

CHAPTER 5

Module V

Relational Database Design

Syllabus Topics

Design guidelines for relational Schema, Functional Dependencies, Database tables and normalization, The need for normalization, The normalization process, Improving the design, Definition of Normal Forms- 1NF, 2NF, 3NF & The Boyce-Codd Normal Form (BCNF).

Self-learning Topics: Consider any real time application and normalization upto 3NF/BCNF

5.1	Database Design	5-3
5.1.1	Features of Good Relational Designs	5-4
5.2	Design Guidelines for Relational Schema	5-5
5.3	Functional Dependencies	5-5
UQ. 5.3.1	Attempt the following. Functional Dependencies MU - Dec. 18, 5 Marks	5-5
5.3.1	Closure of Functional Dependency	5-11
5.3.2	Functional Dependency Set	5-13
5.3.3	Closure of Attributes	5-13
5.3.4	Irreducible Set of FD / Minimal Set of FD / Removal of Extraneous Attributes / Canonical Cover	5-14
5.3.5	Solved Examples	5-14
5.4	Database Tables and Normalization	5-17
UQ. 5.4.1	Define normalization. MU - May 16, Dec.17, May 18, Dec.18, Dec.19, 1 Mark	5-17
5.4.1	The Need for Normalization	5-17
UQ. 5.4.2	Explain need of Normalization along with all the normal forms. MU - Dec. 17, 10 Marks	5-17
UQ. 5.4.3	Illustrate the need of normalization ? Explain all forms with an example. MU - Dec. 18, 10 Marks	5-17
5.4.2	Data Redundancy	5-18
5.4.3	Anomalies	5-18
5.5	The Normalization Process	5-19
5.6	Definition of Normal Forms- 1NF, 2NF, 3NF & The Boyce-Codd Normal Form (BCNF)	5-20
5.6.1	1NF (First Normal Form)	5-20



UQ. 5.6.1	Explain 1NF with example.	MU - May 16, Dec.17, May 18, Dec.18, Dec.19, 3 Marks	5-20
UQ. 5.6.2	Explain with suitable example First Normal form.	MU - May 19, 3 Marks	5-20
5.6.2	2NF (Second Normal Form)		5-21
UQ. 5.6.3	Explain 2NF with example.	MU - May 16, Dec.17, May 18, Dec.18, Dec.19, 3 Marks	5-21
UQ. 5.6.4	Explain with suitable example Second Normal form.	MU - May 19, 3 Marks	5-21
5.6.3	Improving the Design		5-22
5.6.4	3NF (Third Normal Form)		5-23
UQ. 5.6.5	Explain 3NF with example.	MU - May 16, Dec.17, May 18, Dec.18, Dec.19, 3 Marks	5-23
UQ. 5.6.6	Explain with suitable example Third Normal form.	MU - May 19, 3 Marks	5-23
5.6.5	Boyce-Codd Normal Form (BCNF)		5-24
UQ. 5.6.7	Describe BCNF in detail.	MU - Dec. 16, Dec.17, May 18, Dec.18, 5 Marks	5-24
5.6.5 (A)	Differentiate between 3NF and BCNF		5-25
5.6.5(B)	BCNF Decomposition Algorithm		5-25
5.6.6	Decomposition using FD		5-26
5.6.6 (A)	Types of Decomposition		5-28
5.6.6(B)	Difference between Lossy and Non-Loss decomposition		5-30
5.6.7	Multi-valued Dependency - Fourth Normal Form		5-31
UQ. 5.6.13	Describe 4 NF in detail.	MU - Dec. 16, 5 Marks	5-31
5.6.7(A)	Difference between 4NF and BCNF		5-33
5.6.8	Join Dependencies and Fifth Normal Form		5-33
5.7	Self-learning Topics: Consider any real time application and normalization upto 3NF/BCNF		5-34
UQ. 5.7.1	Construct a dependency diagram of relation R and normalize it up to the BCNF Normal form	MU - Dec. 17, May 18, 10 Marks	5-34
□	Chapter Ends		5-36