Code No	Subject		Theory			Practical		
		Lecture	Credit	University	Internal	Hours/Week	Credit	Marks
		Hrs/ Week	Theory	Marks	Evaluation	L/T	Practical	
	Semester – 5							
NMCA 501	Artificial Intelligence and Expert System	3	3	100	50	2	1	50
NMCA 502	Object Oriented Analysis and Design with UML	3	3	100	50	2	1	50
NMCA 503	Internet Technology and Enterprise Java	3	3	100	50	2	1	50
NMCA 504	Accounting Information System	3	3	100	50			
NMCA 505_B	**Elective II** Information Security and Management	3	3	100	50			
NMCA 506_A	**Elective III** Distributed System	3	3	100	50			
NMCA507	**Elective IV** Software Testing	3	3					
NMCA 508	Minor In-house Project and Viva					6	4	150
NMCA 509	Summer Internship Evaluation					0	2	100
TOTAL		18	21	600	300	12	09	400
TOTAL Marks: 1300								
Total Credits: 30								

5th semester
NMCA 501: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM

Module I

Introduction to AI, AI Problems and AI techniques, Solving problems by searching, Problem Formulation. Intelligent Agents: Structure of Intelligent agents, Types of Agents, Agent Environments. Uninformed Search Techniques: DFS, BFS, Uniform cost search, Depth Limited Search, Iterative Deepening, Bidirectional search, Comparing Different Techniques.

Module II

Informed Search Methods: Heuristic functions, Hill Climbing, Simulated Annealing, Best First Search, A*, IDA*, SMA*, Crypto-Arithmetic Problem, Backtracking for CSP, Performance Evaluation. Adversarial Search: Game Playing, Min-Max Search, Alpha Beta Pruning.

Module III

Knowledge and Reasoning: A Knowledge Based Agent, WUMPUS WORLD Environment, Propositional Logic, First Order Predicate Logic, Forward and Backward Chaining. Planning: Introduction to Planning, Planning with State Space Search, Partial Ordered planning, Hierarchical Planning, Conditional Planning, Planning with Operators.

Module IV

Uncertain Knowledge and Reasoning: Uncertainly, Representing Knowledge in an Uncertain Domain, Conditional Probability, Joint Probability, Bays theorem, Belief Networks, Simple Inference in Belief Networks. Learning: Learning from Observation, General Model of Learning Agents, Inductive Learning, Learning Decision Trees, Rote Learning, Learning by Advice, Learning in Problem Solving, Explanation based Learning. Expert Systems: Introduction, Design of Expert systems.

Books:

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 2nd Edition, Pearson Education.
2. Elaine Rich, Kevin Knight, Shivshankar B Nair, Artificial Intelligence, McGraw Hill, 3rd Edition.
3. Nills J. Nilsson, "*Artificial Intelligence: A New Synthesis*", 2nd Edition, 2000, Elsevier India Publications, New Delhi.
4. Michael Negnevitsky, "*Artificial Intelligence: A Guide to Intelligent Systems*", Second Edition, 2005, Pearson Education, Inc. New Delhi.
5. Dan W. Patterson, "*Introduction to Artificial Intelligence and Expert Systems*", 1st Edition, 1996, PHI Learning Pvt. Ltd., New Delhi.
6. Ben Coppin, "*Artificial Intelligence Illuminated*", 2005, Narosa Publication, New Delhi. ISBN: 978-81-7319-671-3

NMCA502 OBJECT ORIENTED ANALYSIS AND DESIGN WITH UML

Module-I

Introduction: Object orientation &Object oriented development, Modeling Concepts: Modeling as a design technique, Class Modeling, advanced class modeling, State Modeling, advanced State Modeling, Interaction Modeling, advanced Interaction Modeling. Collaboration Diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration diagrams

Module-II

Analysis and Design: Process overview, system Conception, Domain Analysis, System Design, Class design.

Module-III

Implementation: Implementation Modeling, Object Oriented (OO) Languages, Databases, Programming Style.

Module-IV

Management of Object-Oriented Software projects, Object oriented analysis, domain analysis and generic components of object- oriented analysis model, object behavior model. The intent of object-oriented metrics, the distinguishing characteristics and metrics for the object-oriented design model, class oriented metrics, operation oriented metrics, metrics for object oriented testing, metrics for object-oriented projects.

