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Bachelor of Technology (Computer and CommunicationEngineering)
Choice Based Credit System (CBCS)(2016-2017)

SEMESTER-VI

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS501	-	Theory of Computation	60	20	20	-	-	3	1	-	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES
The student will have ability to:
1. To introduce concepts in automata theory and theory of computation.
2. To identify different formal language classes and their relationships.
3. To design grammars and recognizers for different formal languages.

COURSE OUTCOMES
Upon completion of the subject, students will be able to:
1. Ability to relate practical problems to languages, automata, and computability.
2. Ability to demonstrate an increased level of mathematical sophistication.
3. Ability to apply mathematical and formal techniques for solving problems.

SYLLABUS

UNIT–I
Introduction: Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem.

UNIT–II

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Regular Expression (RE): Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden's Theorem, Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

UNIT–III

Context Free Grammar (CFG) and Context Free Languages (CFL): Definition, Examples, Derivation, Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure proper ties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs.

UNIT–IV

Push Down Automata (PDA): Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG.

UNIT–V

Turing machines (TM): Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Undecidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory.

TEXT BOOKS:

1. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education, 3rd edition, 2014

REFERENCES:

1. Martin J. C., "Introduction to Languages and Theory of Computations", TMH, 4th edition, 2010.
2. Peter Linz, "An Introduction to Formal Language and Automata", Narosa Pub.House, 2011.
3. Papadimitriou, C. and Lewis, C. L., "Elements of the Theory of Computation", PHI, 1997.
4. K.L.P Mishra & N.Chandrasekaran,"Theory of Computer Science", PHI Learning.

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCC505		Mobile Ad-hoc Networks	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
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COURSE OBJECTIVES
The student will have ability to:

1. Understand the division of Ad-hoc network functionalities into layers.
2. Be familiar with the components required to build different types of networks
3. Be exposed to the required functionality at each layer
4. Learn the flow control, routing and congestion control algorithms.

COURSE OUTCOMES
Upon completion of the subject, students will be able to:

1. Have an understanding of the principles of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks.
2. Understand how proactive routing protocols function and their implications on data transmission delay and bandwidth consumption.
3. To understand the routing algorithm used mobile adhoc network
4. To understand the Transport protocol of mobile adhoc network
5. To understand the security mechanism used in mobile adhoc network

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SYLLABUS

UNIT–I
Introduction
Introduction to adhoc networks – definition, characteristics features, applications. Charectristics of Wireless channel, Adhoc Mobility Models:- Indoor and outdoor models.

UNIT–II
Medium Access Protocols
MAC Protocols: design issues, goals and classification. Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

UNIT–III
Network Protocols
Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing, AODV.

UNIT–IV
End-End Delivery and Security
Transport layer: Issues in desiging- Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.

UNIT–V
Cross Layer Design and Integration of Adhoc for 4G
Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary prespective. Intergration of adhoc with Mobile IP networks.

TEXT BOOKS:

1. C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education, 2007.
2. Charles E. Perkins, Ad hoc Networking, Low Price Edition, Pearson Education,Addison, 2008.
3. C.K.Toh, "Ad Hoc Mobile Wireless Networks", 1st Edition, Pearson Education, 2007.
4. C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education, 2007.

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REFERENCES:

1. James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach Featuring the Internet", 5th Edition, Pearson Education, 2010.
2. Nader. F. Mir, "Computer and Communication Networks", 2nd Edition,Pearson Prentice Hall Publishers, 2006.
3. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks",1st Edition, Morgan Kaufmann Publishers, 2004.
4. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", 2nd Edition, World Scientific Publishing Company, 2011.

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT603		Cyber and Network Security	60	20	20	-	-	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
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COURSE OBJECTIVES

The student will have ability to:
1.To gain a fundamental knowledge of what Cyber Security is and how it applies to your daily work
2. To gain an understanding of terms commonly used in Cyber Security such as vulnerability
3.To gain a fundamental understanding of what an attack is, and how to identify and prevent them from occurring
4. To provide the fundamental skills and understanding needed to identify Cyber Security threats.

