1981

B.Sc. (Hons.)- V Sem.COMPUTER SCIENCE C

Paper 501-FILE STRUCTURES AND DATABASE SYSTEMS(New Course)
(Admissions of 2001 and onwards)

Time : 3 Hours *Maximum Marks : 75*

(Part A is compulsory. Attempt any four questions from Part B. Parts of a question should be answered together.)

Part A

Q1 a) Suppose the search key field is V= 9 bytes long, the block size is B = 1024 bytes, a record pointer is P = 7 bytes and a block pointer P(b)=6 bytes. Find out the order p of B tree and B+ tree. 6

b) For a given relational schema SHIPPING (ship#, capacity, date, cargo, value) with a set of functional dependencies

F = { ship#--> capacity,

ship#, date→ cargo,

cargo→ value }

i) Find out the key for the given relation. 3

ii) Reduce the given relation into 3NF relations. 3

c) Give an ER diagram, for a system having the following requirements:

- An INVOICE is written by a sales representative (SALESREP). Each sales representative can write many invoices, but each invoice is written by a single SALESREP. For each SALESREP his/her s_id, sname, address and phone# is stored.
- Each invoice has an invoice_id (unique) and a date .
- An INVOICE is written for a single CUSTOMER. However, each customer can have many invoices. For each customer c_id (unique) , cname, address and phone# is stored.
- The product information is stored in a PRODUCT entity which is represented by a p_id (unique), a pname and price. An invoice can contain many products and a product can be indicated in many invoices.

Also supply the min, max constraints and state the additional assumptions if any. 6

d) What are the constraints on specialization and generalization? 4

e) What is the difference between procedural and non procedural language? 3

f) For the following relational schema, write SQL statements for the given queries-

PROJECT (Proiect#, ProjectName, ChiefArchitect)
EMPLOYEE (Emp#, EmpName)
Assigned_To (Proiect#, Emp#)

(i) Get all the project names to which employee 107 is not assigned.
(ii) Retrieve the list of employees who are assigned to projects on which employee 109 is the chief architect.
(iii) Get number of projects for each employee along with their name. 6

g) How is a class-subclass relationship different from a relationship in an ER diagram ? 4

Part B

Q2 a) Mention with examples three scenarios where use of null values would be appropriate. 3

b) During the mapping of a 1: N relationship in an ER diagram to relation, the relationship attribute is kept on which side and why? Give an example. 3

c) Differentiate between the following:

i. Run time database processor and stored database processor
ii. Extension and intension of a database 4

Q3 a) Differentiate between the following:

iii. Physical schema and logical schema
iv. centralized and distributed DBMS 4

b) Consider the following relational schema

PARTS (pno,pname,price)

CUSTOMERS (cno,cname,street,city)

EMPLOYEES (eno,ename,city,hdate)

ORDERS (ono ,cno, eno)

ODETAILS (ono, pno, qty)

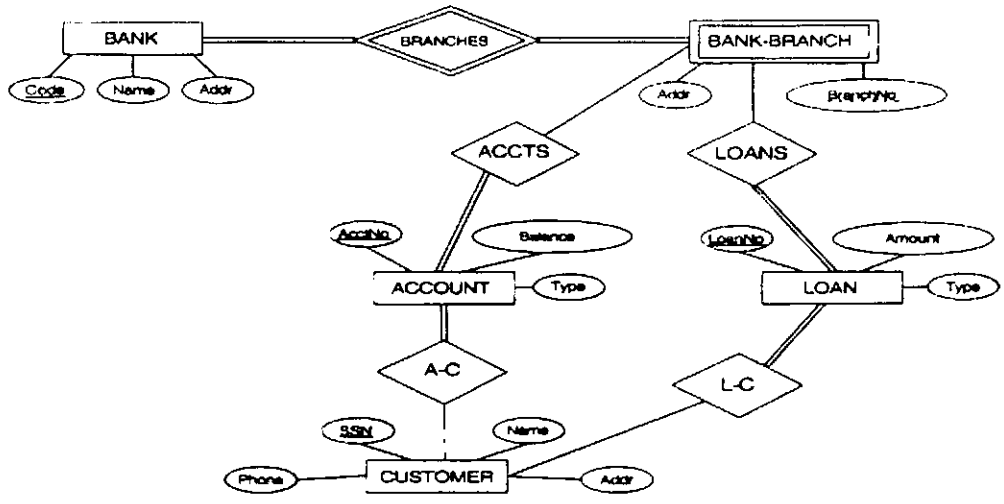
Write the following queries in relational algebra.

i) Retrieve the name of parts that cost less than Rs. 200 .

ii) Retrieve the names of customers who have ordered parts from employees living in 'Delhi'.

iii) Retrieve the number of orders of each employee. 6

Q4 a) Map the following ER diagram to a relational database:



6

c) Prove that a relation schema R(A, B) with two attributes is always in BCNF. 4

Q5 a) Consider the set P of functional dependencies on R(A,B,C,D,E,F,G): P={A ->{B,C,D,E,G } , E->{F,G } }. Is the set of functional dependencies P minimal? If not, try to find an minimal set of functional dependencies that is equivalent to P. 6

b) What is internal hashing? 4

Q6 a) What are the different kinds of anomalies that arise in the following relation:

EMP_DEPT(ename,ssn,bdate,address,dnumber,dname, dmgrssn) 6

(b) How does multilevel indexing improve the efficiency of searching an index file? Give one example. 4

Q7 a) A part file with P# as key field includes records with the following P# value: 23, 65, 37, 60, 46, 92, 48, 71.

Suppose that search field values are inserted in the given order in a B+ tree with p=4 and Pleaf = 3. Show how the tree will expand and what the final tree will look like. 6

b) Let the following relation schemas be given:

R=(A,B, C) S=(D, E, F)

Let r(R) and s(S) be given. Write equivalent SQL query statements for each of the following:

(i) $\prod_{A,F}(\sigma_{C=D}(r \times s))$

(ii) R union S. 4