BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B.Tech. **SEMESTER : IV**
BRANCH: Ftech **SESSION : SP/2025**

SUBJECT: FE203 PROGRAMMING LANGUAGE AND DATABASE MANAGEMENT SYSTEM

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Given the following C++ code, answer the questions (i) and (ii).	[5]	CO1	1

```
# include <<iostream.h>>
class Readbook
{
public:
Readbook() // Function1
{
cout << "Open the book" << endl;
}
void Readchapter() // Function2
{
cout << "Read Chapter 1" << endl;}
~Readbook()
{
cout << "Close the Book" << endl;}
};
```

(i) In object-oriented programming, what is Function1 referred to as and when does it get invoked/called?

(ii) In object-oriented programming, what is Function2 referred to as and when does it get involved/called?

Q.1(b)	Differentiate between early binding and late binding.	[2]	CO1	1
Q.1(c)	Explore the possibilities when a derived class inherits from a base class using public, private and protected keywords.	[3]	CO1	1,2

Q.2(a)	Consider the entities given below and answer the following questions. Draw hierarchical and network models for the entities given below. Identify the relationships between entities.	[5]	CO2	2,3

Batch	
Batch	**Year**
1	1999-2002
2	2000-2003
3	2001-2004
4	2002-2005
5	2003-2006
6	2004-2007
7	2005-2008
8	2006-2009
9	2007-2010
10	2008-2011
11	2009-2012

Class			
Class Code	**Class Describe**	**Total Students**	**Batch**
Fy-1	fy div-1	60	1
Fy-2	fy div-2	60	1
Sy-1	sy div-1	60	1
Fy-1	fy div-1	60	2
Sy-2	sy div-2	60	2
Fy-1	fy div-1	90	3
Fy-2	fy div-2	90	3

PTO

Q.2(b) Draw an E-R diagram for the summer camp which is held in the school during summer vacation. Use the following rules to draw the diagram. [5] CO2 2,3

i. There are many activities under different categories such as sports, intellectual, art, etc., organized. Sports activities such as football, volleyball, badminton, table tennis, basketball, swimming, skating, etc.; art activities such as calligraphy, paper craft, sand sculptures, glass painting, etc.; intellectual activities such as effective speaking, fun with maths, fun with science, good reading habits, etc.; are organized.

ii. One participant can participate in many activities under different categories.

iii. Each activity has a schedule.

iv. Each activity is conducted by one resource person.

v. A resource person can conduct many activities at different time.

Q.3(a) Consider the employee database given below. Give an expression in the relational algebra to express each of the following queries: [5] CO3 3

---

employee (*person_name*, *street*, *city*)
works (*person_name*, *company_name*, *salary*)
company (*company_name*, *city*)

---

i. Find the ID and name of each employee who works for "BigBank".

ii. Find the ID, name, and city of residence of each employee who works for "BigBank".

iii. Find the ID, name, street address, and city of residence of each employee who works for "BigBank" and earns more than $10000.

Find the ID and name of each employee in this database who lives in the same city as the company for which she or he works.

Q3(b) Outer join expressions can be computed in SQL without using the SQL outer join operation. To illustrate this fact, show how to rewrite each of the following SQL queries without using the outer join expression. [5] 4

(i) select * from student natural left outer join takes

(ii) select * from student natural full outer join takes

Q.4(a) Consider the SQL query. [2] CO4 4

```
select p.a1
from p, r1, r2
where p.a1 = r1.a1 or p.a1 = r2.a1
```

Under what conditions does the preceding query select values of p.a1 that are either in r1 or in r2? Examine carefully the cases where either r1 or r2 may be empty.

Q.4(b) Rewrite the where clause [3] CO4 3

```
where unique (select title from course)
```

without using the unique construct.

Q.4(c) SQL allows a foreign-key dependency to refer to the same relation, as in the following example: [5] CO4 5

```
create table manager
    (employee_ID char(20),
    manager_ID char(20),
    primary key employee_ID,
    foreign key (manager_ID) references manager (employee_ID)
                                    on delete cascade)
```

Here, employee_ID is a key to the table manager, meaning that each employee has at most one manager. The foreign-key clause requires that every manager also be an employee. Explain exactly what happens when a tuple in the relation manager is deleted.

PTO

Q.5(a)	Suppose that we decompose the schema R = (A, B, C, D, E) into (A, B, C) (A, D, E). Show that this decomposition is a lossless decomposition if the following set F of functional dependencies holds: A → BC CD → E B → D E → A	[5]	CO5	5,6
Q.5(b)	Normalize the following schema, with given constraints, to 4NF. books(accessionno, isbn, title, author, publisher) users(userid, name, deptid, deptname) accessionno → isbn isbn → title isbn → publisher isbn →→ author userid → name userid → deptid deptid → deptname	[5]	CO5	5

:::::29/04/2025 E:::::