COURSE OUTCOMES (04-05)

Upon completion of the subject, students will be able to:
1.Identify physical points of vulnerability in simple networks .
2.Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to
3.attack, and explain the characteristics of hybrid systems.
4.Evaluate the computer network and information security needs of an organization.
5.Formulate, update and communicate short- and long-term organizational cyber-security strategies and policies.
6.Troubleshoot, maintain and update an enterprise-level information security system.

SYLLABUS

UNIT–I

Introduction to Network Security, Computer Security and Cyber Security.Security Terminologies and Principle, Security Threats, Types of attacks (Operating System, application level, Shrink Wrap-code, Misconfiguration attacks etc.).Introduction to Intrusion, Terminologies, Intrusion Detection System

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(IDS), Types of Intrusion Detection Systems, System Integrity Verifiers (SIVS).Indication of Intrusion: System Indications, File System IndicationsIntrusion Detection Tools ,Post attack IDS Measures Evading IDS Systems. Penetration Testing, Categories of securityassessments,Types of Penetration Testing. Risk Management.

UNIT–II

Cryptography, Classical Cryptographic Techniques, Encryption, Decryption, Code Breaking: Methodologies, Cryptanalysis, Cryptography Attacks, Brute-Force Attack, Use of Cryptography. Public key cryptography, Principles of Public key Cryptosystems, Cryptographic Algorithms RSA, Data Encryption Standard (DES), RC4, RC5, RC6, Blowfish, Key Management, Diffie-Hellman key exchange, elliptic curve cryptography.

UNIT–III

Hash Functions, One-way Hash Functions, SHA (Secure Hash Algorithm), Authentication Requirements, Authentication Functions, Kerberos. Message Authentication codes ,Message Digest Functions, MD5, SSL (Secure Sockets Layer), SSH (Secure Shell), Algorithms and Security, Disk Encryption, Government Access to Keys (GAK)Digital Signature: Analysis, Components, Method, Applications, Standard, Algorithm: Signature Generation/Verification, ECDSA, EIgamal Signature Scheme, Digital Certificates.

UNIT–IV.

Cyber security fundamentals, Cyber security Architecture, principles ,Enterprise level Security System, Networks, Applications, Data. The Security Environment Threats, vulnerabilities, and Consequences ,Advanced persistent threats, The state of security today, Why security matters to DoD , Cyber security Management Concepts, Security governance, Management models, roles, and functions, Enterprise Roles and Structures, Information security roles and positions.

UNIT–V

Alternative enterprise structures and interfaces, Strategy and Strategic PlanningStrategy, security strategy, The information security lifecycle, Architecting the enterprise, Security Plans and Policies ,Levels of planning, Planning misalignment, The System Security Plan (SSP),Policy development and implementation, Laws and Regulatory Requirements, Timeline of U.S. laws related to information security, The Federal Information Security Management Act (FISMA) Security Standards and

Controls, Security standards and controls,Certification and accreditation (C&A),Risk Management, Principles of risk, Types of risk, Risk strategies, The Risk Management Framework (RMF)

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security: Principles and Practice",7th Edition Pearson,2017
2. Charlie Kaufman, Radia Perlman, Mike Speciner, Michael Speciner, " Network Security -Private communication in a public world" ,2nd Edition,TMH,2002
3. Fourozon, "Cryptography & Network Security" 4thEdition ,TMH,2005
4.Salvatore J. Stolfo(Editor), Steven M. Bellovin, Insider "Attack and Cyber Security: Beyond the Hacker",1st edition, Springer,2008
5.MayankBhushan "Fundamentals of Cyber Security",1st Edition ,BPB Publication,2017
6. GauravGupta,Sarika Gupta "Information Security and Cyber Laws",1st Edition,Khanna Book Publishing,2011

REFERENCES:

1.Carl Endorf, Eugene Schultz, Jim Mellander**"**INTRUSION DETECTION & PREVENSION**"**,1st Edition,TMH,2007
2.Neal, Krawetz, Introduction to Network Security,1st Edition ,Cengage Learning,2006
3. Joseph MiggaKizza, Computer Network Security,4thedition , Springer International,2017
4. AtulKahate,"Cryptography and Network Security",McGraw Hill,,2009
5.SunitBelapure Nina Godbole"Cyber Security",1st edition, Wiley Publication, 2011

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS504	-	Software Engineering & Project Management	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES

The student will have ability to:
1. Knowledge of basic software engineering methods and practices.
2. Define software requirements and requirement engineering.
3. Apply approaches for various designs and their principle.
4. Explore testing in various domains.
5. Development of significant teamwork and project based experience.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:
1. Compare various software process models and identify where these models are applicable.
2. Define and analyze software project management, the framework and the dimensions of software project management.
3. Comprehend System modeling using UML.
4. Identify software testing strategies by using testing tools.
5. Analyze software risks and risk management strategies.

