2022

(November)

COMPUTER SCIENCE

(Elective/Honours)

(CS-301 T)

(Database Management System)

Marks : 56

Time : 2½ 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 four advantages of DBMS over traditional file processing. 6

(b) Explain logical data independence and physical data independence. 5

(c) Distinguish between database schema and database state. 4

2. *(a)* Explain with a proper example of each of the following terms : 2×3=6

(i) Multivalued attribute

(ii) Complex attribute

(iii) Specialization

(b) Notown Record has decided to store information about musicians who perform on its albums (as well as other company data) in a database. Given the following information, design the ER diagram : 9

(i) Each musician that records at Notown has an SSN, a name, an address, and a phone number. Poorly paid musicians often share the same address, and no address has more than one phone.

(ii) Each instrument used in songs recorded at Notown has a unique identification number, a name (e.g., guitar, synthesizer, flute) and a musical key (e.g., C, B-flat, E-flat).

(iii) Each album recorded on the Notown label has a unique identification number, a title, a copyright date, a format (e.g., CD or LP), and an album identifier.

(iv) Each song recorded at Notown has a title and an author.

(v) Each musician may play several instruments, and a given instrument may be played by several musicians.

(vi) Each album has a number of songs on it, but no song may appear on more than one album.

(vii) Each song is performed by one or more musicians, and a musician may perform a number of songs.

(viii) Each album has exactly one musician who acts as its producer. A musician may produce several albums, of course.

UNIT—II

3. (a) What is meant by RAID? Explain minoring and striping. 2+3=5

(b) Differentiate between spanned and unspanned records using an example. 3

4. (a) Write briefly about primary index and multilevel index. 4

(b) Explain the concept of hashing as used in file organization. 4

UNIT—III

5. (a) What is the difference between a key and a superkey? Why do we designate one of the candidate keys of a relation to be the primary key? 4+2=6

(b) Discuss the entity integrity and referential integrity constraints. Why is each considered important? 6

(c) Explain natural join operation with an example. 3

6. (a) Define foreign key. What is this concept used for? How does it play a role in the join operation? 2+2+1=5

(b) Consider the following relational schema :

Suppliers(sID, sName, address)

Parts(pID, pName, colour)

Catalog(sID, pID, price)

Write a relational algebra expression for the following : 2×3=6

(i) Find the names of all red parts.

(ii) Find all prices for parts that are red or green. (A part may have different prices from different manufacturers.)

(iii) Find the sIDs of all suppliers who supply a part that is red or green.

(c) Explain the ALTER TABLE command with an example. 4

UNIT—IV

7. (a) What is a functional dependency? 1

(b) Define first, second, and third normal forms when only primary keys are considered. 3

(c) What are multivalued dependencies? 2

8. (a) What is a minimal set of functional dependencies? Does every set of dependencies have a minimal equivalent set? 2+2=4

(b) Define BCNF. 2

UNIT—V

9. (a) Describe the ACID properties of a transaction with appropriate examples. 6

(b) What are conflicting operations? Explain conflict serializability of a schedule. 2+4=6

10. (a) Differentiate between a recoverable schedule and a cascadeless schedule. 4

(b) What is locking? Explain the concept of two-phase locking. 2+2=4

(c) Using precedence graph to check for the serializability of the following schedule : 4

T1	T2	T3
r1(X)		
	r2(Z)	
r1(Z)		
		r3(X)
		r3(Y)
wl(X)		
		w3(Y)
	r2(Y)	
	w2(Z)	
	w2(Y)	

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