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

CLASS: IMSc. **SEMESTER: II**
BRANCH: QEDS **SESSION: SP/2024**

SUBJECT: ED119 PROGRAMMING LANGUAGE & DATA BASE 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 handbook/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	2

```
# 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)	In an institution, it was decided to modify the rules of computation of grades for players. Accordingly modify the classes student and player such that the player class also has a function 'compute_grade'. Use the concept of function overriding such that at run time, for player object, the computation of grade is done using the compute_grade () function of player class. Choose appropriate rules for the computation of grades for the player object.	[3]	CO1	3
Q.2(a)	If you were designing a Web-based system to make airline reservations and sell airline tickets, which DBMS architecture would you choose from & why? Why would the other architecture not be a good choice?	[2]	CO2	3
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.	[3]	CO2	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.

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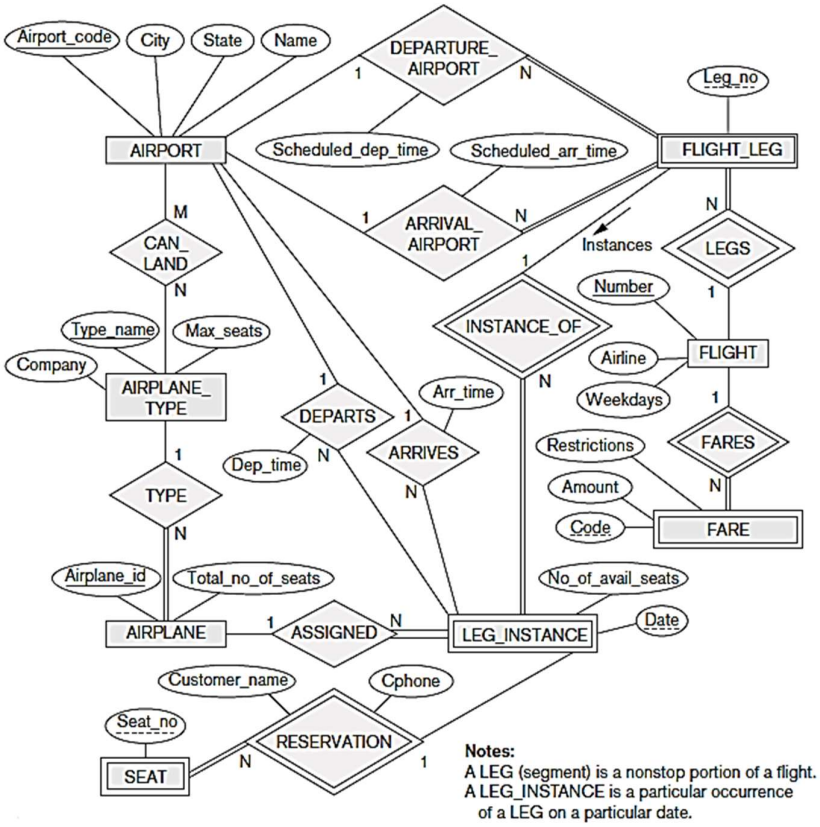
Q.2(c) Given an ER diagram for an AIRLINE database schema. Extract the requirements and constraints that produced this schema. Try to be as precise as possible in your requirements and constraints specification. [5] CO2 1 & 3



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 4

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.
iv. 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.

Q.3(b) Design a relational database schema for a database application of your choice. [5] CO3 5

i. Declare your relations using the SQL DDL.
ii. Specify a number of queries in SQL that are needed by your database application.
iii. Based on your expected use of the database, choose some attributes that should have indexes specified on them.
iv. Implement your database, if you have a DBMS that supports SQL.

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.

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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.

Q.5(a) Consider the schema R = (A, B, C, D, E, G) and the set F of functional dependencies: [5] CO5 6

AB → CD
B → D
DE → B
DEG → AB
AC → DE

R is not in BCNF for many reasons, one of which arises from the functional dependency AB → CD. Explain why AB → CD shows that R is not in BCNF and then use the BCNF decomposition algorithm starting with AB → CD to generate a BCNF decomposition of R. Once that is done, determine whether your result is or is not dependency preserving, and explain your reasoning.

Q.5(b) Normalize the following schema, with given constraints, to 4NF. [5] CO5 6

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

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