616, 1704, 1511, 1727, 1569, 1666, 1545, 1528, 1581

**Date of Examination** : 13-10-2024  
**Exam Duration** : 90 minutes **Maximum Marks: 50**

**General instruction(s):**

- Answer All Questions

Q. No	Question	M	CO	BL
1.	Consider the following relation and set of functional dependencies and answer the following $R = (ABCD)$ $F = \{AB \rightarrow C, B \rightarrow D; C \rightarrow A\}$ (i) What is/are the candidate key? (ii) Is the given relation present in the BCNF or not? If not then decompose into BCNF. (iii) Is that the decomposed relation preserving the functional dependencies? If no then list the functional dependencies that are not preserved and state the reason.	2+	2	3
2.	Construct a B+-tree for the following set of values (2, 3, 5, 7, 11, 17, 19, 23, 29, and 31). Assume that the tree is initially empty and values are inserted in ascending order. (i) Construct B+-trees for the cases where the number m of pointers that will fit a node is 4 (ii) Shows the form of the B+-tree after each operation of the sequence: Insert 9, 10; (iii) Shows the form of the B+-tree after each operation of the sequence: Delete 19, 23;	4+	3	3
3.	Consider the following relations containing airline flight information: Flights( <u>flno</u> , from, to, distance, departs, arrives, aid) Aircraft( <u>aid</u> , aname, total_capacity, range) Certified( <u>eid</u> , <u>aid</u> ) Employees( <u>eid</u> , ename, salary) Consider the above schema and write the following query into relational algebra. The key attribute is underlined. (i) List the names of pilots certified for some Boeing aircraft. (ii) List the flight number that can be piloted by every pilot whose	10	3	3



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	<p>salary is more than Rs.150,000.</p> <p>(iii) Find the total amount paid as salaries to Boeing certified pilot.</p> <p>(iv) Find the names of pilots who can operate planes with a range greater than 3,000 miles but are not certified on any Boeing aircraft.</p> <p>(v) Find the aids of all aircraft that can be used on non-stop flights from Chennai to Delhi. (A flight will be considered as non-stop, if the aircraft range is greater than equal to the distance of flight).</p>			
4.	<p>Consider the following Schema Student(StudId, Fname, Lname, Major) Grades(StudId, CrsId, Grade) Course(CrsId, Cname, Credit_Points, Dept)</p> <p>Construct an Initial Query Tree and Optimized Query Tree using Heuristic Query Optimization Techniques for the SQL query given below: SELECT StudId, Fname FROM Student s, Grades g, Course c WHERE s.StudId=g.StudId AND g.CrsId= c.CrsId AND Grade = 'S' AND Dept = 'DataScience' AND Major = 'AI'</p>	10	3	4
5.	<p>Consider the transactions T1, T2, and T3 and the schedules S1 and S2 given below.</p> <p>T1: r1(A); r1(C); w1(A); w1(C)</p> <p>T2: r2(B); r2(C); w2(C)</p> <p>T3: r3(B); r3(A); w3(B)</p> <p>S1: r1(A); r3(B); r3(A); r2(B); r2(C); w3(B); w2(C); r1(C); w1(A); w1(C)</p> <p>S2: r1(A); r3(B); r2(B); r3(A); r1(C); r2(C); w3(B); w1(A); w2(C); w1(C)</p> <p>Check whether the given Schedules S1 or S2 are conflict serializable or not? Give justification to your answer with neat explanation.</p>	10	4	4

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