

Total No. of Questions : 8]

SEAT No. :

**PB3777**

**[6262]-35**

[Total No. of Pages : 3

**T.E.(Computer Engineering/AIDS)  
DATABASE MANAGEMENT SYSTEMS  
(2019 Pattern) (Semester -I) (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. [9]  
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) Explain following Codd's rules with suitable examples: [8]
- i) Guaranteed Access Rule
  - ii) Comprehensive Data Sub-Language Rule
  - iii) Integrity Independence
  - iv) Systematic Treatment of NULL Values.

OR

**Q2) a)** What is the impact of insert, update & delete anomaly on overall design of database? How normalization is used to remove these anomalies? [8]

- b) What is decomposition? Consider the relation F (FN, PN, C, D) with the following Functional Dependencies: [9]

FD1: FN, PN → C

FD2: C → D

FD3: D → F

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

**P.T.O.**

- Q3) a)** What is recoverable schedule? Why is recoverability of schedule desirable? Are there any circumstance under which it could be desirable to allow non recoverable scheduler? Explain your answer. [9]
- b)** State and explain the ACID properties. During its execution a transaction passes through several states, until it finally commits or aborts. List all possible sequences of states through which a transaction may pass. Explain the situations when each state transition occurs. [9]

OR

- Q4) a)** What is R-timestamp (Q) and W-timestamp(Q). Explain the necessary condition used by time stamp ordering protocol to execute for a read/write operation. [9]
- b)** 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 Ti.

W(X) denotes read operation on data item X by transaction Ti.

- Q5) a)** List the different NOSQL data models. Explain document store NOSQL data model with example. [8]
- b)** Draw and explain architecture of Distributed database system. State the reasons for building distributed database systems. [9]

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

OR

- Q8)** a) Write a short note on complex data types: [9]  
i) Semi-structured data  
ii) Features of semi-structured data models  
b) What is Deductive Database. Explain its features and state its advantages over traditional database. [9]

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