2019

(October)

COMPUTER SCIENCE

(Elective/Honours)

(CS-301 T)

(Database Management System)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer *any* **one** question from each unit

UNIT—I

1. *(a)* List and explain the characteristics of database approach over traditional file processing approach. 1+4=5

(b) Write a note on the three-tier database architecture. 6

(c) Describe entity and attribute. What is a weak entity type? 2+2=4

2. *(a)* With the help of an example, explain database schema. What is meant by data independence? 2+2=4

(b) Consider a mail-order database in which employees take orders for parts from customers. The data requirements are summarized below :

(i) The company has employees with unique ENo, firstname, lastname and zipcode

(ii) Each customer has a unique customer number, firstname, lastname and zipcode

(iii) Each part sold by the company is identified by a part number that is unique part name, price and quantity in stock

(iv) Each order placed by a customer is taken by an employee and is given a unique order number. Each order contains specified quantities of one or more parts. Each order has a date of receipt and an expected ship date. Actual ship date is also recorded

Design an ER diagram for the above database. Note any unspecified requirements and make assumptions to make the specification complete. 7

(Continued)

(c) What is a participation role? Explain its use in the description of relationship type. 2+2=4

UNIT—II

3. *(a)* Discuss the primary indexing technique in an ordered file of fixed length. Illustrate your answer with an example. 4

(b) Discuss the allocation of file blocks on disk. What do you understand by file header? List any two file operations in brief. 4

4. *(a)* Differentiate between spanned and unspanned records along with examples. 4

(b) Explain dynamic hashing technique. 4

UNIT—III

5. *(a)* Explain the JOIN operation. Briefly explain NATURAL JOIN with an example. 2+3=5

(b) Consider the grade book relational schema describing the data for a grade

(Turn Over)

book of a particular instructor. (The attributes A, B, C and D of courses store grade cut-offs) :

Catalog(CNo, CTitle)
Student(SID,FName, LName)
Courses(Term,SecNo,CNo,A,B,C,D)
Enrolls(SID,Term,SecNo)

(i) Write **SQL statements** to retrieve the names of students who have enrolled in course number 'BSC2019'.

(ii) Write **Relational Algebra** expression to find the number of students in each section. 3+3=6

(c) Write notes on the DROP command and the GROUP BY clause with examples. 2+2=4

6. (a) What are the characteristics of relation that make them different from files? 4

(b) Discuss the relational algebra operations SELECT, PROJECT and CARTESIAN PRODUCT with suitable examples explaining their usage. 2+2+2=6

(c) Define foreign key with example. What role does it play in the join operation? 3+2=5

UNIT—IV

7. (a) Define BCNF. 2

(b) When is an FD said to be minimal? Find the minimal cover for the FD, $F = \{A \rightarrow D,\ BC \rightarrow A,\ BC \rightarrow D,\ C \rightarrow B,\ E \rightarrow A,\ E \rightarrow D\}$ for the relational schema, $R(A, B, C, D, E)$ 1+3=4

8. (a) Differentiate among 1NF, 2NF and 3NF when only primary keys are concerned. 4

(b) What are multivalued dependencies? 2

UNIT—V

9. (a) What is meant by the term 'schedule'? When can you say that two operations in a schedule are conflicting? 3+3=6

(b) Swapping of non-conflicting instructions in conflcit serializable schedule is possible. How? 3

(c) Explain starvation with reference to deadlocks. 3

10. (a) When is a schedule called a complete schedule? 4

(b) How can the serializability of a schedule be tested? Draw the precedence graph for the following schedule : 2+6=8

Transaction T_1	Transaction T_2	Transaction T_3
		read_item(Y); read_item(Z);
read_item(X); write_item(X);		
		write_item(Y); write_item(Z);
read_item(Y); write_item(Y);	read_item(Z);	

	read_item(Y);
	write_item(Y);
	read_item(X);
	write_item(X);	

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