SYLLABUS

UNIT–I

Nature of software, software engineering, software process, A Generic process model, process assessment and improvement, prescriptive process models-waterfall model, incremental models, evolutionary models, concurrent models, Specialized Process Model, Unified Process, Personal and team process models, process technology, Agile development.

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UNIT–II

Functional and Non-functional requirements, Requirement Sources and Elicitation Techniques, Analysis Modeling for Function-oriented and Object-oriented software development, Use case Modeling, System and Software Requirement Specifications, Requirement Validation, Traceability.

UNIT–III

The Software Design Process, Design Concepts and Principles, Software Modeling and UML, Architectural Design, Architectural Views and Styles, User Interface Design, Function-oriented Design, SA/SD Component Based Design, Design Metrics.

UNIT–IV

Software testing strategies-Approach, issues, validation testing and their criteria, system testing, alpha-beta testing, system testing, debugging, Testing conventional applications, Testing object oriented applications ,Testing web applications.

UNIT–V

Need and Types of Maintenance, Software Configuration Management (SCM), Software Change Management, Version Control, Change control and Reporting, Program Comprehension Techniques, Re-engineering, Reverse Engineering, Tool Support. Project Management Concepts, Feasibility Analysis, Project and Process Planning, Resources Allocations, Software efforts, Schedule, and Cost estimations, Project Scheduling and Tracking, Risk Assessment and Mitigation, Software Quality Assurance(SQA). Project Metrics.

TEXT BOOKS:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Tata McGraw-Hill seventh edition, 2009.
2. Richard Fairley, "Software Engineering Concepts" –, Tata Mcgraw Hill, 2008.
3. PankajJalote ,"An Integrated Approach to Software Engineering", Narosa Pub, 2005.
4. Richard H.Thayer,"SoftwareEnginerring& Project Managements",Willey India

REFERENCES:

1. Bernd Bruegge, Allen H. Dutoit," Object-Oriented Software Engineering" Using UML, Patterns, and Java, PEARSON Third Edition, 2017.
2. Waman S.Jawadekar,"Software Enginerring", TMH
3. Ian Sommerville, "Software Engineering", Seventh Edition, Pearson Education Asia, 2007.
4. Rajib Mall, "Fundamentals of Software Engineering" Second Edition, PHI Learning.

LIST OF EXPERIMENTS:

Select a topic of the project, and then make the report on following points:

1. System Analysis

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1.1. Identification of Need
1.2. Preliminary Investigation
2. Feasibility Study
2.1. Technical Feasibility
2.2. Economical Feasibility
2.3. Operational Feasibility
3. Literature Survey
3.1. Work done by other
3.2. Benefits
3.3. Proposed Solution
3.4. Technology used
4. Technical Part
5. Software Engineering Approach
5.1. Software Engineering paradigm Applied
5.1.1. Description
5.1.2. Advantage & Disadvantages
5.1.3. Reasons for use
5.2 Requirement Analysis
5.2.1 Software Requirement Specification
5.2.1.1 Glossary
5.2.1.2 Supplementary Specifications
5.2.1.3 Use Case Model
5.2.1.4 Comparative analysis documents
5.2.2 Conceptual Level Activity Diagram
5.3 Planning Managerial Issues
5.3.1 Planning Scope
5.3.2 Project Resources
5.3.3 Team Organization
5.3.4 Project Scheduling
5.3.5 Estimation
5.3.6 Risk Analysis
5.3.7 Security Plan
5.4 Design
5.4.1. Design Concept
5.4.2. Design Technique
5.4.3. Modeling
5.4.3.1. ER Model
5.4.3.2. DFD Model
5.4.3.3. Data Dictionary
5.4.3.4. Activity Diagram

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5.4.3.5. Software Architecture

5.5 Implementation Phase

5.5.1. Language Used Characteristics

5.5.2. Coding

5.6 Testing

5.6.1. Testing Objectives

5.6.2. Testing Methods & Strategies used along with test data and the error listed for each test case for each function provided by the system

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS602		Internet of Things	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES

1. To understand the configuration of Internet of Things (IoT) based architecture.
2. To identify an IoT device.
3. To understand working of IoT devices.

