Thapar Institute of Engineering and Technology, Patiala

Department of Computer Science and Engineering

MID SEMESTER EXAMINATION

Course Code: UCT 402	Course Name: Database Management Systems
March 19, 2024	Tuesday, 3.00 PM – 5.00 PM
Time: 2 hours, M. Marks: 30	Name of Faculty: Dr. Rupali Bhardwaj

Note: Attempt all the questions.

Q1 a.	Describe the three-level architecture of DBMS and describe the significance of each level.	02
Q1 b.	What are the three data anomalies that are likely to occur as a result of data redundancy, explain with example. Can data redundancy be completely eliminated in database approach?	03
Q2	Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient, a log of various tests and examinations conducted. Map your E-R diagram to relational data model.	03+02
Q3.	What is functional dependency? Explain trivial and non-trivial functional dependency with example. Compute canonical cover for relation $R = (A, B, C)$ with following FDs- $F = \{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C\}$	01+02+02
Q4.	Consider the relation R (A, B, C, D) and set of FDs $F = \{AB \rightarrow C, C \rightarrow D, D \rightarrow A\}$ Determine whether the decomposition $R_1\ (A, B, C)$, $R_2\ (C, D)$ i. Lossy or lossless ii. Dependencies are preserved or not.	02+03
Q5.	Consider relation $R(A, B, C, D, E, F)$ and set of FDs $F = \{A \rightarrow B, C \rightarrow DF, AC \rightarrow E, D \rightarrow F\}$ i. Determine key for the relation. ii. Normalize the relation up to BCNF normal form and justify your answer.	0.5+3×1.5
Q6.	Prove or disprove the following using inference rules- i. $\{W \rightarrow Y, X \rightarrow Z\} \mid = \{WX \rightarrow Y\}$ ii. $\{X \rightarrow Y, X \rightarrow W, WX \rightarrow Z\} \mid = \{X \rightarrow Z\}$	05