Text Books:

1. Michael R. **Blaha** and James R **Rambaugh**, "*Object-Oriented Modeling and Design with UML*", Second Edition, 2005, Pearson Education, Inc. New Delhi.
Chapters: 1 to 8, 10, 11, 12, 14, 15, 17, 18, 19, 20.

2. Mark **Priestley**, "*Practical Object-Oriented Design with UML*", Second Edition, 2006, McGraw-Hill Education, India. New Delhi.

Reference Books:

1. Grady **Booch**, "*Object-Oriented Analysis and Design with Applications*", Third Edition, 2007, Pearson Education, Inc. New Delhi.

2. Craig **Larman**, "*Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development*", Third Edition, 2005, Pearson Education, Inc. New Delhi.

3. Mike **O'Docherty**, "*Object Oriented Analysis and Design: Understanding System Development with UML 2.0*", 2005, Wiley India Pvt. Ltd., New Delhi.

4. John W. **Satzinger**, Robert B. **Jackson**, Stephen D. **Burd**, "*Object-Oriented Analysis and Design with the Unified Process*", 2006, CENGAGE Learning India Pvt. Ltd., New Delhi.

5. James **Rumbaugh**, Grady Booch, Ivar Jacobson, "*The Unified Modeling Language*

NMCA 503 INTERNET TECHNOLOGY AND ENERPRISE JAVA

Module-I (10 hours)

Internet and Web Technology: Introduction and overview, Internetworking concept and architectural model,World wide web ,Web 2.0, Web Browsers, Web Servers, URLs, URN, URIclassful internet addresses, classless and subnet address extensions (CIDR)

Web Programming:-, Basics of HTML & XHTML Programming: Syntax, Document structures, images, hyperlinks, List, Tables, Forms, Frames, CSS, Basic JavaScript Programming: DOM, Loops, function and arrays,Formdesign,Event handling. XML: Document structure, DTD, Namespaces, XML Schema, and Parsing XML documents.

Module-II (10 hours)

Enterprise Java Programming: Concept of Swing Package, Java EE 6 API, Web Applications, Java Servlet Technology: - Lifecycle of a Servelet, Servelet API, Servlet Packages, Types of servlets, Stateless and Stateful protocols ,Session tracking in Servlet ,Cookie ,Session variable

Database Programming: Concept of JDBC,JDBC drivers,connecting to database ,Database Access using Servlet.

Module-III (10 hours)

JSP Technology: - Architecture & Anatomy of JSP Page, JSP life cycle, JSP with MVC Architecture, Dynamic webpage Creation, Scripting Elements, Directive tags ,Action tags , Session Tracking, Database access using JSP page, JSTL, concept of Ajax. Introduction to Java Server Faces (JSF) Technology, Introduction to Face-lets,

Module-IV(10 hours)

Enterprise JavaBeans Technology: EJB Component Architecture, Role of EJB & its life cycle, Types of Beans, Stateless and stateful beans, Simple program using stateless and stateful beans ,Security features of EJB, Contexts and Dependency Injection for the Java EE Platform; Java Persistence API, Security in Java EE, Java EE Supporting Technologies: Introduction, Transactions and Resource Connections.

Module-V(6 hours)

(As per choice of faculty)

Portion covered can be tested through internal evaluation only not to be included in university examination.

Recommended Books:

1. Douglas E. **Comer**, "*Internetworking with TCP/IP, Volume 1: Principles, Protocols and Architecture*", Fifth Edition, 2006, PHI Learning Pvt. Ltd., New Delhi.

Chapters: 1, 3, 4, 9, 10, 18, 20, 27, 28.

2. Ralph **Moseley**, "*Developing Web Applications*", 2008, Wiley India, New Delhi.

3. Eric **Jendrock**, D. Carson, I. Evans, D. Gollapudi, K. Haase, C. Srivastha, "*The Java EE6 Tutorial*", Volume-1, Fourth Edition, 2010, Pearson India, New Delhi.

