

This question paper contains 8 printed pages]

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S. No. of Question Paper : 6074

Unique Paper Code : 234305

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Name of the Paper : Database Systems (CSHT-307)

Name of the Course : B.Sc. (H) Computer Science

Semester : III

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Section A is compulsory. Attempt all parts together.

Attempt any *four* questions from section B.

All questions in section B carry equal marks.

Section A

All parts are compulsory.

1. (a) Differentiate between the following :

2×4

- (i) Database and DBMS
- (ii) Specialization lattice and Specialization hierarchy
- (iii) Entity type and Entity set
- (iv) Centralized and Distributed DBMS

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(b) Explain the meaning of notation A + in XML document. 2

(c) Consider a MUSICAL COMPANY database in which data is recorded about the music industry. The data requirements are as follows :

- (i) Each musician has an SSN, a name, an address and a phone number.
- (ii) Each instrument that is used in the songs has a name and a musical key.
- (iii) Each album that is recorded on the company label has a title, a copyright date, a format and an album identifier.
- (iv) Each song recorded at the company has a title and an author.
- (v) Each musician may play several instruments and several musician may play a given instrument.
- (vi) Each album has a number of songs on it but no song may appear in more than one album.
- (vii) One or more musician perform each song and a musician may perform in a number of songs.
- (viii) Each album has exactly one musician who acts as its producer. A musician may produce several albums.

Design an ER diagram for the above specifications and indicate all keys and cardinality constraints. Also state any assumptions that are made. 8

- (d) Give SQL commands to create the following tables with the given constraints. 5

DEPARTMENT

Field	Data-Type	NULL	Key	Default
Dno	int	No	Primary Key	Nil
Dname	Varchar(20)	Yes		Nil
Dlocation	Varchar(25)	Yes		'Chandigarh'

EMPLOYEE

Field	Data-Type	NULL	Key	Default
UID	Char(12)	No	PRIMARY	Nil
ename	Varchar(25)	no		Nil
Hire-date	date	no		Nil
Manager	Char(12)	yes	Foreign Key	Nil
Dno	Int	Yes	Foreign Key	10
salary	Decimal(10,2)	No		Nil

- (e) Find the output of the following expressions by using the DIVISION operator in relational algebra on the tables A, B1, B2, B3 as given : 2×3

(i) A/B1

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(ii) A/B2

(iii) A/B3

A =

S.No.	P.No.
S1	P1
S1	P2
S1	P3
S1	P4
S2	P1
S2	P2
S3	P2
S4	P2
S4	P4

B1 =

P.No.
P2

B2 =

P.No.
P2
P4

B3 =

P.No.
P1
P2
P4

(f) Consider a relation R(A, B, C, D, E, F, G, H, I, J) and the set of functional dependencies

$$F = \{AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ\}.$$

What is the key of R ? Decompose R into 2NF and then 3NF relations. 2+4

Section B

Attempt any *four* questions :

2. (a) Define the Entity Integrity and Referential Integrity constraints. Why are they considered important ? 2+2

(b) Map the ER diagram given in Figure 1 to relational database. Cardinality constraints are given as follows :

6

- (i) BANK and BANK-BRANCH (1 : N)
- (ii) BANK-BRANCH and ACCOUNT (1 : N)
- (iii) BANK-BRANCH and LOAN (1 : N)
- (iv) LOAN and CUSTOMER (M : N)
- (v) ACCOUNT and CUSTOMER (M : N)

