CSPE3013 SOFTWARE TESTING & QUALITY ASSURANCE (3-0-0)

Course Objectives:

- To understand the fundamentals and principles of software testing.
- To learn various testing methodologies, tools, and techniques.
- To introduce software quality assurance practices and standards.
- To enable students to plan, design, and execute software test cases effectively.
- To appreciate the importance of software process improvement.

Module – I: (08 Hrs)

Introduction Software Testing: Testing as an Engineering Activity, Role of Process in Software Quality, testing as a Process - Basic Definitions, Software Testing Principles, The Tester's Role in a Software Development Organization, Origins of Defects, Defect Classes, The Defect Repository and Test Design, Defect Examples - Developer/Tester Support for Developing a Defect Repository.

Module – II: (10 Hrs)

Testing Issues: Introduction to Testing Design Strategies, The Smarter Tester, Test Case Design Strategies - Using Black Box Approach to Test Case Design, Random Testing, Equivalence Class Partitioning, Boundary Value Analysis, Other Black-box Test Design Approaches, Black-box testing and COTS - Using White-Box Approach to Test design, Test Adequacy Criteria, Coverage and Control Flow Graphs, Covering Code Logic - Paths, White-box Based Test Design, Additional White Box Test Design Approaches, Evaluating Test Adequacy Criteria.

Module – III: (08 Hrs)

Fundamentals of Software Quality Assurance: Ethical Basis for Software Quality, Total Quality Management Principles, Software Processes and Methodologies, Four Dimensions of Quality- Specification Quality, Design Quality, Development Quality, Conformance Quality, Software Product Quality: white box standpoint vs functionality standpoint, Program Quality.

Module – IV: (09 Hrs)

Quality Standards: Quality Standards, Practices and Conventions – Software Configuration Management – Reviews and Audits – Enterprise Resource Planning Software.
Quality Assurance department: Role, position, organization and staffing.
Software Verification: walkthrough, inspections, audits, process.
Validation: Definition, software designs, product specification, software product. Familiarization with testing tools like Selenium.

Module – V: (05 Hrs)

Quality Metric System: Measurement Theory – Software Quality Metrics – Designing Software Measurement Programs – Complexity Metrics and Models – Organizational Learning – Improving Quality with Methodologies – Structured/Information Engineering.

Course Outcomes:

On completion of this course, the student will be able to:

1. Understand the fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. Understand software quality management.
3. Analyze different types of testing
4. Evaluate the techniques and skills of using modern software testing tools to support software testing projects.

Text Books:

1. Chemuturi, M. (2010). Mastering software quality assurance: Best practices, tools and techniques for software developers. J. Ross Publishing.
2. Dustin, E., Garrett, T., & Gauf, B. (2021). Implementing effective software testing: A process-oriented guide. Addison-Wesley Professional.
3. Patton, R. (2020). Software testing (4th ed.). Sams Publishing.
4. Desikan, S., & Ramesh, G. (2006). Software testing: Principles and practices. Pearson Education India.

Reference Books:

1. Schulmeyer, G. Gordon, James McManus, "Handbook of Software Quality Assurance", Second Edition, Van Nostrand Reinhold, 1992.
2. Edward Kit, "Software Testing in the Real World – Improving the Process", Pearson Education, 2004.
3. William E.Perry, "Effective methods for Software Testing", Second Edition, Wiley, 2000.