Chapters: 1, 3, 4, 5, 7, 9 to 12, 14 to 16, 17, 19, 23, 26, 27, 28.

4.H. M.Deitel, P. J. Deitel, S. E. Santry" Advanced Java 2 Platform HOW TO PROGRAM" , Prentice Hall, 2001

References:

1. Joe **Wigglesworth**, Paula **McMillan**, "*Java Programming: Advanced Topics*", 3rd Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
2. William **Stallings**, "*Computer Networking with Internet Protocols and Technology*", 2004, Pearson education, New Delhi.
3. **Kongent S.**, "*Java Server Programming (JEE 6) Black Book, Platinum Edition*", 2008, Dreamtech / Wiley India Pvt. Ltd.
4. David **Geary**, Cay S. **Horstmann**, "*Core JavaServer Faces*", Second Edition, 2007, Pearson Education, Inc. New Delhi.
5. Adrian **Farrel**, "*The Internet and its Proto*

MCA504 ACCOUNTING INFORMATION SYSTEM

Course objective n outcomes :

The subject introduces and familiarizes with the application of accounting principles and concepts in a computerized environment.

Students would know about the use of technology in accounting and developing an accounting system for a business with an objective of preparing computerized financial statements and reports.

MODULE-I

Accounting as a language of business, Accounting an information system, Accounting Concepts, Accounting Equations, Basic Terminology used in Profit/Loss A/c and Balance

Sheet, Accounting Cycle, Recognition of Revenue and Expenditures, Advantages of computerized accounting system over conventional accounting practices.

MODULE-II

Classification of Accounts, Golden Rules of Accounting, Preparation of vouchers, Journals,

Posting in Subsidiary books of accounts, Cash Book, Trial Balance.

MODULE-III

Financial Statements and its preparation, Income Statement, Balance Sheet, Adjustment

Entries(simple numerical problems to be taught), Cash Flow Statement, Director's Reports,

Preparation of Income Statement and Balance Sheet of Non- Profit Making organisations .

Text Book :

1. **Computerised Accounting with Quick Books – 2015- MH publications**

NMCA505A-CRYPTOGRAPHY AND CYBER LAW

Module – I Introduction - Cyber Attacks, Defence Strategies and Techniques, Guiding Principles, Mathematical Background for Cryptography - Modulo Arithmetic's, The Greatest Common Divisor, Useful Algebraic Structures, Chinese Remainder Theorem
Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Other Cipher Properties, Secret Key Cryptography – Product Ciphers, DES Construction.

Module – II Public Key Cryptography and RSA – RSA Operations, Why Does RSA Work?, Performance, Applications, Practical Issues, Public Key Cryptography Standard (PKCS), Cryptographic Hash - Introduction, Properties, Construction, Applications and Performance, The Birthday Attack, Discrete Logarithm and its Applications - Introduction, Diffie-Hellman Key Exchange, Other Applications.

Module – III Key Management - Introduction, Digital Certificates, Public Key Infrastructure,
Identity–based Encryption, Authentication–I - One way Authentication, Mutual Authentication, Dictionary Attacks, Authentication – II – Centralized Authentication, The Needham-Schroeder Protocol, Kerberos
Intrusion Prevention and Detection - Introduction, Prevention Versus Detection, Types of Instruction Detection Systems, DDoS Attacks Prevention/Detection,
Web Service Security – Motivation, Technologies for Web Services, WS- Security, SAML, Other Standards.

Module –IV
Concepts of Cyber Crime and the IT ACT-2000,Hacking,Teenage Web Vandals, Cyber Fraud and Cyber Cheating, Nature of Cyber criminality, Strategies to tackle cyber crime and trends, Criminal justice in India and implications on Cyber Crime
Copyright Ownership and Assessment, License of Copy Right, Copy Right Term and respect for foreign Work, Copy Right Infringement, Remedies and Offers, Computer Software piracy

TextBooks:
1. Cryptography, Network Security and Cyber Laws – **Bernard Menezes**, Cengage Learning, 2010
2.Cyber Law simplified- **VivekSood**, Mc-GrawHill, 11th reprint , 2013

Reference Books:
1. Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc-
GrawHill, 3rd Edition, 2015
2. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition

NMCA 505B Information Security and Management

Module-I (10 Hours)
The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Defense; Elementary Cryptography: Substitution Ciphers, Transpositions, Making "Good" Encryption Algorithms, Private-Key Cryptosystems, The Data Encryption Standard, The AES Encryption Algorithm, Public-Key Cryptosystems, Public Key Encryptions, Usesof Encryption, Pseudo-randomness, and Hashing.