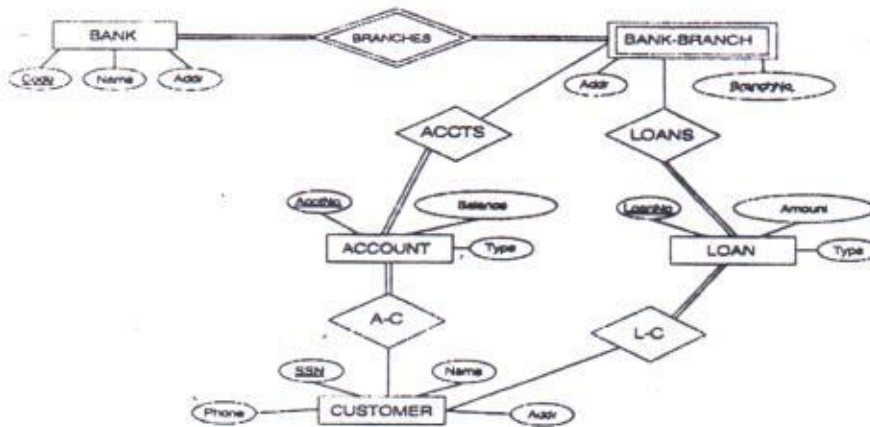


Figure 1

3. (a) Consider the ER diagram in Figure 2. Assume that an employee may work in up to two departments or may not be assigned to any department. Assume that each department

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must have one and may have up to three phone numbers. Supply (min, max) constraints on this diagram. State clearly any additional assumptions you make. 4

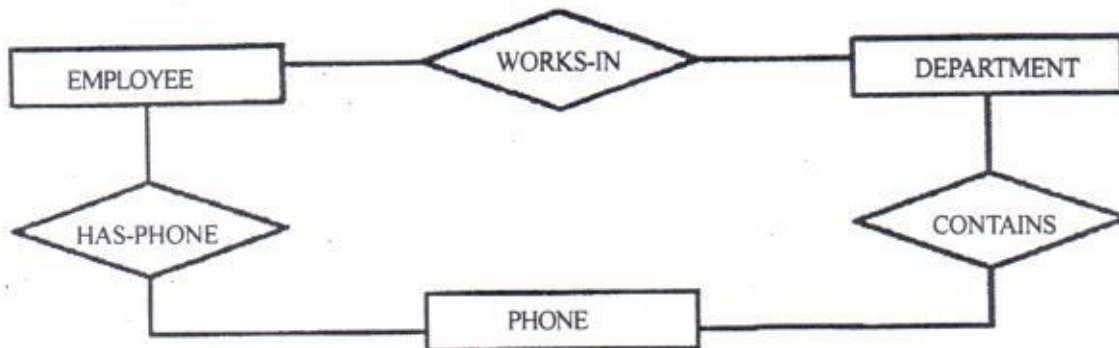


Figure 2

(b) Given below are two sets F and G of FDs for a relation R(A,B, C, D, E). Are they equivalent? Justify your answer.

$$F = \{A \rightarrow B, AB \rightarrow C, D \rightarrow AC, D \rightarrow E\}$$

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$$G = \{A \rightarrow BC, D \rightarrow AE\}$$

4. (a) Consider a database that consists of the following relations :

SUPPLIER (Sno, Sname)

PART (Pno, Pname)

PROJECT (Jno, Jname)

SUPPLY (Sno, Pno, Jno)

Solve the following queries in SQL :

2×3

(i) Retrieve the project names (Jname) to whom supplier S1 supplies part P2.

- (ii) Retrieve the total no. of parts supplied by each supplier.
- (iii) Retrieve a list of project names.
- (b) Differentiate between shared subclass and category with example. 2+2
5. (a) Explain the lost update problem, the dirty read problem and the incorrect summary problem with examples. 2×3
- (b) What are the three main types of XML documents ? Explain 3
- (c) What do you mean by commit point of a transaction ? 1
6. (a) Give one example each of the following : 6
- (i) Recursive relationship
- (ii) Identifying relationship
- (iii) Total and disjoint specialization.
- (b) How is OUTER UNION operation different from UNION operation ? Explain with example. 4
7. (a) Explain update anomalies in a relation due to bad design with the help of an example ? Why do they occur ? 4
- (b) What will be the result of the following relational algebra queries on the relations M and N given below : 1.5×4
- (i) $M \text{ Join } N \text{ where } M.X = N.P$
- (ii) $M \text{ Right Outer Join } N \text{ where } M.Y = N.Q$

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(iii) M Full outer Join N where $M.X = N.P$ AND $M.Y = N.Q$

(iv) M Union N

M

X	Y	Z
5	3	6
10	7	9
5	2	7

N

P	Q	R
5	10	6
10	7	12
15	2	7