# SPPU B.E./B.Tech IT Sem 4 syllabus

## Database Management System

### Database Management System

### Introduction to DBMS

Introduction : Basic concepts, Advantages of DBMS over file processing systems, Data abstraction,
Database languages, Data models, Data independence, Components of a DBMS, Overall structure of
DBMS, Multi-user DBMS architecture, System catalogs, Data Modeling: Basic concepts, Entity, attributes,
relationships, constraints, keys.

### Relational Model

ER and EER diagrams: Components of ER model, Conventions, Converting ER diagrams into tables
Relational Model: Basic concepts, Attributes and Domains, Codd’s rules.

Relational Integrity: Nulls, Entity, Referential integrities, Enterprise constraints, Views, Schema
diagram

### Introduction to SQL - PL/SQL

Introduction to SQL: Characteristics and advantages SQL Data Types, Literals, DDL, DML, SQL
Operators Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Updation using Views,
Indexes, Nulls.
SQL DML Queries: SELECT query and clauses, Set operations, Tuple Variables, Set comparison,
Ordering of Tuples , Aggregate Functions, Nested Queries, Database

Modification using SQL Insert,
Update, Delete Queries, Stored Procedure, Triggers, Programmatic SQL : Embedded SQL, Dynamic
SQL, ODBC

**Database Design & Query Processing**

Relational Databases Design: Purpose of Normalization, Data Redundancy and Update Anomalies,
Functional Dependencies. The process of Normalization: 1NF, 2NF, 3NF, BCNF. Introduction to
Query Processing: Overview, Measures of Query cost, Selection and Join operations, Evaluation of
Expressions
Introduction to Query optimization: Estimation, Transformation of Relational Expression

**Transaction & Concurrency Control**

Transaction Management: Basic concept of a Transaction, Properties of Transactions, Database
Architecture, Concept of Schedule, Serial Schedule.
Serializability: Conflict and View, Cascaded aborts Recoverable and Non-recoverable Schedules.
Concurrency Control: Need Locking methods Dead locks, Time stamping Methods. Optimistic
Techniques, Multi-version Concurrency Control.
Different crash recovery methods: Shadow-Paging, Log-based Recovery: Deferred and Immediate,
Check Points

**Advanced Databases**

Database Architectures: Centralized and Client-Server Architectures, 2 Tier and 3 Tier Architecture,
Introduction to Parallel Databases, Key elements of Parallel Database Processing, Architecture of
Parallel Databases, Introduction to Distributed Databases, Architecture of Distributed Databases,
Distributed Database Design.
Emerging Database Technologies: Introduction, No SQL Databases- Internet Databases, Cloud
databases, Mobile Databases, SQLite database, XML databases

# Software Engineering

## Software Engineering

## Introduction To Software Engineering

Software Engineering Fundamentals: Nature of Software, Software Engineering Practice,
Software Process, Software Myths.
Process Models : A Generic Process Model, Linear Sequential Development Model, Iterative
Development Model, The incremental Development Model
Agile software development: Agile manifesto, agility principles, Agile methods, myth of planned
development, Introduction to Extreme programming and Scrum.
Agile Practices: test driven development, pair programming, continuous integration in DevOps ,
Refactoring

## Requirements Engineering & Analysis

Requirements Engineering: User and system requirements, Functional and non-functional
requirements, requirements engineering (elicitation, specification, validation, negotiation)
prioritizing requirements (Kano diagram), requirement traceability matrix(RTM)
Software Requirements Specification (SRS): software requirements Specification document,

structure of SRS, writing a SRS, structured SRS for online shopping,
Requirements Analysis: Analysis Model, data modeling, scenario based modeling, class based
modeling, Flow oriented modeling, behavioral modeling-Introduction to UML diagrams

## Design Engineering

Design Engineering : Design Process & quality, Design Concepts, design Model, Pattern-based
Software Design. Architectural Design :Design Decisions, Views, Patterns, Application
Architectures,
Component level Design: component, Designing class based

components, conducting
component-level design, User Interface Design: The golden rules, Interface Design steps&
Analysis, Design Evaluation

**Project Planning, Management And Estimation**

Project Planning: Project initiation, Planning Scope Management, Creating the Work Breakdown
Structure, scheduling: Importance of Project Schedules, Developing the Schedule using Gantt
Charts, PERT/ CPM
Project Management: The Management Spectrum, People, Product, Process, Project, The W5HH

Principle, Metrics in the Process and Project Domains, Software Measurement: size &function-
oriented metrics(FP & LOC), Metrics for Project

Project Estimation: Software Project Estimation, Decomposition Techniques, Cost Estimation
Tools and Techniques, Typical Problems with IT Cost Estimates.

**Software Quality And Testing**

Quality Concepts: Quality, software quality, Quality Metrics, software quality dilemma, achieving
software quality
Software Testing: Introduction to Software Testing, Principles of Testing, Test plan, Test case,
Types of Testing, Verification & Validation, Testing strategies, Defect Management, Defect Life
Cycle, Bug Reporting, debugging.

**Formal Methods Recent Trends In Software Engineering**

Recent Trends in SE : SCM, Risk Management, Technology evolution, process trends, collaborative
development, software reuse, test-driven development, global software development challenges,
CASE – taxonomy, tool-kits, workbenches, environments, components of CASE, categories (upper,
lower and integrated CASE tools), Introduction to agile tools Jira, Kanban

# Engineering Mathematics- III

## Engineering Mathematics- III

### Unit I Linear Differential Equations

LDE of nth order with constant coefficients, Complementary function, Particular integral, General
method, Short methods, Method of variation of parameters, Cauchy's & Legendre's DE,
Simultaneous & Symmetric simultaneous DE.

### Unit II Transforms

Fourier Transform (FT): Complex exponential form of Fourier series, Fourier integral theorem,
Fourier Sine & Cosine integrals, Fourier transform, Fourier Sine & Cosine transforms and their
inverses, Discrete Fourier Transform.
Z –Transform(ZT):Introduction, Definition, Standard properties, ZT of standard sequences and their
inverses. Solution of difference equations.

### Unit III Statistics

Measures of central tendency, Measures of dispersion, Coefficient of variation, Moments,
Skewness and Kurtosis, Curve fitting: fitting of straight line, parabola and related curves,

Correlation and Regression, Reliability of Regression Estimates.

### Unit IV Probability and Probability Distributions

Probability, Theorems on Probability, Bayes theorem, Random variables, Mathematical
Expectation, Probability density function, Probability distributions: Binomial, Poisson, Normal and
Hyper geometric, Sampling distributions, Test of Hypothesis: Chi-Square test, t-test.

### Unit V Numerical Methods

Numerical Solution of Algebraic and Transcendental equations: Bisection, Secant, Regula-Falsi,
Newton–Raphson and Successive Approximation Methods, Convergence and Stability.
Numerical Solutions of System of linear equations: Gauss elimination, LU Decomposition, Cholesky,
Jacobi and Gauss-Seidel Methods.

**Unit VI Numerical Methods**

Interpolation: Finite Differences, Newton's and Lagrange's Interpolation formulae, Numerical
Differentiation. Numerical Integration: Trapezoidal and Simpson's rules, Bound of truncation error.
Solution of Ordinary differential equations: Euler's, Modified Euler's, Runge-Kutta 4th order
methods and Predictor-Corrector methods