Module-II (10 hours)
Program Security :Secure Programs, Non-malicious Program Errors, viruses and other malicious code, Targeted Malicious code, controls Against Program Threats, Protection in General Purpose operating system protected objects and methods of protection memory and address protection, File protection Mechanisms, User Authentication Designing Trusted O.S : Security polices, models of security, trusted O.S. design, Assurance in trusted OS, Implementation examples. Digital Signatures, Authentication, Secret Sharing, Group oriented cryptography, Identification.

Module-III (10 hours)
Data base & Network Security: Security requirements, Reliability and integrity, Sensitive data, Inference, multilevel database, proposals for multilevel security; Security in Network; Threats in Network, Network Security Controls, Firewalls, Intrusion Detection Systems, Secure E-mail.

Module-IV (10 Hours)
Administering Security: Security Planning, Risk Analysis, Organizational Security policies
Physical Security; The Economics of Cyber security; Privacy in Computing; Legal and Ethical Issues in Computer Security: Protecting Programs and data, Information and the law, Rights of Employees and Employers, Software failures, Computer Crime, Case studies of Ethics.

Module-V (Portion covered can be tested through internal evaluation not to be included in the university examination)

Textbooks:
1.Charles P. Pfleeger& Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, 2007, Pearson Education, Inc. New Delhi. Pvt. Ltd., New Delhi.
2.William Stallings&Lawrie Brown, "Computer Security: Principles and Practice", First Edition, 2008, Pearson Education, Inc. New Delhi.

Reference Books
1.Charlie Kaufman, Radia Perlman& Mike Speciner, "Network Security: Private Communication in a Public World", 2ndEdition, 2003, PHI Learning. New Delhi.
2.ChuckEasttom, "Computer Security Fundamentals", First Edition, 2006, Pearson Education, Inc. New Delhi.
3Alfred Baasta, "Computer Security", First edition, 2008, CENGAGE Learning.

NMCA 506A DISTRIBUTED SYSTEM / DISTRIBUTED TECHNOLOGY

Module-1

Distributed systems: Definition, goals, types of Distributed Systems, Architectures, Key characteristics, Design issues, naming, communication, software structure, workload allocation, consistency maintenance; User requirement, functionality, Quality of service, re configurability

Module-2

Interprocess communication, building blocks, client server communication; CORBA's Common Data Representation (CDR); Java object serialization; Extensible markup language (XML); Remote object references; Inter-process communication in UNIX; Remote procedure calling; Design issues, interface definition language exception handling; Implementation - interface processing, communication handling; Binding, Case study: sun RPC Vs. Java RMI

Module-3

Distributed Operating systems: kernel, processes and threads, Naming and protection - Communication and Invocation, virtual memory,

Distributed file services - design issues, interfaces, implementation techniques, Case study sun NFS, Name services: Name spaces; Name resolution, Domain Name System, SNS and DNS, Peer-to-Peer Systems.

Coordination and Agreement: Time and Global States, Time and co-ordination, Synchronizing physical clocks- logical time and logical clocks, Distributed co-ordination, distributed mutual exclusion, elections, Replication, basic architectural model, consistency and request ordering.

Module-4

Distributed Transactions, Recovery and fault tolerances: Transaction recovery, logging shadow versions, fault model for transaction; Fault tolerance: characteristics; Hierarchical and group masking of faults; Security, authentication and key distribution, logic of authentication, digital signatures; Web Services: SOAP, XML, CORBA, Distributed object based systems, Distributed file systems, Distributed web- based systems, Distributed coordination based systems.

Module-5 (Portion covered can be tested through internal evaluation not to be included in the university examination

Text books:

1. George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems: Concepts and Design”, Fourth Edition, 2006, Pearson Education, Inc. New Delhi.
2. Andrew S. Tanenbaum, Maarten van Steen, “Distributed Systems: Principles and Paradigms”, 2nd Edition, 2007, PHI Learning Pvt. Ltd., New Delhi.

