BSc (H) Semester - III 2012 (3)

This question paper contains 7 printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **8840**

Unique Paper Code : **234305** **C**

Name of the Paper : **CSHT-307 : Database Systems**

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

Semester : **III**

Duration : **3 Hours** Maximum Marks : **75**

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

Parts of A question must be answered together. Part I is compulsory.

Attempt *All* questions of Part I. Attempt any *four* questions from Part II.

All questions carry equal marks.

Part I

Attempt *All* questions

1. (*a*) Discuss *three* advantages of database system over traditional file system. 3

(*b*) Discuss the role of high level data model in the database design process by giving *one* example. 3

(*c*) Explain the following terms briefly : 4

(*i*) ODBC

(*ii*) Run time database processor

(*iii*) Data dictionary

(*iv*) Schema

P.T.O.

(*d*) Give *three* cases where use of null values would be appropriate. 2

(*e*) Consider the table R(A,B,C) given below : 2

R

A	B	C
1	1	2
2	1	1
1	2	1
3	3	3

Check whether the following functional dependencies hold or not?

(*i*) $A \longrightarrow B$

(*ii*) $AB \longrightarrow C$

(*f*) Differentiate between the following (Give example wherever possible) : 2×4

(*i*) Specialization hierarchy and specialization lattice

(*ii*) Attribute defined specialization and user defined specialization

(*iii*) Inner join and outer join

(*iv*) Key and super key

(*g*) Write a SQL statement to create domain with name Salary_domain whose valid range is Rs. 10000 to Rs. 50000. 2

(*h*) Why are duplicate tuples not allowed in a relation ? 2

(*i*) Consider the following set of Functional dependencies for relational schema R(A, B, C).

$$F = \{A \longrightarrow BC,\ B \longrightarrow C,\ A \longrightarrow B,\ AB \longrightarrow C\}$$

(*i*) Find the key of the relation R. 2

(*ii*) Find the canonical cover for the given set F. 3

(*j*) What is lost update problem in concurrency control? Explain with an example. 2+1

(*k*) Write *one* basic difference between HTML and XML. 1

PART II

Attempt any *four* questions. *All* questions carry equal marks.

2. (*a*) Why is data abstraction required in database systems ? Explain with the help of a suitable example. 2+2

(*b*) What is a participation role ? When is it necessary to define role names in the description of relationship types ? 3

(*c*) Consider two sets of functional dependencies of a relation 3

$F = \{A \longrightarrow C,\ AC \longrightarrow D,\ E \longrightarrow AD,\ E \longrightarrow H\}$

$G = \{A \longrightarrow CD,\ E \longrightarrow AH\}$

Check whether these two sets are equivalent or not.

3. Consider the following set of requirements for a University Database that is used to keep track of student's transcripts : 10

(*i*) The university keeps track of each student's name, student number, social security number, current address and phone, permanent address and phone, birth date, sex, class (freshman,

sophomore,…., graduate), major department, minor department (if any) and degree program (B.A., B.S., ….., Ph.D.). Some user applications need to refer to the city, state and zip code of the student's permanent address and to the student's last name. Both social security number and student number have unique values for each student.

(*ii*) The university also maintains its employees information. Employee may be either faculty or staff member or research associates. Post-graduates students can work as research associates.

(*iii*) Each department is described by a name, department code, office number, office phone and college . Both name and code have unique values for each department.

(*iv*) Each course has a name, description, course number, number of semester hours, level and offering department. The value of course number is unique for each course.

(*v*) Each section has an instructor, year, course and section number. The section number distinguishes sections of the same course that are taught during the same semester/year; its value are 1, 2, 3,…. Upto the number of sections taught during each semester.

(*vi*) A grade report has a student, section, letter grade and numeric grade (0, 1, 2, 3 or 4).

Design an ERD/EERD for this application. State clearly any additional assumptions required. Specify key attributes of each entity type and structural constraints on each relationship type.

4. Consider the following database scheme :

BOOK

Book_id	Title	PublisherName

BOOK_COPIES

Book_id	Branch_id	No_of_Copies

LIBRARY_BRANCH

Branch_id	BranchName	Address

BOOK_AUTHORS

Book_id	AuthorName

BOOK_LOANS

Book_id	Branch_id	Cardnumber	DateIssue	DueDate

BORROWER

Card_no	Name	Phone	Address

Write the following queries using SQL : 2×3

(*a*) (*i*) How many copies of the book titled "The Lost Tribe" are owned by each library branch.

