KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE- 638 060
EVEN SEMESTER 2022-23
CONTINUOUS ASSESSMENT TEST I – March 2023
Regulation 2020
Key

PART - A (10 × 2 = 20 Marks)

ANSWER ALL THE QUESTIONS

1.	Define DBMS A database-management system (DBMS) is a collection of interrelated data and a set of programs to access those data.	[CO1,K1]
2.	Differentiate between file processing system and DBMS. Data redundancy and inconsistency, Difficulty in accessing data, Data isolation, Integrity problems, Atomicity problems, Concurrent-access anomalies, Security problems.	[CO1,K2]
3.	Differentiate Physical data independence and logical data independence. Physical data independence: Any change at the physical level, does not require to change at the logical level. Logical data independence: Any change at the logical level, does not require to change at the physical level.	[CO1,K2]
4.	Determine atleast five super keys, possible candidate keys and suitable primary key for the following relation. Faculty(fid, fname, designation, address, salary, phoneno, mailid) Super Keys: {fid}, {fid,fname}, {phoneno},{fid, phoneno}, {mailid},{fid,phoneno,mailed}…. Candidate keys: {fid},{mailid},{ phoneno} Primary key: {fid}	[CO1,K3]
5.	Consider the following relations A, B, C. How many tuples does the result of the following relational algebra expression contain? Assume that the schema of A U B is the same as that of A. **(GATE)**	[CO1,K3]

