

# **MSCCS-Final / MCA 2<sup>nd</sup> Year**

## **Syllabus**

**Course Code:** MSCCS-203, 09/MCA-203

**Course Name:** Software Engineering

### **Unit 1: Introduction to Software Engineering**

Define: Software, Engineering, Software Engineering, Emergence of Software Engineering, Aims of Software Engineering, Software Characteristics, Software Crisis, Software Myths, Software Product and Qualities of software product, Software Process, Software Engineering Paradigms, Software Life Cycle, Computer-Aided Software Engineering (CASE).

### **Unit 2: Software Requirements Analysis**

Identifying Software Requirement: Functional Requirements, Non-Functional Requirements, User Requirements, System Requirement, Feasibility Study, Process of Requirement Engineering: Requirement Elicitation, Requirement Analysis and Modelling, Requirement Documentation, Requirement Review, Requirement Management. Software Requirement Document (SRS), System Models, Analytical Frameworks: Structure analysis modelling, Object oriented modelling, Data Modelling, Introduction to CASE tools.

### **Unit 3: Software Specification**

Critical System Specification, Risk-Driven Specification, Safety Specification, Security Specification, Software Reliability Specification: Types of System Failure, Steps in Building Reliability Specification, User Interface Specification: User Interface Specification process.

### **Unit 4: Software Process Model**

Process Activities, Process Iteration, Software Development Techniques: Predicative Software Development, Adaptive Software Development, Waterfall Model: Stages, Advantages and Disadvantages, Prototyping: Prototyping Process, Advantages and Disadvantages, Concurrent Development, Rapid Application Development (RAD): Development Methodology, Phases, Advantages and Disadvantages, Unified Development Process: Rational Unified Process, Aspect Oriented Software Development, 4GL Techniques.

### **Unit 5: Software Design**

Relationship between Analysis and Design , Design Concepts, Tools and Diagramming aids, Modularity, Design Strategies, Function-Oriented Design, Object-Oriented Design, Data-Oriented Design, Data Flow-Oriented Design, Real time Design, User interface Design, User interface Design Issue, User interface Design Process, User Analysis, User interface Prototyping, Interface Evaluation.

### **Unit 6: Project Management**

Introduction to Project Management, Management Activities, Management Structures, Project Planning: Project Planning Objectives, Estimation Reliability Factors, Project Planning Activities, Project cost Estimation, Project Scheduling and Tracking: Software Project Scheduling, Tracking the Schedule, Risk Management, Risk Identification and Projection, Risk Mitigation, Monitoring, and Management (RMMM), Productivity, Project Milestones, Work Definition, Allocation and Assignments.

### **Unit 7: Software Cost Estimation, Metrics, and Measures**

Software Productivity, Estimation Techniques, Algorithmic Cost Modelling, Project Duration and Staffing, Empirical Models, Putnam Model, COCOMO, Software Metrics and Measures, Process Metrics, Project Metrics, Software Measurement.

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### **Unit 8: Software Reuse**

Software Components Reuse, Design Patterns, Application Frameworks, Application System Reuse, Software Evolution.

### **Unit 9: Verification and Validation**

Planning Verification and Validation Activities, Software Inspections, Verification and Formal Methods: Clean Room Software Development.

### **Unit 10: Software Testing**

Testing Fundamentals, Testing Techniques & Strategies, Test Case Design: Functional Testing, Structural Testing, Test Case Generation & Tool Support, Test Case Execution & Analysis, Strategic Issues in Testing, Levels of Testing, Black box and White Box Testing.

### **Unit 11: Quality Management**

Quality Assurance (QA), QA in Software Development, Software Quality Factors, Software Verification and Validation, Software Maintenance, Software Configuration Management.

### **Unit 12: Process Improvement and Measurement**

Process and Product Quality Improvement: Process Attributes, Process and Product Quality, Benefits of Process Improvement, Process Classification, Process Measurement, Process Analysis and Modelling, Process Change, CMMI Process Improvement Framework: Capability Maturity Model, Structure of CMM, Levels of CMM, CMMI Benefits.