B.TECH/IT/4TH SEM/INFO 2204/2021

DATABASE MANAGEMENT SYSTEMS
(INFO 2204)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) The attribute closure (SZ)+ of the following FDs
S→C, C→T and (S,Z)→W is
(a) {S,C} (b) {S,C,T,Z,W}
(c) {S,T} (d) none

(ii) If two relations hold a referential integrity constraint then which of the following is true
(a) no row can be inserted in child table if it is not present in parent table
(b) no row can be inserted in parent table if it is not present in child table
(c) no rows can be deleted from child table
(d) no rows can be deleted from parent table

(iii) Given a set of Functional dependencies, F={S→C, C→ T, (S,P)->Z}
(a) the candidate key of F is S (b) the candidate key of F is (S,C)
(c) the candidate key of F is (S,P) (d) the candidate key of F is C

(iv) A secondary index is created on the nonordering key field of a disk file. The number of records in the disk file is 30000. The record length of file is 30 bytes and for index it is 15 bytes. Block size of index and file = 1024 bytes. So number of blocks in index is
(a) 30000/(bfr of index) (b) 3000/(bfr of disk file)
(c) 30/(bfr of index) (d) 30000/15

(v) Consider a Schedule S, with transactions T1 and T2. If S is conflict serializable it will also be _____
(a) covariant (b) view nonequivalent
(c) view serializable (d) conflict nonequivalent

(vi) The SQL command used to select all objects present in a particular user domain is
(a) select * from emp (b) select * from tab
(c) select * from all (d) none

(vii) A _____type of index structure is used for a ordered key field of a data file
(a)secondary (b)primary
(c)clustering (d)multilevel

(viii) In B Tree with 13, 4, 12, 34, 45 search key values, of order 3
(a) all search keys are at leaf nodes (b) only [4, 13, 35] are leaf nodes
(c) [12, 4] are leaf nodes (d) None

(ix) In a relation R, if the following set of FDs
A→ B, BC→ D, holds then
(a) A→C (b) AC→D
(c) both a and b holds (d) no FD's holds

(x) A relation R(X,Y,Z,P) is decomposed into R1(X,Y) and R2(X,Z,P), where X is the candidate key of R1. So, the decomposition is
(a) lossy (b) is lossless
(c) both a and b (d) none of these

Group – B

2. (a) Problem : Sales information system:
A product can be described with a unique product number, product name, manufacturer name, product rate, selling price, product description. The product can be sold to a particular client and each client have its own unique client number, client name, client address, city, pin code, state and total balance required to be paid. Each client order to buy product from the salesman. In the order, it has unique sales order number, sales order date, client number, salesman number (unique), billed whole payment by the party or not, and its delivery date, total quantity ordered, date of cancelation of the order. The salesman have the unique id number, name, address, city, pin code, state, and salary of the sales man.

Design an Entity Relationship model for the above problem, maintaining all cardinality, and constraints.

(b) Students of 2nd year will enroll in summer training courses organized by HIT. The constraints are: A student can enroll in only one course. A course can have many students.
Design the relations along with atrributes. Mention the primary key and referential integrity considered in the designed relations. What will be the cardinality among the relations.

8 + 4 = 12

3. (a) Write a PL/SQL code to find whether a number entered by the user is even or odd. If even then insert the number in a table named EVEN else insert it into table ODD. Both the tables has only one attribute, number. Repeat the process for all numbers in the range 3 to 100.

   (b) A bank has set rules for dealing with negative account balance, by setting the account balance as zero and creating a loan in the amount of overdraft. An overdraft is an event where a customer's withdrawal amount exceeds the available account balance. Write a **trigger** such that once the event happens, a row in the loan table gets inserted, with values loan_no and loan-amount ,(which is equal to the overdrawn amount).

6 + 6 = 12

Group – C

4. (a) An educational database has the following relations.
Course(Course-Names, Dept–ID, Total-Intake),
Department(Dept_Id, Dept–Name),
Instructor (Instructor_name,Course_Names),
Write the SQL for the following queries.
   (i) Find the Course names along with its department's name having total intake >60
   (ii) Find the instructor associated with two or more courses
   (iii) Find the course which has largest intake.

   (b) Write down the expressions in Relational Algebra for the above queries.

6 + 6 = 12

5. (a) A relation R (Y, Q , D , U , H) with attributes is given.
The given set of FD's are
(Y, Q) → H, Y→ D, D→ U
   (i) Find the canonical cover of the set
   (ii) Find out the candidate keys from the set of given FD's.
   (iii) Find out in which normal form the relation is in. Convert the relation into its higher normal form such that dependency is preserved and lossless decomposition occurs.

   (b) Explain the concept of 4NF with proper eample.

(2 + 3 + 3) + 4 = 12

Group – D

6. (a) Consider the relation R = {A,B,C,D,E,F,G,H,I,J} and set of functional dependencies F = {{A,B}-->{C}, {A}--> {D,E}, {B}-->{F}, F-->{GH}, {D}-->{I,J}.
   (i) Find out the candidate keys from the set of given FD's.
   (ii) Find out in which normal form the relation is in.
   (iii) Convert the relation into its highest normal preserving dependencies

(b) Find out the canonical cover of the following FD.
A→DB , B-> Q, Z-> P, D->B,A->Q

(3 + 3 + 3) + 3 = 12

7. (a) Consider two transactions T1 and T2 and the concurrent schedule S. The read and write operations are given below.
T_1: $r_1(X)$; $w_1(X)$; $r_1(Y)$; $w_1(Y)$
T_2: $r_2(X)$; $w_2(X)$; $r_2(Z)$; $w_2(Z)$
S = $r_1(X);w_1(X);r_2(X);w_2(X);r_1(Y);w_1(Y);r_2(Z);w_2(Z)$
Find out (without using graph) whether the schedule **S** is conflict serializable.

(b) Justify for or against with example, all recoverable schedules are also cascadeless schedule.

7 + 5 = 12

Group – E

8. (a) A student file with Rollno as the key field includes records with the following Rollno values: 70, 15, 20, 35, 18, 55, 43. Suppose the search field values are inserted in a B tree of order p=3; show the tree after inserting these values.

(b) Explain with diagram the concept of Secondary Indexing technique.

6 + 6 = 12

9. (a) Suppose that an ordered file with r=60000 records stored on a disk with block size B=1024 bytes.
File records are of fixed size with record length R = 1000 bytes.
(i) Find out the blocking factor and the number of blocks needed for the file. Suppose a primary index is created on the above file, with ordering key field 12 bytes and block pointer 8 bytes.
(ii) Find the blocking factor for the index.
(iii) Also find the total number of blocks in the index.
(iv) Find how many block access is required to access a particular record.

(b) Suppose the above mentioned primary index is converted to multi level index structure. Calculate the i) Fan out of each level ii) Calculate the top level index iii) number of blocks in each level. iv) To search a record how many block access is required.

(2 + 2 + 2 + 2) + 4 = 12

Department & Section	Submission Link
IT	https://classroom.google.com/c/MzIxMzkwODAwNjgz/a/Mzc0MTUwMjM1NDkx/details