Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Information Technology)
Choice Based Credit System (CBCS) 2016-17
SEMESTER VI

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	Th	T	P	CREDITS
BTCS601	UG	COMPILER DESIGN	60	20	20	30	20	3	1	2	5

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:
1. To introduce the major concept areas of language translation and compiler design
2. To enrich the knowledge in various phases of compiler and its use
3. To provide practical programming skills necessary for constructing a compiler

COURSE OUTCOMES:
1. Ability to apply the knowledge of lex tool &yacc tool to develop a scanner & parser
2. Ability to design and develop software system for backend of the compiler
3. Ability to comprehend and adapt to new tools and technologies in compiler design

Syllabus

Unit – I:
Introduction to Compiling: Compilers – Analysis of the source program**,** Phases of a compiler**,** Cousins of the Compiler, Grouping of Phases and Compiler construction tools, Lexical Analysis, Role of Lexical Analyzer, Input Buffering, Specification of Tokens.

Unit – II:
Syntax Analysis: Role of the parser, Writing Grammars, Context-Free Grammars, Top Down parsing, Recursive Descent Parsing, Predictive Parsing, Bottom-up parsing, Shift Reduce Parsing, Operator Precedent Parsing, LR Parsers, SLR Parser – Canonical LR Parser – LALR Parser.

Unit – III:
Intermediate Code Generation: Intermediate languages**,** Declarations, Assignment Statements, Boolean Expressions, Case Statements, Back patching, Procedure calls.

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Unit – IV:

Code Optimization and Run Time Environments: Introduction, Principal Sources of Optimization, Optimization of basic Blocks, DAG representation of Basic Blocks - Introduction to Global Data Flow Analysis, Runtime Environments, Source Language issues, Storage Organization, Storage Allocation strategies, Access to non-local names, Parameter Passing, Error detection and recovery.

Unit – V:

Code Generation: Issues in the design of code generator, The target machine, Runtime Storage management, Basic Blocks and Flow Graphs, Next-use Information, A simple Code generator, Peephole Optimization.

TEXT BOOKS:
1. Alfred V. Aho, Jeffrey D Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education Asia, 2012
2. Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", BS Publications, 2005
3. Dhamdhere, D. M., "Compiler Construction Principles and Practice", 2nd edition, Macmillan India Ltd., New Delhi, 2008

REFERENCES:
1. Allen I. Holub, "Compiler Design in C", Prentice Hall of India, 2003
2. C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings, 2003
3. HenkAlblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI, 2001
4. Kenneth C. Louden, "Compiler Construction: Principles and Practice", Thompson Learning, 2003

LIST OF EXPERIMENTS:
1. To study the Lex Tool.
2. To study the Yacc Tool.
3. Write a program to implement Lexical Analyzer to recognize few patterns of C.
4. Write a program to implement the Recursive Descent Parser.
5. Write a program to implement the Computation of FIRST and FOLLOW of variables of grammar.
6. Write a program to compute the leading and trailing symbols of grammar.
7. Write a program to implement Operator Precedence Parser.
8. Write a program to implement SLR parser.
9. Write a program to check the data types.
10. Write a program to implement the generation of three address code.
11. Write a program to implement the computation of postfix notation.
12. Write a program to implement the computation of Quadruples.
13. Write a program to implement the construction of Directed Acyclic Graph (DAG).

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	Th	T	P	CREDITS
BTCS602	UG	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 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.
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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| COURSE CODE | CATEGORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | Th | T | P | CREDITS |
| | | | THEORY | | | PRACTICAL | | | | | |
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT603	UG	CYBER AND NETWORK SECURITY	60	20	20	-	-	3	-	-	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 Cybercrime and Network Security.
2. To gain a fundamental understanding of a Cyber-attack and Challenges in identify and prevent them from occurring.
3. To gain a fundamental knowledge of Tools and Methods used in Cybercrime for prevention.
4. To understand the need of Cyber law and the fundamental concepts of Cyber Forensic.
5. To provide the fundamental skills and understanding needed to identify Cyber Security threats.

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Identify physical points of vulnerability in simple networks and security needs of an organization.
2. Evaluate the Legal Perspective of Cybercrime and Cyber Security.
3. Formulate, update and communicate short- and long-term organizational cyber-security strategies and policies.
4. Troubleshoot, maintain and update an enterprise-level information security system.
5. Investigate the Cybercrime with the help of Cyber Forensic.

SYLLABUS

UNIT–I
Computer Security Concepts,The OSI Security Architecture, Security Attacks, Security Services, Security mechanism, Fundamental Security Design Principles, Attack Surface and Attack trees, A Model for Network Security.
Introduction to Cybercrime, Cybercrime and Information Security, Classification of Cybercrimes,

Cybercrime: The Legal Perspective, Cybercrime: An Indian Perspective.

