Module Title: Database
Module Code: CMM5322
Module Value: 1.0
Duration: 30 weeks
Class-Contact Hours: Lecture 30 hours.
Tutorial / Laboratory 30 hours.
Assessment Scheme: Continuous Assessment 30%
Examination 70%

Module Rationale/Aims:
· to provide an understanding of the need of using database;
· to introduce various data models for implementing a database system;
· to provide an understanding of the structure and operational use of database management systems;
· to enable the design and implementation of a relational database system.
Learning Objectives:
Students will be able to:
· understand the needs of using databases;
· design the logical and physical databases for relational systems;
· perform data definition and data manipulation on relational system using SQL;
· perform access control on relational system using SQL.
Syllabus Keywords:
data, database, database system, database management system, ANSI/SPARC architecture, metadata, data dictionary, data independence, relational model, relational structure, candidate key, primary key, alternate key, foreign key, superkey, functional dependency, relational integrity, logical design, anomaly, well-structured relations, normalization, ER model, mappings, physical design, data definition, data manipulation,
SQL, hierarchical model, network model, database administration, integrity control, security control, access control. Recommended

Textbooks/References:

Date, C.J., An Introduction to Database System s, Addison-Wesley, 6th ed., 1995. Connolly, T.M., Begg, C.E., and Strachan, A.D., Database Systems: A Practical Approach to Design, Implementation and Management, Addison-Wesley, 1996. Lorents, A.C. and Morgan, J.N., Database Systems: Concepts, Management, and Applications, Dryden Press, 1998. Elmasri, R. and Navathe, S.B., Fundamentals of Database System s, 2nd ed., Benjamin/Cummings, 1994. Silberschatz, A., Korth, H.F. and Sudarshan, S., Database System Concepts, 3rd ed., McGraw-Hill, 1997. Hansen, G.W. and Hansen, J.V., Database Management and Design, 2nd. ed., Prentice-Hall, 1996.Key Content Area:

Content Lecture Tut/Lab.

1 Database Concepts and Architecture for a Database System

a Needs for Database

b Database Application System and Database Management System

c ANSI/SPARC Architecture

d Data Independence

e Data and Metadata, Data Dictionary

2 Relational Model

a Relational Structure

b Relational Keys: Candidate Key, Primary Key, Alternate Key, Foreign Key, Superkey

c Functional Dependencies

d Relational Integrity

3 Logical Design for Relational Systems

a Database Anomalies and Well-Structured Relations

b Normalization from UNF to BCNF

c Logical Design based on ER: mappings for entities, relationships, and attributes

d Logical Design Considerations

4 Physical Design for Relational Systems

a Physical Design Considerations

b Performance Issues, Indexing

c File Organizations

5 Data Definition and Manipulation using SQL

a CREATE TABLE including the specifications of PK, FK, and referential integrity constraints

b ALTER TABLE, DROP TABLE

c CREATE INDEX, DROP INDEX

d SELECT, INSERT, UPDATE, DELETE

e Single and multi-table queries including the use of subqueries, set operations, inner and outer joins, aggregate functions, and grouping and sorting results

6 Other Data Models for Implementing Database Systems

a Hierarchical Database Model

b Network Database Model

c Object Database Model

7 Database Administration and Control

a Integrity and Security Control

b Access Control using SQL: CREATE VIEW, DROP VIEW, GRANT, REVOKE