Silicon Institute of Technology

Silicon Hills, Bhubaneswar

| An Autonomous Institute |

5th Semester B.Tech. Mid Term Examination 2021-22

FUNDAMENTALS OF DBMS(18CS3T04)

Duration: 01:30 Full Marks: 25

1 ***Answer All***

a Differentiate between generalization and specialization with a suitable example. 1

b What do you understand by attribute inheritance? Give a suitable example. 1

c What is a recursive relationship in ER Model? Give a suitable example? 1

d Give an example where an attribute of a relation references the primary key of the same relation. 1

e What is the cardinality of the the relation |R ⨯ S| if |R| = 7(No of tuples in R) and |S| = 5 (No of tuples in S). 1

f What is a free variable and bound variable in non procedural query language? 1

2 ***Answer All***

a In the context of ER Model, what is mapping cardinality? Describe the various possible mapping cardinalities with suitable diagram. 3

b Define relationship, relationship type, relationship set and identifying relationshipset with suitable examples. 3

c 3

EMP

ENAME	**EID**	SAL	DNO

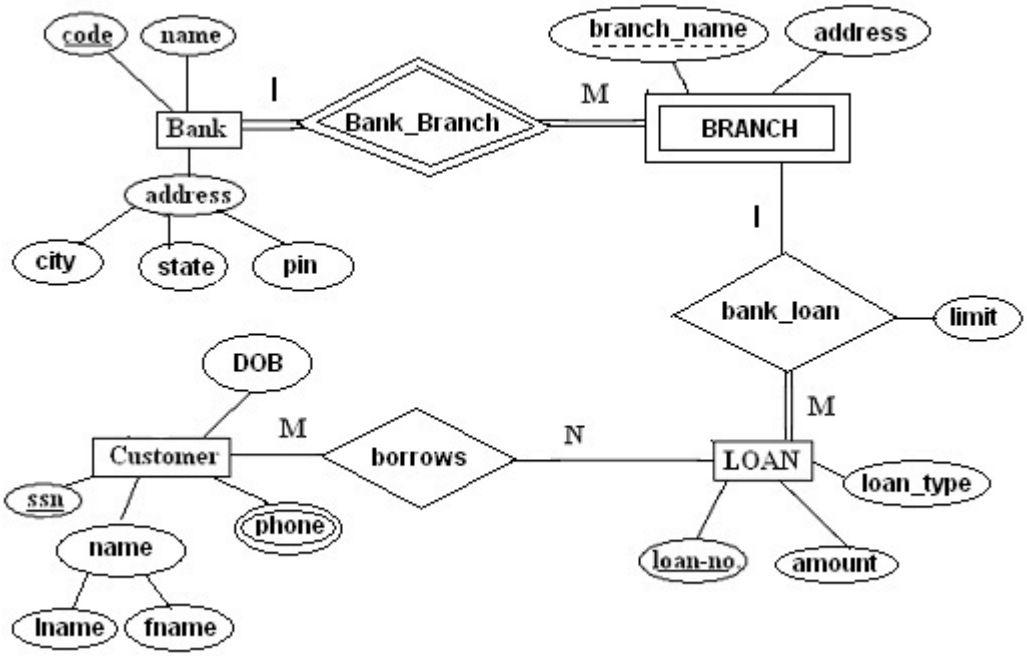
WORKS_ON

EID	PNO

Write a relational algebric expression to retrieve the names of all employees who are assigned to all projects where HAYES works.
(Use division operatiion to solve the query)

3 ***Answer any One***

a Convert the following ER diagram to relational model. 5



b Consider the following information about a university database: 5
Professors have an SSN, a name, an age, a rank, and a research specialty. Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget. Graduate students have an SSN, a name, an age, and a degree program (e.g., M.S. or Ph.D.). Each project is managed by one professor (known as the project's principal investigator). Each project is worked on by one or more rofessors (known as the project's co-investigators). Professors can manage and/or work on multiple projects. Each project is worked on by one or more graduate students (known as the project's research assistants). When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a supervisor for each one. Departments have a department number, a department name. Departments have a professor (known as the chairman) who runs the department. Professors work in one or more departments, and for each department that they work in, a time percentage is associated with their job. Graduate students have one major department in which they are working on their degree. Each graduate student has another, more senior graduate student (known as a student advisor) who advises him or her on what courses to take. Design and draw an ER diagram that captures the information about the university.

4 ***Answer any One***

a Consider the following relational schema: 5
employee (person name, street, city)
works (person name, company name, salary)
company (company name, city)
Write the following queries in relational algebra

1. Find the name of each employee who lives in city “Miami”.
2. Find the name of each employee whose salary is greater than $100000.
3. Find the name of each employee who lives in “Miami” and whose salary is greater than $100000.
4. Find the name and salary of each employee who does not work for “BigBank”.
5. Find the average salary of each company.
6. Find the name, street address, and city of residence of each employee who works for “BigBank” and earns more than $10000.

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

b **SAILOR** (**SID**, SNAME, AGE) 5
RESEARVE (**SID, BID**, DAY_RES)
BOAT (**BID**, BNAME, COLOUR)

Write Relational algebra, TRC, DRC and QBE for the following queries:
a) Show all sailors who have not reserved a RED colour boat?
b) Find all the sailor names and their boat names which they will sail on 22 / 12 / 92?