$$(A \cup B) \rhd\lhd_{A.Id>40 \ v \ C.Id<15} C$$

Table A

Id	Name	Age
12	Arun	60
15	Shreya	24
99	Rohit	11

Table B

Id	Name	Age
15	Shreya	24
25	Hari	40
98	Rohit	20
99	Rohit	11

Table C

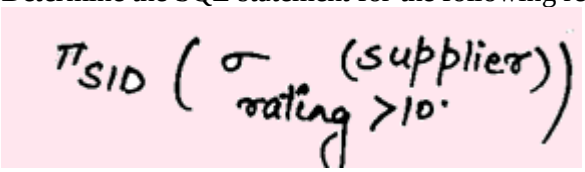
Id	Phone	Area
10	2200	02
99	2100	01

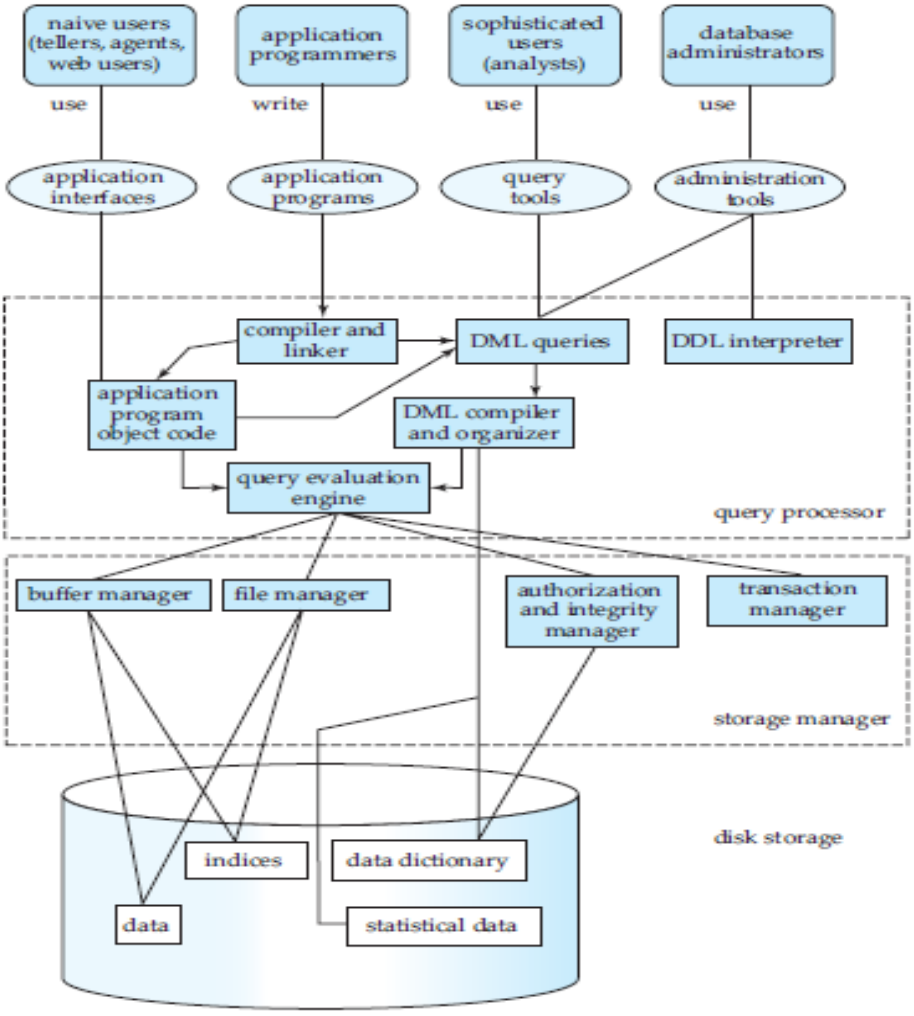
Result of AUB will be following table

Id	Name	Age
12	Arun	60
15	Shreya	24
99	Rohit	11
25	Hari	40
98	Rohit	20

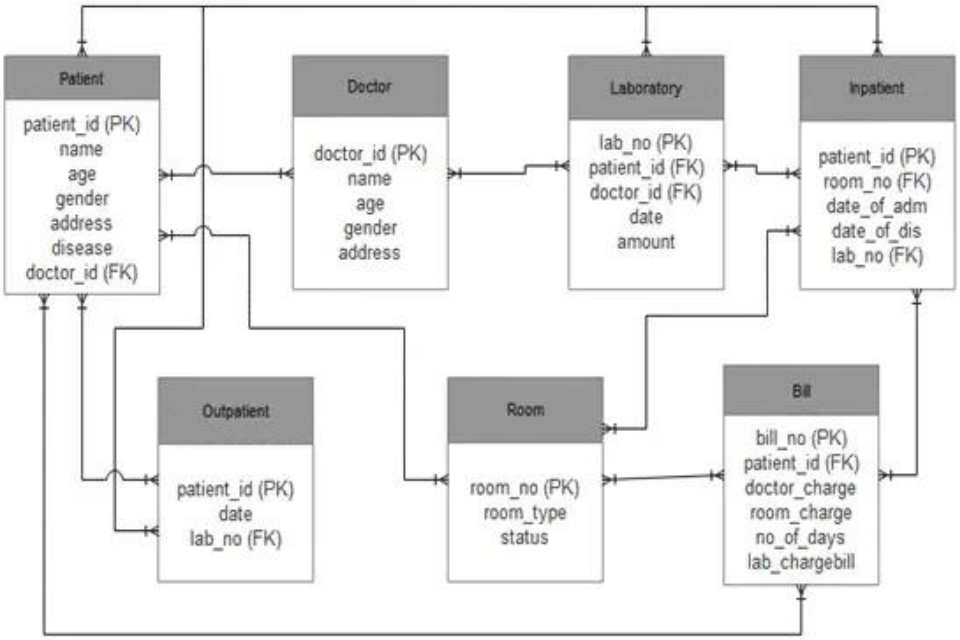
The result of given relational algebra expression will be 7 Rows

Id	Name	Age	Id	Phone	Area
12	Arun	60	10	2200	02
15	Shreya	24	10	2200	02
99	Rohit	11	10	2200	02
25	Hari	40	10	2200	02
98	Rohit	20	10	2200	02
99	Rohit	11	99	2100	01
98	Rohit	20	99	2100	01

<table>
<tr><td>6.</td><td>Determine the SQL statement for the following relational algebra expression (GATE)
 
