

Total No. of Questions : 8]

SEAT No. :

PE-2516

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T.E. (Computer Eng./AI & DS/Computer Science)

DATABASE MANAGEMENT SYSTEM

(2019 Pattern) (Semester - V) (310241)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

Q1) a) What is functional dependency? Explain its use in database design. [8]

Consider the following schema.

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Identify the functional dependencies and check whether the given schema is in 3NF or not. If not justify and convert the schema into 3NF.

b) Elaborate the significance of codd's rule. Explain 12 rules proposed by codd's. [9]

OR

Q2) a) What is decomposition? Explain the desirable properties of decomposition?

Consider the relation F (FN, PN, C, D) with the following Functional Dependencies : [8]

FD1: FN, PN ->C

FD2: C ->D

FD3: D -> F

If F is decomposed into F1(FN, PN, C) and F2(C, D). Check decomposition is lossless or lossy?

b) Explain why database normalization is required for good relational database design. Explain with example requirements of different normal forms like 1NF, 2NF and 3NF. [9]

P.T.O.

- Q3) a)** What is conflict serializability? Check following schedule is conflict serializable or not? Also, explain the concept of conflict equivalent schedule. [9]

T1	T2	T3	T4
R(X)			
R(Z)			
	W(X)		
		R(Y)	
		W(Y)	
			W(X)
			W(Y)
			W(Z)

R(X) denotes read operation on data item X by transaction T<sub>i</sub>.

W(X) denotes write operation on data item X by transaction T<sub>i</sub>.

- b) When do deadlocks happen, how to prevent them, and how to recover if deadlock takes place? [9]

OR

- Q4) a)** How to ensure atomicity using Recovery Methods? Explain the log based recovery method in detail. [9]

- b) Explain two phase locking protocol. Consider the following two transactions : [9]

T31: read(A);

read(B);

if A = 0 then B := B + 1;

Write (B)

T32: read(B);

read(A);

if B=0 then A := A + 1;

write (A).

Add lock and unlock instructions to transactions T31 and T32, so that they observe the two phase locking protocol. Can the execution of these transactions result in a deadlock?

**Q5) a)** State and explain the concept of CAP theorem and BASE properties with example. [9]

b) Explain the NOSQL database types with examples and write down the real time applications. [8]

OR

**Q6) a)** Explain Structured, Semi-structured and Unstructured data types with examples. [9]

b) Describe the following operations with MongoDB syntax : [8]

i) Map- Reduce

ii) Aggregation pipeline

**Q7) a)** What is the significance of XML databases? Explain with proper example when to use XML database. [9]

b) What is object relational database system. Explain Table inheritance with example. [9]

OR

**Q8) a)** Write short note on Geographic data and Geometric data. [9]

b) Explain how encoding and decoding of JSON object is done JAVA with example. [9]

