

**BACHELOR OF ENGINEERING IN
PRINTING ENGINEERING
EXAMINATION, 2023
(3rd YEAR, 2nd SEMESTER)**

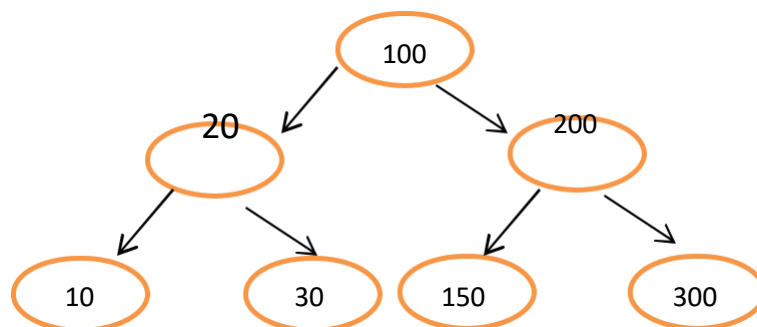
DATABASE MANAGEMENT SYSTEM

Time: 3 Hours

Full Marks: 100

Section - A (Any One)

- Q1
- a) Which strategy is used to perform Quick sort algorithm? Explain how.
 - b) Show stepwise the insertion of the following elements in an binary tree.
63, 81, 19, 27, 18, 108, 99, 84
 - c) What is Binary Search Tree? Explain with example.
 - d) Give the in order traversal of the following BST



2+4+2+2

- Q2
- a) Show stepwise how do we apply insertion sort on the following data.
12, 3, 1, 6, 23, 7
 - b) Explain with proper diagram the properties of stack and queue.

- c) "All trees are graphs but all graphs are not trees." Do you agree or disagree with this. Explain.
- d) State 2 differences between B tree and B+ tree.

3+2+3+2

Section - B (Any One)

- Q1 a) Create an E-R diagram for each of the following descriptions.
- i) Each company operates four departments and each department belongs to one company.
 - ii) Each department in (i) employs one or more employees and each employee works for one department.
 - iii) Each of the employees in part (ii) may or may not have one or more dependents and each dependent belongs to one employee.
 - iv) Each employee in part (iii) may or may not have an employment history.
 - v) Represent all the E-R diagrams described in (i), (ii), (iii) and (iv) as a single E-R diagram.
- b) Reduce the E-R diagram into tables. Explain with proper diagram.
- c) Explain the following with examples.
- i) composite attribute
 - ii) multivalued attribute
 - iii) derived attribute
- d) Give the symbol that represents entity set and derived attributes.

(1+1+1+1+5)+3+(2+2+2)+2

- Q2 a) What is meant by ACID properties in DBMS?
- b) Are Null values in a database the same as that of blank space or zero? Explain.
- c) Give an example of an abort state in a transaction.
- d) What are tuples and attributes in a DBMS?

e) Explain the following terms.

i) data

ii) database

iii) database management system

iv) entity

v) E-R model

f) Explain with example: correlated sub-queries in DBMS?

6+2+2+3+5+2

Section - C (Any *One*)

Q1 a) State the significance of keys in DBMS.

b) Explain the difference between a Primary key and a Foreign Key with an example?

c) Define and explain the following with examples.

i) Super Key

ii) Candidate Key

iii) Composite Key

d) Explain the different types of integrity constraints with examples.

e) Why database management system is prioritized over traditional file based ?

f) What are the different levels of data abstraction in a DBMS.

g) Give 2 examples of Data Manipulation Language (DML).

2+2+(2+2+2)+ 3+3+3+1

Q2 a) What does the rectangle symbol represents in an E-R diagram?

b) Explain strong and weak entity with example.

c) What type of query language does the following SQL belong to?

```
Select rollno, name, dob from students where gender='M';
```

d) Suppose there are 2 entity sets A and B with attributes a1, a2, a3 and b1, b2, b3 respectively. Here a1 is the key for A and b2 is the key for B. If there exist a one-to-many relationship R from A to B with an attribute r1, what would be the schema for R after converting E-R diagram into schemas? Give reason.

e) Draw an E-R model for library management application considering the following constraints.

- In a library multiple students can enroll.
- Students can become a member by paying an appropriate fee.
- The books in the library are identified by a unique ID.
- Students can borrow multiple books from subscribed libraries.

- i) Identify the entity sets.
- ii) Identify the attributes for the given entities
- iii) Identify the key attributes
- iv) Identify the relationships between entity sets
- v) Construct the complete E-R diagram

f) What are constraints in DBMS? Why do we need it? Name 2 different types of constraints.

1+3+1+3+(1+1+1+1+5)+(1+1+1)

Section - D (Any One)

Q1 a) What is normalization?

b) How is normalization different from demoralization?

c) Explain 'insertion anomaly' with an example.

d) What do you mean by prime attributes? Explain.

e) Write the conditions for a relation to be in 3rd normal form.

f) Find the highest normal form of a relation (A, B, C, D, E) with FD set as

{BC->D, AC->BE, B->E}

g) Explain the term functional dependency.

2+2+3+3+2+5+2

- Q2
- What is the use of normalization?
 - Explain the conditions for a relation to be in 2NF.
 - What is natural join? Explain with examples. Why do we need this operator?
 - Give examples of the following.
 - Insertion anomaly
 - Deletion anomaly
 - Updation anomaly
 - What is transitive dependency? Explain with example.
 - Find whether the following relation is in 2NF? Give reasons.