Select SID from supplier where rating > 10;</td><td>[CO1,K3]</td></tr>
<tr><td>7.</td><td>Convert into relational algebra for the following SQL query. Select distinct $a_1, a_2, ..., a_n$ From $r_1, r_2, ..., r_m$ Where P; (GATE)
$\pi_{a1, a2, ..., an}$ $(\sigma_P (r_1 \times r_2 \times r_3 \ldots \times r_m))$</td><td>[CO2,K3]</td></tr>
<tr><td>8.</td><td>Consider the relations r_1(P, Q, R) and r_2(R, S, T) with primary keys P and R respectively. The relation r_1 contains 3000 tuples and r_2 contains 2500 tuples. Find the maximum size of the join $r_1 \bowtie r_2$. (GATE) 2500</td><td>[CO2,K3]</td></tr>
<tr><td>9.</td><td>Consider the following relational schema: (GATE)
COURSES (<u>cno</u>, cname)
STUDENTS (<u>rollno</u>, sname, age, year)
REGISTERED FOR (<u>cno</u>, <u>rollno</u>)
The underlined attributes indicate the primary keys for the relations. The ‘year’ attribute for the STUDENTS relation indicates the year in which the student is currently studying (First year, Second year etc.) Write a SQL query to print the age and year of the youngest student in each year.
SELECT year, min(age) FROM STUDENTS GROUP BY year;</td><td>[CO2,K3]</td></tr>
<tr><td>10.</td><td>A table T1 in a relational database has the following rows and columns: (GATE)
<table><tr><td>Rollno</td><td>marks</td></tr><tr><td>1</td><td>10</td></tr><tr><td>2</td><td>20</td></tr><tr><td>3</td><td>30</td></tr><tr><td>4</td><td>Null</td></tr></table>The following sequence of SQL statements was successfully executed on table T1.
Update T1 set marks = marks + 5
Select avg(marks) from T1
What is the output of the select statement?
<table><tr><td>Rollno</td><td>marks</td></tr><tr><td>1</td><td>15</td></tr><tr><td>2</td><td>25</td></tr><tr><td>3</td><td>35</td></tr><tr><td>4</td><td>Null</td></tr></table>Average mark: 25</td><td>[CO2,K3]</td></tr>
<tr><td></td><td>PART – B (3 × 10 = 30 Marks)</td><td></td></tr>
</table>

11.	Illustrate the system architecture of DBMS with a neat diagram.  Diagram : 3 Marks Explanation : 7 Marks	[CO1,K2]

12.	a. Draw the schema diagram for hospital management system.	(5)	[CO1,K2]



b. How database applications are handled in two and three tier architecture? (5)

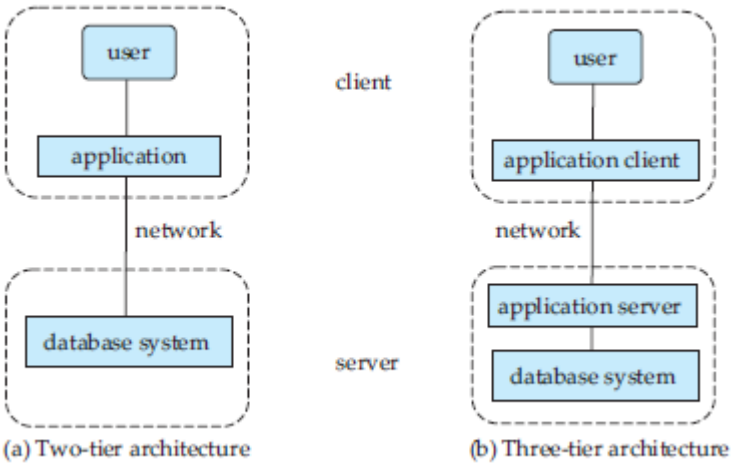


Diagram : 2 Marks Explanation : 3 Marks

13.	Consider the following relational database emp (empname, street, city) works(empname, compname, salary) company(compname, city) manager (empname, managername) Give an expression in the relational algebra to express each of the following queries: a. Find the names of all employees who work for First Bank Corporation. **Π*empname* (*σcompname* = "First Bank Corporation" (*works*))** b. Find the names and cities of residence of all employees who work for First Bank Corporation. **Π*empname, city* (*emp* ⋈ (*σcompname* = "First Bank Corporation" (*works*)))** c. Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000. **Π*empname, street, city* ($\sigma_{(compname = \text{"First Bank Corporation"} \wedge salary > 10000)}$ *works* ⋈ *employee*)** d. Find the names of all employees in this database who live in the same city as the company for which they work. **Π*empname* (*employee* ⋈ *works* ⋈ *company*)** e. Find the names of all employees who live in the same city and on the same street as do their managers. T←$\Pi_{street,city}$ ($\sigma_{emp.empname=manager.managername}$(*employee* ⋈ *manager*))	[CO1,K3]
14.	Consider the following relational database emp (empname, street, city) works(empname, compname, salary) company(compname, city) manager (empname, managername) Give an expression in SQL for each of the following queries i)Modify the database so that Ram now lives in Delhi. **Update emp set city='Delhi" where empname='Ram';** ii) Find the names and cities of residence of all employees who work for First Bank Corporation. **Select empname, city from emp natural join works where compname=' First Bank Corporation';** iii) Find all employees in the database who earn more than every employee of small bank corporation. **select empname from works where salary > all (select salary from works where compname = 'Small Bank Corporation');** iv) Find all employees who earn more than the average salary of all employees of their company. **select empname from works T where salary > (select avg (salary) from works S where T.compname = S.compname);** v) Remove the company relation from the database. **drop company;**	[CO2,K3]