Reference books:

1. HagitAttiya, Jennifer Welch, “Distributed Computing: Fundamentals, Simulations, and Advanced Topics”, 2nd Edition, 2005, Wiley India Pvt. Ltd., New Delhi.
2. Mordechai Ben-Ari, “Principles of Concurrent and Distributed Programming”, 2nd Edition, 2006, Pearson Education, Inc. New Delhi.
3. Mei-Ling Liu, “Distributed Computing: Principles and Applications”, 2004, Pearson Education, Inc. New Delhi.
4. Gerard Tel, “Introduction to Distributed Algorithms”, Second edition, 2002, Cambridge University Press / Foundation Books India, New Delhi.
5. Ajay D. Kshemkalyani, Mukesh Singhal, “Distributed Computing: Principles, Algorithms, and Systems”, 2008, Cambridge University Press / Foundation Books India, New Delhi.

NMCA 506B PARALLEL COMPUTING

Module-I (10 hours)
Introduction to Parallel Computing; Motivating Parallelism, Scope of Parallel Computing; Parallel Programming; Platforms: Implicit parallelism, Limitation of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms: PRAM Model, Interconnection network, network topology, Evaluation of interconnection network.

Module-II (10 hours)
Communication Costs of Parallel Machines, Routing Mechanism for Interconnection Networks, Impact of Process-processor Mapping and Mapping Techniques.
Principles of Parallel Algorithm Design: Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for containing interaction Overheads.

Module-III (10 hours)
Parallel Algorithm Models: Basic Communication Operations: One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and Reduction, Scatter and Gather, All-to-All Personalized Communication, Circular Shift. All reduce and prefix sum.

Module-IV (10 hours)
Analytical Modeling of Parallel Programs: Sources of Overhead, Performance metrics. Effect of Granularity on Performance, Scalability of Parallel Systems, minimum Execution time and minimum cost-optimal Execution time, Asymptotic Analysis of Parallel Programs,
Introduction to MPI Principles of Message: The Building Blocks (Send and Receive Operations), Message Passing Interface, Collective Communication and Computation Operations.

Module V (06 Hours)(as per choice of faculty)
Portion covered can be tested through Internal evaluation only not to be included in University examination)

Text Books:

1. Ananth **Grama**, George **Karypis**, Vipin **Kumar**, Anshul **Gupta**, "*Introduction to Parallel Computing*", 2nd Edition, 2004, Pearson Education, Inc. New Delhi.
2. Michael J. **Quinn**, "*Parallel Computing: Theory and Practice*", 1994, McGraw-Hill Education (India), New Delhi. **Reference Books:**

1. Calvin **Lin**, Larry **Snyder**, "*Principles of Parallel Programming*", 1st Edition, 2009, Pearson Education, Inc. New Delhi.
2. Michael J. **Quinn**, "*Parallel Programming in C with MPI and OpenMP*", 2004, McGraw-Hill Education (India), New Delhi.
3. Barry **Wilkinson**, "*Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers*", 2nd Edition, 2005, Pearson Education, Inc. New Delhi.
4. Yves **Robert**, Henri **Casanova**, Armand **Legrand**, "*Parallel Algorithms*", 1st Edition, 2009, CRC Press. ISBN-13:9781584889458.
5. Harry F. **Jordan**, Gita **Alagband**, "*Fundamentals of Parallel Processing*", first Edition, 2003, PHI Learning Pvt. Ltd. New Delhi.

NMCA 506C MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING

Module I: (10 Hours)
Microprocessor History, 8085 Architecture and Register organization, Functional Block Diagram, Bus Organization, 8085 Instruction Set, Instruction classifications, Instruction word size, Instruction format, Addressing modes, Assembly Language programming, Interrupts.

Module II: (10 Hours)
Instruction cycle, Machine cycle, Timing Diagram, Stack and subroutine. Debugging a program, Programming techniques such as looping, counting and indexing. Memory, I/O devices, Addressing memory and I/O devices, Memory mapping, Memory Interfacing, Tri State Devices, Buffers.