COURSE OUTCOMES

1. Able to understand the application areas of IOT.
2. Able to realize the revolution of Internet in Mobile Devices, Sensor Networks.
3. Able to understand building blocks of Internet of Things and characteristics.

SYLLABUS

UNIT–I: Overview of Internet of Things
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels, Sensor, Type of Sensor, Domain Specific IOTs: Home Automation, Cities, Environment, IOT Platforms.

UNIT–II : M2M to IoT
The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, Difference between IOT and M2M, A use case example of M2M & IOT, Differing Characteristics, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT.

UNIT–III : Communication Protocols
Introduction to communication architecture- Network protocol stack, Channels and protocols - RF: ZigBee, Blue Tooth, BLE, Zwave, Mesh network. Communication Channels: GSM/GPRS, 2G, And

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3G, LTE, WiFi, And PLC, IoT protocols: MQTT/MQTTS, CoAP, 6LoWPAN, IPSO, Thread, like TCP, UDP, HTTP/s, CoAP, and MQTT. Comparison of the different IOT protocols, advantages and disadvantages (limitations) of these IOT protocols. IPv4 addressing problem for IOT and introduction to IPv6 is required to address more devices. Application issues with RF protocol - power consumption, LOS, reliability. Security Aspects.

UNIT–IV: Designing and Developing

Network & Communication aspects Wireless medium access issues, Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages.

UNIT–V: IOT Devices

IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Introduction to R-Pi microcomputer, Linux on Raspberry Pi, Interfaces, and Programming & IOT Devices.

TEXT BOOKS:

1. Vijay Madisetti, Arshdeep Bahga," Internet of Things A Hands-On- Approach",2014, ISBN:978 0996025515
2. Adrian McEwen, Hakim Cassimally "Designing the Internet of Things", John Wiley & Sons (2013), ISBN - 9781118430620

REFERENCES:

1. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN 0989973700
2. Wolfram Donat "Learn Raspberry Pi programming in python", Apress (2014), ISBN – 9781430264255
3. Massimo Banzi, "Getting Started with Arduino", O'Reilly Media, Inc." (2011), ISBN - 9781449309879
4. Tero Karvinen, Kimmo Karvinen, Ville Valtokari, "Make: Sensors: A Hands-On Primer for Monitoring the Real World with Arduino and Raspberry Pi", Maker Media, Inc., (2014), ISBN – 9781449368067
5. Richard Grimmett, "Raspberry Pi Robotics Essentials", Packt Publishing Ltd (2015), ISBN – 9781785285646

LIST OF EXPERIMENTS:

1. Design use Cases ranging from Smart Home to Smart Cities.
2. IOT approach to solve Logistics Business Problem.

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3. Using an IoT gateway to connect the "Things" to the cloud.
4. Case study of IP spoofing attack in 6 LoWPAN network.
5. The Challenges of IoT Addressing.

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BTIT505		COMPONENT TECHNOLOGY	60	20	20	30	20	3	1	2	5

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COURSE OBJECTIVES:

The student will have ability to:

1. Understand Client-Server Component.
2. Design component-based software systems using well-structured design methods.
3. Describe, Compare, contrast and evaluate structured, Object Oriented, data Oriented and formal approaches to component modeling.
4. Knowledge of UML notation: ability to produce UML documentation.
5. Analyze a software component problem and be able to design and implement an effective program structures to solve it, including appropriate modularity, separation of abstraction and implementation concerns, use of standard design patterns to solve recurring design problems, and use of standard libraries.
6. Discuss component composition and integration

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Understood basic concepts of Client Server.
2. Acquire knowledge about component-based software systems.
3. Acquire knowledge about formal approaches to component modeling.
4. Shall have the basic knowledge UML notation: ability to produce UML documentation.
5. Shall be able to Solve Component Problem and will be able to design and implement Program Structure.
6. Acquire knowledge of component composition and integration.

