



4.	a)	Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F = \{ \{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\} \}$ . What is the key for R? Decompose R into 2NF, then 3NF relations by giving the definitions of key of R, 1NF, 2NF and 3NF.	10
	b)	Mention the informal design guidelines for relation schemas.	4
	c)	Write short notes on the following with an example. i. Multivalued dependencies ii. Join dependencies	6
5.	a)	Explain the ARIES Recovery algorithm.	10
	b)	With examples discuss why concurrency control is needed.	10