Module III: (10 Hours)
Interfacing Chips: 8255A (PPI), 8155 (Multipurpose Programmable Device), 8259A (PIC), 8257 or 8237A (DMA Controller), 8251A (USART).Some Standard Interfaces: Data communication buses such as IEEE 488 and CAMAC standard, Serial data communication Standards such as 20-mA current loop and RS- 232C.

Module IV: (10 Hours)
16 bit processor 8086: Introduction, Architecture, Pin Diagram, Min & Max Mode, Addressing Modes. Introduction to Microcontrollers and embedded processors, overview of the 8051 microcontroller family.

Module V:(6 hours)(as per choice of faculty)
(Portion covered can be tested through Internal evaluation only not to be included in University examination.)

Text Books:

1. Ramesh S. Gaonkar, “Microprocessor Architecture, Programming and Application with 8085”, 5th edition, Penram International Publishing (India) Pvt. Ltd.
2. D V Hall, “Microprocessor & Interfacing” McGraw Hill Education India.
3. M.A. Mazidi and J.G. Mazidi, “The 8051 Microcontroller and Embedded Systems”, Pearson Education, India.

Reference Books:

1.A. P. Mathur , “Introduction to Microprocessor” McGraw Hill Education India.
2. B.Ram, “Fundamentals of Microprocessor and Microcomputer” Dhanpat Rai& Co Publication.
3. P K Ghosh, P R Sridhar, “0000 to 8085 Introduction to microprocessor to Engineers &Scientists” Prentice-Hall of India.
4. M.Mano” Logic and Computer Design Fundamentals”Pearson Education/PHI.

NMCA 507 SOFTWARE TESTING

Module-1: Introduction (10 Hrs.)

Testing as an Engineering Activity, Testing Fundamentals, Defects, Strategies and Methods for Black Box Test Case Design, Strategies and Methods for White-Box Test Case design, Test Adequacy Criteria, Evaluating Test Adequacy Criteria, Levels of Testing and different types of testing, OO Testing.

Module-2: Test Case Design (11 Hrs.)

The need for levels of testing, Testing Lifecycle, Unit Test, Unit Test Planning, Designing the Unit Tests, The test harness, Running the Unit tests and Recording results, Integration tests, Designing Integration Tests, Integration Test Planning, Scenario testing, Defect bash elimination System Testing, Acceptance testing, Performance testing, Regression Testing, Internationalization testing, Ad-hoc testing, Alpha, Beta Tests, Testing OO systems, Usability and Accessibility testing, Configuration testing, Compatibility testing, Testing the documentation, Website testing

Module-3: Test Management (8 Hrs.)

Testing and Debugging Goals and Policies, Test Planning, Test Plan Components, Test Plan Attachments, Locating Test Items, Reporting Test Results, Process and the Engineering Disciplines, Introducing the test specialist, Skills needed by a test specialist, Building a Testing Group, Measurement and Milestones for Controlling and Monitoring, Status Meetings, Reports and Control Issues, Criteria for Test Completion, SCM, Types of reviews, Developing a review program, Components of Review Plans, Reporting review results.

Module-4: Software Quality (4 Hrs.)

Software quality definition, Software quality assurance, Software quality factors, Components of the SQA system, SQA standards, System certification and assessment components, Considerations guiding construction of an organization's SQA system.

Module-5: Test Automation (7 Hrs.)

Software test automation, Skills needed for automation, Scope of automation, API testing, CLI testing, GUI testing, System Under Test, Test automation architecture, Test automation framework, Test automation strategy, Test script, Requirements for a test tool, Challenges in automation, Test metrics and measurements, project, progress and productivity metrics.

Suggested Books:

1. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2006.
2. Naresh Chauhan, Software Testing Principle and Practices, Oxford University Press, 2016.

3. Ron Patton, “Software Testing”, Second Edition, Sams Publishing, Pearson Education,
   2007.
4. Ilene Burnstein, “Practical Software Testing”, Springer International Edition, 2003.
5. Martin Wieczorek, & Dirk Meyerhoff, “Software Quality”, Springer, 2001.