

Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech/IT/New/SEM-6/IT-601/2013

2013

DATABASE MANAGEMENT SYSTEMS

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :
 $10 \times 1 = 10$

- i) The relation $R = (A, B, C)$ and set of dependencies
 $F = \{ A \rightarrow B, B \rightarrow C \}$. R is decomposed into two
different ways $R1 = (A, B)$, $R2 = (B, C)$. This is
- a) lossless join decomposition
 - b) dependency preserving
 - c) both (a) & (b)
 - d) none of these.

CS/B.Tech/IT/New/SEM-6/IT-601/2013



- ii) The employee salary should not be greater than Rs. 20,000. This is
- a) integrity constraint
 - b) referential constraint
 - c) over-defined constraint
 - d) feasible constraint.
- iii) The operation on certain relation X , produces Y such that Y contains only selected attributes of X , such operation is
- a) Projection
 - b) Selection
 - c) Union
 - d) Difference.
- iv) The command used to delete the records from a table is
- a) Truncate
 - b) Drop
 - c) Select
 - d) All of these.
- v) Aggregation is
- a) specialization
 - b) generalization
 - c) abstraction
 - d) all of these.

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- vi) Prime attributes are part of
- a) primary domain b) multivalued domain
 - c) candidate key d) none of these.
- vii) There is a conflict in a schedule if
- a) two transactions work on the same data item
 - b) the operations are from different transactions
 - c) at least one of the operations is write
 - d) all of these.
- viii) Time stamp is used for
- a) Serialization b) Deadlock control
 - c) Transaction log d) both (b) & (c).
- ix) Which is the false statement ?
- a) A database is ordered collection of data
 - b) A database is systematic compilation of records in a computer
 - c) DBMS manages the database
 - d) Data helps in making decisions.

CS/B.Tech/IT/New/SEM-6/IT-601/2013



- x) DML language is used to
- a) define schema
 - b) define internal level
 - c) access data
 - d) all of these.
- xi) is the attribute or group of attributes that uniquely identify occurrence of each entity.
- a) Foreign key
 - b) Super key
 - c) Primary key
 - d) All of these.
- xii) is the information about data.
- a) Data
 - b) Meta-data
 - c) Entity
 - d) Relations.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Explain the terms "lossless decomposition" and "dependency preservation".
3. a) What are entity integrity and referential integrity constraint ?
b) Explain the difference among primary key, candidate key and super key. 2 + 3
4. Find the closure of attribute set (AG) + for the following :
 $R = \{ A, B, C, G, H, I \}$
 $F = \{ A \rightarrow B,$
 $A \rightarrow C$
 $CG \rightarrow H$
 $CG \rightarrow I$
 $B \rightarrow H \}$

CS/B.Tech/IT/New/SEM-6/IT-601/2013



5. What is a database cursor ? What is the difference between cursor and trigger ?
6. a) List four significant differences between a file management system and a DBMS.
- b) What are the different types of Data Models ? 3 + 2

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Describe the three-level architecture of DBMS. Explain the difference between physical & logical data independence. Describe the basic components of DBMS. 3 + 3 + 5
- b) Answer the following queries in relational algebra using the given database scheme : 2 × 2 = 4

EMP (Eno, Ename, Eadd, Bdate, Super_no)

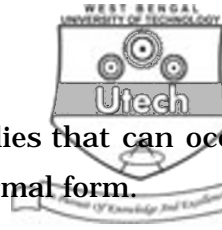
DEPT (Dno, Dname, Mgn)

PROJECT(Pno, Pname, Dno, Plocation)

WORKS_NO(Eno, Dno, Hours)

 - i) List the employee no, name, address of all employees working in the 'Research' Department.
 - ii) For all projects in 'Kolkata' print the project no, location, controlling department number and its manager's name, address and birthday.

CS/B.Tech/IT/New/SEM-6/IT-601/2013



8. a) Describe in detail, the various anomalies that can occur in various normal forms up to 4th normal form. 9
- b) Create the student database schema : $4 \times 1 \frac{1}{2}$

STUDENT (Name, Roll, Class, Department)

COURSE (Cname, Cnumber, Credit_Hours, Department)

SECTION (Section_id, Cnumber, Semester, Year, Instruction)

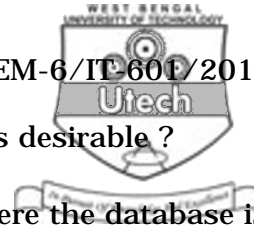
GRADE (Roll, Section_id, Grade)

PREREQUISITE (Cnumber, Pnumber)

Specify the following queries in SQL on the database schema :

- i) Change the class of student 'Pritam' from '1' to '2'.
 - ii) Insert a new course <'Bio-tech', 'CS4390', '3', 'CS'>
 - iii) Retrieve the names of all students in the department 'CS'.
 - iv) Delete the record for the student whose name is 'Chandan' and whose student roll no. is 17.
9. a) Define the concept of aggregation with example.
- b) What is weak entity set ? When is it required ?
- c) Define outer join with suitable example (in basic relational format).
- d) Write the features of network model. Compare network model and relational model. $3 + (1 + 1) + 5 + 5$

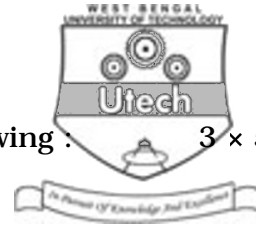
CS/B.Tech/IT/New/SEM-6/IT-601/2013



10. a) Why is higher normal form not always desirable ?
- b) Give an example with explanation where the database is in 1NF but not in 2NF.
- c) Why is BCNF stricter than 3NF ?
- d) How are spurious tuples generated ? Explain with example.
- e) Write an algorithm to find the α^+ for a given set of attributes of a relation r . 2 + 3 + 2 + 3 + 5
11. Suppose you are given a relation R with four attributes A, B, C, D . For each of the following sets of FDs, assuming those are the only dependencies that hold for R , do the following :
- a) Identify the candidate key(s) for R .
- b) Identify the best normal form that R satisfies (1NF, 2NF, 3NF or BCNF).
- c) If R is not in BCNF, decompose it into a set of BCNF relations that preserve the dependencies.
- i) $C \rightarrow D, C \rightarrow A, B \rightarrow C$
- ii) $B \rightarrow C, D \rightarrow A$
- iii) $ABC \rightarrow D, D \rightarrow A$
- iv) $A \rightarrow B, BC \rightarrow D, A \rightarrow C$
- v) $AB \rightarrow C, AB \rightarrow D, C \rightarrow A, D \rightarrow B$. 3 + 8 + 4

CS/B.Tech/IT/New/SEM-6/IT-601/2013

12. Write short notes on any *three* of the following :



3 × 5

- a) Serializable
- b) Two-phase protocol
- c) Natural join
- d) Transition state
- e) Time stamp protocol.

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