(*ii*) Retrieve the name of all the borrowers who do not have any books checked out.

(*iii*) Create a view to store the branch name and the total number of books loaned out from each library branch.

P.T.O.

(b) Write the following queries using Relational Algebra Form 2×2

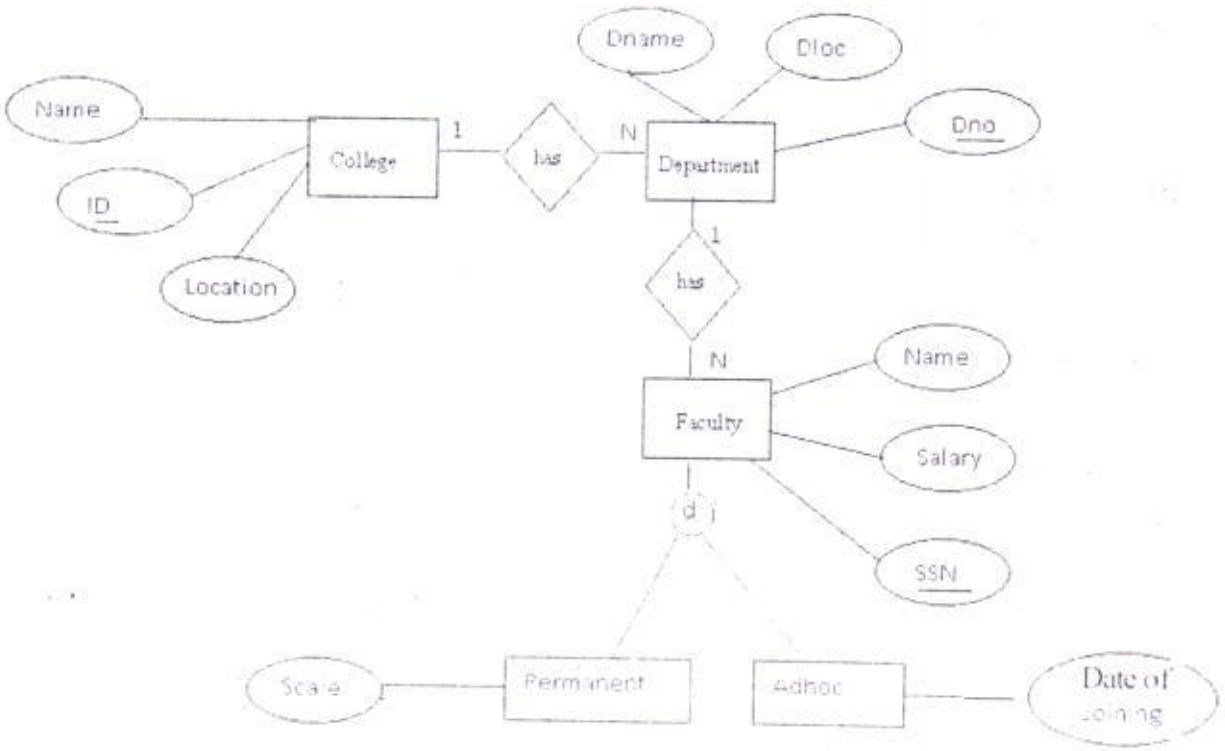
(i) Retrieve the name, address and number of books issued to all borrowers who have more than five books issued.

(ii) Retrieve book titles published by 'SSSS' but not authored by 'AAA'.

5. (a) Briefly explain state transition diagram in the transaction processing system. 4

(b) Consider the relational scheme R(A,B,C) with set of FDs F{AB ⟶ C, C ⟶ A}. Show that the schema R is in 3NF but not in BCNF. Also specify key(s) of relation(s). 6

6. (a) Map the following ERD to the corresponding relational database. 6



(b) Why is XML model called a tree model ? Explain with the help of an example. 4

7. (*a*) Consider two tables T1(X,Y,Z) and T2(A, B, C) given below : 4

T1

X	Y	Z
1	20	A
2	30	B
3	10	C
4	10	B

T2

A	B	C
2	10	B
3	10	C
1	20	C
1	30	A

Show the results of the following operations :

(*i*) **T1** $\bowtie$ T1.X = T2.A **T2**

(*ii*) **T1** $\bowtie$ T2.B = T1.Y **T2**

(*b*) When do insertion and deletion anomalies occur in the database? Explain with the help of suitable examples. 2+2

(*c*) Why is catalog stored separately in database systems ? 2