

Total No. of printed pages = 3

**CS 131504 (NR)**

Roll No. of candidate

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1/31<sub>22</sub> 2021

B.Tech. 5<sup>th</sup> Semester End-Term Examination

CSE

**DATABASE MANAGEMENT SYSTEMS**

**(New Regulation)**

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following: (10 × 1 = 10)
- (i) Which of the following is not an example of DBMS?
- (a) MySQL (b) Microsoft Access  
(c) IBM DB2 (d) Google
- (ii) Count function in SQL returns the number of
- (a) values (b) distinct values  
(c) groups (d) columns
- (iii) The method of file organization in which data records in a file are arranged in a specified order according to key field is known as the
- (a) Sequential access method (b) Queuing method  
(c) Predetermined method (d) Direct access method
- (iv) A set of possible data values is called
- (a) attribute (b) degree  
(c) tuple (d) domain
- (v) The database environment has all the following components except
- (a) Database administrator (b) Database  
(c) Users (d) Separate files

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(vi) The minimal set of super key is called

- (a) Primary key (b) Secondary key  
(c) Candidate key (d) Foreign key

(vii) An indexing operation

- (a) Sorts a file using a single key  
(b) Sorts file using two keys  
(c) Establishes an index for a file  
(d) Both (b) and (c)

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(viii) Which of the following is a database administrator's function?

- (a) Database design (b) Backing up the database  
(c) Performance monitoring (d) All of the above

(ix) A transaction completes its execution is said to be

- (a) Saved (b) Loaded  
(c) Rolled (d) Committed

(x) The physical location of a record is determined by a mathematical formula that transforms a file key into a record location is:

- (a) Index file (b) Sequential file  
(c) Hashed file (d) B-tree

2. (a) Differentiate between logical and physical data independence. (4)

(b) What are the differences between the following: (6)

Candidate key, Alternate key, Super key, Composite key

(c) How generalization and specialization is represented in ER diagram? Give example. (5)

3. (a) Differentiate between lossless and lossy decomposition. (5)

(b) Find the highest normal form of a relation R(A,B,C,D,E) with FD BC->D, AC->BE, B->E. (5)

(c) Let the following relation schemas be given: (1 + 2 + 2 = 5)

R = (A, B, C)

S = (C, D, E)

Let relation r(R) and s(S) be given. Give an expression in SQL that is equivalent to each of the following queries:

(i)  $\prod_A(r)$

(ii)  $\sigma_{B>7}(r)$

(iii)  $r \times s$

4. (a) What is query processing? How can the queries be represented? (2+3 = 5)
- (b) Consider the relation schema  $R = \{E, F, G, H, I, J, K, L, M, N\}$  and the set of functional dependencies  $\{E, F\} \rightarrow \{G\}$ ,  $\{F\} \rightarrow \{I, J\}$ ,  $\{E, H\} \rightarrow \{K, L\}$ ,  $K \rightarrow \{M\}$ ,  $L \rightarrow \{N\}$  on  $R$ . List the candidate key of  $R$ . (5)
- (c) Explain briefly the ACID property of transaction. (5)
5. (a) Construct a B-tree of order 3 for the following keys 23, 48, 35, 20, 55, 36, 12, 46 (5)
- (b) Consider the transactions  $T_1$  and  $T_2$  and the schedules  $S_1$  and  $S_2$  given below: (5)
- $S_1 : R_1(A), R_1(B), R_2(A), R_2(B), W_2(B), W_1(A)$
- $S_2 : R_1(A), R_2(A), R_2(B), W_2(B), R_1(B), W_1(A)$
- Check if  $S_1$  and  $S_2$  are conflict serialisable? If yes, give the equivalent serial schedule.
- (c) What do you mean by concurrency control mechanism? Write the Thomas write rule. (5)
6. (a) What is data warehouse? Explain the characteristics of data warehouse. (5)
- (b) What does database encryption and decryption mean? (5)
- (c) What is indexing? What are the different types? Explain in brief. (5)
7. Write short notes on (any three) : (3 × 5 = 15)
- (a) Normalization
- (b) Lost update problem
- (c) Natural join
- (d) Hashing
- (e) Distributed databases.

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