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SYLLABUS:

UNIT I - Client/server computing
Building blocks, types of servers, types of clients, types of middleware aspects of client/server systems, sizing, scalability, tiered architecture, client/server models, Requirements of client/server systems, Distributed objects, benefits-drawbacks from distributed objects to components

UNIT II - Component technology
Components: definitions, properties, benefits, components and interfaces, direct and indirect interfaces, versions, interfaces as contracts, callbacks forms of design level reuse connection oriented programming, connectable objects, component architecture, component frameworks, composition, data driven, contextual, aspect oriented programming, subject oriented programming, XML components, component development, assembly.

UNIT III - The Microsoft way-component object model
COM, COM+, DCOM to .NET framework evolution, web services technologies - XML,WSDL, UDDI, SOAP- Common Language Runtime.NET framework class library-ADO.NET, ASP.NET

UNIT IV - The Sun Way-component variety
Applets, servlets, java beans, enterprise beans, EJB architecture, types of beans, characteristics, Building and deploying distributed applications using EJB

UNIT V - The OMG way-system object model
CORBA timeline-CORBA architecture-ORB-services facilities-business objects-IIOP-transport mechanisms- IDL- - CCM- CCM container

TEXT BOOKS:

1. Clemens szyperski,Dominik Gruntz and Stephan Murer ,Component Software beyond object oriented programming, third edition, Pearson education,2004.
2. Robert Orfali, Dan Harkey, Jeri Edwards, Client/ Server Survival Guide, Third edition, John wiley Inc,2003.

REFERENCE:

1. David Chappell, Understanding .NET, Pearson Education Inc, 2002.
2. Bill Burke, Richard Monson-Haefel, Enterprise JavaBeans, Fifth Edition, O'Reilly, 2001.
3. Dan Harkey, Robert Orfali, Client/Server programming with JAVA and CORBA, second edition, Wiley & sons Inc, 1999.

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LIST OF PRACTICAL'S:

The students have to develop distributed applications for a given domain using the following technologies:

1. RMI using JDBC
2. CORBA
3. COM
4. DCOM
5. ASP.NET/C#. NET
6. SERVLETS
7. EJB
8. MESSAGE BEANS
9. An interoperable application involving either language/ network protocol heterogeneity or involving any two of the above technologies.
10. Application development using ASP, PHP, JSP 9.

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Choice Based Credit System (CBCS)(2016-2017)

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS711		Soft Computing	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES

The student will have ability to:

1. Apply soft computing techniques to real word problems
2. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.
3. Understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
4. Understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.
5. Apply hybrid techniques to improve efficiency of the algorithms.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:

1. Design asystems using approaches of soft computing for solving various real-world problems.
2. Applythe rules of fuzzy logic forfuzzy control and Competent with issues related fuzzy systems.
3. Learn training, verification and validation of neural network models.
4. Design Engineering applications that can be optimized using genetic algorithms.
5. Design a robust and low-cost intelligent machines with knowledge of tolerance of imprecision and uncertainty.

SYLLABUS

UNIT–I

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Introduction to Soft Computing, Historical Development, Definitions, advantages and disadvantages, solution of complex real life problems, Soft Computing and its Techniques, Soft Computing verses Hard Computing. Applications of Soft Computing in the Current industry.

UNIT–II

Introduction to Fuzzy Logic, Crisp Sets, Fuzzy Sets, Fuzzy Relations, Membership Functions and features, Fuzzification, Methods of Membership Value Assignments, Defuzzification and methods, Lambda cuts. Fuzzy Measure, Fuzzy Reasoning, Fuzzy Inference System.

