

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)**

CLASS: BTECH.

BRANCH: FOOD TECHNOLOGY

SUBJECT: FE203 PROGRAMMING LANGUAGE AND DBMS

TIME: 02 Hours

**SEMESTER : IV
SESSION : SP/2025**

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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| | | CO | BL |
| Q.1 A database table contains 50,000 records, and each record has a fixed length of 200 bytes. The storage block size is 4 KB (4096 bytes). The table is sorted on the Primary Key, and a Primary Index is created using sparse indexing, where each index entry takes 12 bytes. | [5] | CO3 | BL1 |
| a) How many records can fit in one block of database?
b) How many blocks are required to store the entire record?
c) How many index entries will be there in the primary index table?
d) How many blocks are required to store the primary index table?
e) What is the time complexity of searching a record using the primary index? | | | |
| Q.2 Complete the following snippet of code in C++ | [5] | CO1 | BL4 |
| <pre>#include <iostream> using namespace std; class Vehicle { public: string _____; // (1) void showVehicle() { cout << "Vehicle: " << _____ << endl; // (2) } }; class Car : public _____ { // (3) public: string _____; // (4) Car(string v, string m) { _____ = v; // (5) model = m; } void showCar() { cout << "Vehicle: " << vehicleType << ", Model: " << model << endl; } }; int main() { Car myCar("Toyota", "Corolla"); myCar.showCar(); return 0; }</pre> | | | |
| Q.3(a) How do the roles of an interface designer, database designer, and database administrator differ from one another? Provide a brief explanation | [3] | CO2 | BL2 |
| Q.3(b) Explain any two distinct conceptual database models with a brief description and an appropriate pictorial representation for each. | [2] | CO2 | BL1 |
| Q.4 Design an ER model for a university course management system to track students, courses, and instructors. Identify entities, attributes, and relationships, incorporating one-to-many and many-to-many mapping constraints. Include a ternary relationship, existence dependency, and generalization for course types (e.g., undergraduate, postgraduate). Represent the design with an ER diagram | [5] | CO2 | BL3 |
| Q.5 Explain the significance of Polymorphism, Abstraction, Inheritance, and Encapsulation in Object-Oriented Programming (OOP). How do these concepts contribute to software design in terms of reusability, maintainability, and security? | [5] | CO2 | BL1 |