R (A, B, C, D, D) with FD set { B → A, A → C, BC → D, AC → BE }

$$1+2+(1+2+1)+6+2+5$$

Section - E (Any One)

- Q1
- What is the importance of null value in a table?
 - What is a trigger? Give 3 examples of SQL trigger.
 - What is the difference between delete, drop and truncate? Explain with an example.
 - Which SQL command is used to add a column in a database? Explain with example.
 - Consider the following schemas.

Employee (emp_id, emp_name, dept, cont_no, email_id, empid_head)

EmpDept (dept_id, dept_name, dept_off, dept_head)

EmpSalary (emp_id, salary, is_permanent)

Table name: Employee

emp_id	emp_name	dept	cont_no	email_id	empid_head
101	Isha	E-101	1234567890	isha@gmail.com	105
102	Priya	E-104	2345678901	priya@yahoo.com	103
103	Neha	E-101	3456789012	neha@gmail.com	101
104	Rahul	E-102	4567890123	rahul@yahoo.com	105

105	Abhishe	E-101	5678901234	abhishek@gmail.com	102
	k				

Table name: EmpDept

dept_id	dept_name	dept_off	dept_head
E-101	HR	Monday	105
E-102	Development	Tuesday	101
E-103	House Keeping	Saturday	103
E-104	Sales	Sunday	105
E-105	Purchase	Tuesday	104

Table name: EmpSalary

emp_id	Salary	is_permanant
101	2000	Yes
102	10000	Yes
103	5000	No
104	1900	No
105	2300	Yes

Write down SQL queries for the following.

- i) Create EmpDept table clearly stating the necessary constraints.
 - ii) How many temporary candidates take salary less than 5000?
 - iii) Select the name of the employee who is working under Neha?
- f) Explain commit and rollback operations that are used in database management system.
- g) What is the meaning of aborted transaction?

$$2+2+4+2+(2+2+2)+3+1$$

- Q2
- a) Explain two aggregate functions with examples .
 - b) Write 2 differences between JOIN and UNION.
 - c) When should we use 'Having' clause in SQL? Explain with example.
 - d) Consider the following schemas.

Employee (emp_id, emp_name, dept, cont_no, email_id, empid_head)

EmpDept (dept_id, dept_name, dept_off, dept_head)

EmpSalary (emp_id, salary, is_permanant)

Table name: Employee

emp_id	emp_name	dept	cont_no	email_id	empid_head
101	Isha	E-101	1234567890	isha@gmail.com	105
102	Priya	E-104	2345678901	priya@yahoo.com	103
103	Neha	E-101	3456789012	neha@gmail.com	101
104	Rahul	E-102	4567890123	rahul@yahoo.com	105
105	Abhishek	E-101	5678901234	abhisek@gmail.com	102

Table name:EmpDept

dept_id	dept_name	dept_off	dept_head
E-101	HR	Monday	105
E-102	Development	Tuesday	101
E-103	House Keeping	Saturday	103
E-104	Sales	Sunday	104
E-105	Purchase	Tuesday	104

Table name: EmpSalary

emp_id	Salary	is_permanant
101	2000	Yes
102	10000	Yes
103	5000	No
104	1900	Yes
105	2300	Yes

Write down SQL queries for the following.

- i) Select name of employee who is the department head of Development.
- ii) Select name and email_id of the department head who is permanent.
- iii) How many employees have a holiday on Tuesday?
- iv) Name the department with minimum number of employees.

e) What is scheduling? Why do we need scheduling? Explain with example.

$$(1+2+2)+2+3+(2+2+2+2)+(1+1+2)$$

Section - F (All Compulsory)

Q1

- a) Select emp_name from Employees
where emp_Category='devops'
order by emp_name
group by branch_code
having count(*)=1;
- b) Select * from products
where manuf_date BETWEEN '2023-04-01' AND '2023-05-01';

1+1

Q2 Write down the pseudo code for quick sort.

3

Q3 Which clause do we use to filter data. Give an example.

```
#include<stdio.h>
int main()
{
    char arr*+=, 'A', 'B', 'c', 'd', 'E', 'f', 'G';
    int size = sizeof(arr)/sizeof(arr[0]);
    printf("%d\n",size);
    return 0;
}
```

2

Q4 Write down the output of the following queries based on the given tables.

Table name: Employee

emp_id	emp_name	dept	cont_no	email_id	empid_head
101	Isha	E-101	1234567890	isha@gmail.com	105
102	Priya	E-104	2345678901	priya@yahoo.com	103
103	Neha	E-101	3456789012	neha@gmail.com	101
104	Rahul	E-102	4567890123	rahul@yahoo.com	105
105	Abhishek	E-101	5678901234	abhisek@gmail.com	102

Table name:EmpDept

dept_id	dept_name	dept_off	dept_head
E-101	HR	Monday	105
E-102	Development	Tuesday	101
E-103	House Keeping	Saturday	103
E-104	Sales	Sunday	104
E-105	Purchase	Tuesday	104

Table name: EmpSalary

emp_id	Salary	is_permanant
101	2000	Yes
102	10000	Yes
103	5000	No
104	1900	Yes
105	2300	Yes

- a) Select emp_id, emp_name from Employee where dept in ('E-103' , 'E-105');
- b) Select avg(salary) as Salary from EmpSalary where is_permanant='no';
- c) Select emp_name from Employee where emp_name like '%k';

1+1+1