UNIT–III

Neural Network (NN), Biological foundation of Neural Network, Neural Model and Network Architectures, Perceptron Learning, Supervised Hebbian Learning, Back-propagation, Associative Learning, Competitive Networks, Hopfield Network, Computing with Neural Netsand applications of Neural Network

UNIT–IV

Genetic Algorithm, Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

UNIT–V

Neuro-Fuzzy and Soft Computing, Adaptive Neuro-Fuzzy Inference System Architecture, Hybrid Learning Algorithm, Learning Methods thatCross-fertilize ANFIS and RBFN. Coactive Neuro Fuzzy Modeling, Framework Neuron Functions for Adaptive Networks, Neuro Fuzzy Spectrum. Hybridization of other techniques

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TEXT BOOKS

1. S.N. Deepa and S.N. Sivanandam, Principles of Soft Computing, 2ed., Wiley, 2011
2. Vojislav Kecman, Learning and Soft Computing - Support Vector Machines, Neural Networks, and Fuzzy Logic Models, 1ed., The MIT Press, 2001.
3. D. K. Pratihar, Soft Computing, 1ed., Alpha Science, 2007.
4. Timothy J. Ross, Fuzzy logic with Engineering Applications, 3ed., John Wiley and Sons, 2010.
5. S. Rajasekaran and G.A.V. Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms, 2ed. PHI
6. David E. Goldberg, Genetic Algorithms in search, Optimization & Machine Learning, 1ed., Addison-Wesley Publishing Company, 1989

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REFERENCES

1. Jang, Sun andMizutani, Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence, 1ed., Pearson, 1997.
2. George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, 1ed., Prentice Hall, 1995
3. Simon Haykin, Neural Networks: A Comprehensive Foundation, 2ed. Prentice Hall, 1998
4. Samir Roy and UditChakraborty, A Beginners Approach to Soft Computing, 1ed., Pearson, 2013

LIST OF EXPERIMENTS:

1. Fuzzy Membership Functions.
2. Fuzzy set operations and its properties.
3. Fuzzy and Crisp Relations.
4. Fuzzy Inference System
5. McCulloh-Pitts neural network for generate AND, OR functions.
6. Perceptron learning for particular set of problem.
7. OR function with bipolar inputs and targets using Adaline network.
8. XOR function with bipolar inputs and targets using Madaline network.
9. Use of Genetic Algorithm for optimization problem solving.
10. Radial Basis Function and Application
11. Binary and Real Coded genetic Algorithms and Application
12. Introduction to Evolutionary Algorithms and Fundamentals
13. Genetic Expression Programming and Application
14. Introduction to Probabilistic Reasoning and Bayesian Networks Application

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BTCS613		Software Testing & Quality Assurance	60	20	20	30	20	3	1	2	5

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*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:
The student will have ability to:
1. Develop a skill in developing good quality in the software product.
2. Develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time
3. Learn systematic approach to the operation, maintenance, and retirement of software.
4. Learn how to use available resources to develop software, reduce cost of software and how to maintain quality of software
5. Methods and tools of testing and maintenance of software

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Apply approach of Software Testing & QA concepts.
2. Apply modern software testing processes in relation to software development and project management.
3. Create test strategies and plans, design test cases prioritize and execute them.
4. Manage defects within a project.
5. Contribute to efficient delivery of software solutions and implement improvements in the software development processes.

SYLLABUS

UNIT–I
BASIC CONCEPTS: Basic Testing Vocabulary, Quality Assurance versus Quality Control, The Cost of

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Quality, Software Quality Factors, Software Defect, The Multiple Roles of the Software Tester(People Relationships), Scope of Testing, Testing Constraints, Various software development Life cycles (SDLC), Independent Testing, QA Process, Levels of Testing, The "V" Concept of Testing.

UNIT–II

WHITE BOX TESTING: White box testing techniques - Statement coverage - Branch Coverage - Condition coverage - Decision/Condition coverage - Multiple condition coverage - Dataflow coverage - Mutation testing - Automated code coverage analysis.

UNIT–III

BLACK BOX TESTING: Black box testing techniques - Boundary value analysis - Robustness testing - Equivalence partitioning -Syntax testing - Finite state testing - Levels of testing – Unit testing-Integration Testing

UNIT–IV

SYSTEM TESTING - Functional testing-non-Functional testing-acceptancetesting-performance testing –Factors and Methodology for Performance testing, Regression testing-Methodology for Regression-testing. Five Views of Software Quality, McCall's Quality Factors and Criteria, Quality Factors, Quality Criteria, Relationship between Quality Factors and Criteria, Quality Metrics, Quality Characteristics, Software Quality Standard

UNIT–V

ADVANCE SOFTWARE TESTING METHOD (OBJECT ORIENTED TESTING): Syntax testing - Finite State testing - Levels of testing - Unit, Integration and System Testing. Challenges - Differences from testing non-OO Software - Class testing strategies - State-based Testing Software quality Assurance: ISO 9000; CMM and Test Management Issues; Quality Assurance personnel Issues.

TEXT BOOKS:

1.Kshirasagar Naik & Priyadarshi Tripathy, "Software Testing & Quality Assurance", A JOHN WILEY & SONS, INC. Publication.
2. R S. Pressman ,"Software Engineering: A Practitioner's Approach", Sixth edition 2006, McGraw-Hill.

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3. Waman S.Jawadekar,"Software Enginerring", TMH
4. Sommerville,"Software Enginerring",Pearson Education.
5."IBM CE-Enablement Program- Essentials of Software Engineering (OOAD & SW Lifecycle)", IBM Careeer Education

REFERENCES:

1.Kshirasagar Naik & Priyadarshi Tripathy, "Software Testing & Quality Assurance", A JOHN WILEY & SONS, INC. Publication.
2. R S. Pressman ,"Software Engineering: A Practitioner's Approach", Sixth edition 2006, McGraw-Hill.
3. Waman S.Jawadekar,"Software Enginerring", TMH

4. Sommerville,"Software Enginerring",Pearson Education.
5. http://www.softwaretestinghelp.com/online-software-testing-course-syllabus/
6. https://amizone.net/AdminAmizone/WebForms/Academics/NewSyllabus/1217201473127725.pdf
7. http://www.tutorialspoint.com/uml/

LIST OF EXPERIMENTS: (At least 10 based on Syllabus)

1. Design test cases using Boundary value analysis by taking quadratic equation problem.
2. Design test cases using Equivalence class partitioning taking triangle problem.
3. Design test cases using Decision table taking triangle problem.
4. Design independent paths by calculating cyclometer complexity using date problem.
5. Design independent paths by taking DD path using date problem.
6. Design the test cases for login page of AMIZONE.
7. Manual Testing for PAN card verification.
8. Generate test case for ATM machine.
9. Overview of Testing process using Rational Robot.
10. Write a script to record verification point using Rational Robot (For GUI testing of single click on window OS).
11. Write a script to record verification point for Clip Board and alphanumeric values using Rational Robot.

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BTCS606		Minor Project	0	0	0	30	20	0	0	8	4

Legends: L-Lecture; T-Tutorial/Teacher Guided Student Activity; P–Practical; C-Credit; Q/A–Quiz/Assignment/Attendance, MST Mid Semester Test.

*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

This course is the masters by coursework Minor Project.

A Minor Project is a substantial work of supervised research or development, requiring the equivalent of about four to six months full-time work from start to finish. A Project involves identifying a task or problem, searching and reviewing relevant literature, a proposed, implemented, and critically analyzed solution to the task or problem, and a written report describing the problem, the relevant literature, the solution, and its relation to other work in the area.

Note: This course includes a work integrated learning experience in which your knowledge and skillswill be applied and assessed in a real or simulated workplace context and where feedback from industry and/ or community is integral to your experience.

Objectives/Learning Outcomes/Capability Development

Program Learning Outcomes

This course contributes to the following program learning outcomes:

- **Enabling Knowledge:**

You will gain skills as you apply knowledge with creativity and initiative to new situations. In doing so, you will:

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- Demonstrate mastery of a body of knowledge that includes recent developments in Information Technology
- Recognize and use research principles and methods applicable to Information Technology.

- **Critical Analysis:**

You will learn to accurately and objectively examine, and critically investigate Information Technology (IT) concepts, evidence, theories or situations, in particular to:

- analyze and model complex requirements and constraints for the purpose of designing and implementing software artifacts and IT systems
- Evaluate and compare designs of software artifacts and IT systems on the basis of organizational and user requirements.

- **Problem Solving:**

Your capability to analyze complex problems and provide suitable solutions will be extended as you learn to: design and implement software solutions that accommodate specified requirements and constraints, based on analysis or modeling or requirements specification.

- **Communication:**

You will learn to communicate effectively with a variety of audiences through a range of modes and media, in particular to: interpret abstract theoretical propositions, choose methodologies, justify conclusions and defend professional decisions to both IT and non-IT personnel via technical reports of professional standard and technical presentations.

- **Responsibility:**

You will be required to accept responsibility for your own learning and make informed decisions about judging and adopting appropriate behavior in professional and social situations. This includes accepting the responsibility for independent life-long learning and a high level of accountability. Specifically, you will learn to: effectively apply relevant standards, ethical considerations, and an understanding of legal and privacy issues to designing software applications and IT systems.

- **Research and Scholarship:**

You will have technical and communication skills to design, evaluate, implement, analyze and theorize about developments that contribute to professional practice or scholarship; specifically you will have cognitive skills:

- To demonstrate mastery of theoretical knowledge and to reflect critically on theory and professional practice or scholarship
- To plan and execute a substantial research-based project, capstone experience and/or piece of scholarship.

Course Learning Outcomes

Upon successful completion of this course you should be able to:

- Identify a task or problem relevant to /or IT
- Search and review of the relevant literature
- Propose a solution to the task or problem
- Develop a software and/or algorithmic solution to the task or problem
- Implement solutions to meet high quality requirements developed by the supervisor
- Carry out research under supervision
- Present the research in a written form like that used for published papers
- Present the research in an oral seminar.

Overview of Learning Activities

A Minor project is a substantial work of supervised research or software development. You will choose an academic staff member as your supervisor to work on a research project. To successfully complete the course, you must demonstrate research skills: ability to undertake research under supervision, ability to analyze, develop, and present the research in a written form like that used for published papers, and ability to present the research in an oral seminar.

In this course, you are expected to carry out research activities including implementing a complete solution to the problems identified by the supervisor, critical analysis of results, and completing a written Project. The major deadline for this course is the delivery of the Minor Project by the end of the semester.

Overview of Assessment

You must satisfactorily complete each of the following assessment tasks for this course:

- Research project comprising an implemented and critically analyzed solution to the task or problem
- Written report (final Project) describing the problem, the relevant literature, the solution, and its relation to other work in the area

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- Seminar on your research (of 20 minutes) soon after your Project is submitted.

The Minor Project is assessed on its merits as a research publication. Each Project is examined by two academics, usually from within the Institute.

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BTCS610		Technical Presentation Skills	0	0	0	0	100	0	0	4	2

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GUIDELINES :

During the Presentation Session each student is expected to prepare and present a topic on engineering/technology, for a duration of about 15-20 minutes. Each student is expected to present at least twice during the semester and the student is evaluated based on that. At the end of the semester, he / she can submit a report on his / her topic of presentation and marks are given based on the report.

COURSE OBJECTIVES

The student will have ability to:

1. To encourage the students to study advanced engineering developments.
2. To prepare and present technical reports.
3. To prepare technical material using audiovisual materials.
4. To encourage the students to use various teaching aids such as over head projectors, PowerPoint presentation and demonstrative models.

COURSE CONTENTS:

Note taking from reference material , Precise writing , Slide preparation and oral presentation principles, Written presentation of technical material , Preparation of Bibliography , Basics of Official Correspondence , Preparation of curriculum vitae , Students should be asked to prepare and give presentation during the semester.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:

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1. Ability to review, prepare and present technological developments.
2. Ability to face the placement interviews.
3. Ability to effectively communicate technical material in print.
4. Ability to present technical material orally with confidence and poise.
5. Ability to present technical material using audiovisual materials.
6. Ability to communicate technical material to a variety of audiences, from members of the building and engineering trades and medical fields to government representatives and the general public.
7. Ability to work well in teams.

TEXT BOOKS:

1. The Chicago Manual of Style, 13th Edition, Prentice Hall of India 1989.
2. Gowers Ernest, "The Complete Plan in Words" Penguin, 1973.
3. Menzel D.H., Jones H.M, Boyd, LG., "Writing a Technical Paper". McGraw Hill, 1961.
4. Strunk, W., & White E.B., "The Elements of Style", 3rd Edition , McMillan, 1979.

REFERENCES:

1. Turbian K.L., "A Manual for Writers of Term Papers, Thesis and dissertations" Univ of Chicago Press, 1973.
2. IEEE Transactions on "Written and Oral Communication" has many papers.

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