UNIT–II
Introduction to Cyber offence, How Criminal plan the attack, Social Engineering, Cyber stalking, Cybercafé and cybercrime, Botnets: The fuel of cybercrime, Attack vector, cloud computing.
Cybercrime: Mobile and Wireless devices, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Setting for Mobile Devices, Authentication Service Security, Attack on Mobile Phones.

UNIT–III
Tools and Methods Used in Cybercrime, Proxy Server and Anonymizers, Phishing and Identity Theft, Password Cracking, Keylogger and Spyware, Virus and Worms, Trojan Horse and Backdoors, Steganography DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attack on Wireless Networks.

UNIT–IV
Cybercrime and the Legal Landscape around the World, Why Do We Need Cyber laws, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Information Technology Act, Digital Signature and the IT Act, Cybercrime and Punishment.
Introduction to Cyber Forensics, Historical Background of Cyber Forensics, Cyber Forensics and Digital Evidence, Forensic Analysis of E-Mail, Digital Forensic Life Cycle, Approaching Computer Forensic Investigation, Relevance of OSI Model to Computer Forensic, Challenges in Computer Forensic.

UNIT–V
Network Access Control and Cloud Security, Transport- Level Security, Wireless Network Security, Electronic Mail Security, IP Security.

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security: Principles and Practice",7th EditionPearson,2017
2. Sunit Belapure, Nina Godbole"Cyber Security",1st edition, Wiley Publication, 2011

REFERENCES:
1. Carl Endorf, Eugene Schultz, Jim Mellander"Intrusion Detection&Prevention",1stEdition,TMH,2007
2. Neal, Krawetz, Introduction to Network Security,1st Edition ,Cengage Learning,2006
3. AtulKahate,"Cryptography and Network Security",McGraw Hill,,2009
4. Charlie Kaufman, Radia Perlman, Mike Speciner, Michael Speciner, " Network Security - Private communication in a public world" ,2nd Edition,TMH,2002

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5. Fourozon, "Cryptography & Network Security" 4thEdition ,TMH,2005
6. MayankBhushan "Fundamentals of Cyber Security",1st Edition ,BPB Publication,2017
7. GauravGupta,Sarika Gupta "Information Security and Cyber Laws",1st Edition,Khanna Book Publishing,2011

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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*				
BTIT505	UG	COMPONENT TECHNOLOGY	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. 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.

REFERENCES:
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 EXPERIMENTS:

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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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*				
BTCC505	UG	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;
*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. 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

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.

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*				
BTCS511	UG	ARTIFICIAL INTELLIGENCE	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. Know how to build simple knowledge-based systems.
2. Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms).
3. Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems.
4. An ability to use current techniques, skills, and tools necessary for computing practice

COURSE OUTCOMES:
1. Upon completion of the subject, students will be able to:
2. Describe the key components of the artificial intelligence (AI) field and its relation and role in Computer Science;
3. Identify and describe artificial intelligence techniques, including search heuristics, knowledge representation, automated planning and agent systems, machine learning, and probabilistic reasoning;
4. Identify and apply AI techniques to a wide range of problems, including complex problem solving via search, knowledge-base systems, machine learning, probabilistic models, agent decision making, etc.;
5. Design and implement appropriate AI solution techniques for such problems;
6. Analyze and understand the computational trade-offs involved in applying different AI techniques and models.
7. Communicate clearly and effectively using the technical language of the field correctly.

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SYLLABUS

UNIT–I
Introduction To Al And Production Systems:
Introduction to AI-Problem formulation, Problem Definition Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics –Specialized productionsystem- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.

UNIT–II
REPRESENTATION OF KNOWLEDGE
Knowledge Representation Issues: Representations and Mappings, Approaches to Knowledge Representation.Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation ofknowledge.

UNIT–III
KNOWLEDGE INFERENCE
Knowledge Inference -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

UNIT IV
PLANNING AND MACHINE LEARNING
Basic plan generation systems - Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.
Game Playing: Overview, And Example Domain : Overview, Mini-Max, Alpha-Beta Cut-off, Refinements, Iterative deepening, The Blocks World, Components Of A Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques.

UNIT–V
EXPERT SYSTEMS
Expert Systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.

TEXT BOOKS:
1. Rich E and Knight K, Artificial Intelligence, TMH New Delhi.
2. Nelsson N.J., Principles of Artificial Intelligence, Springer Verlag, Berlin.
3. Kos Ko B, Neural Networks and Fuzzy system –PHI.

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REFERENCES:

1. Neural Network, Fuzzy Logic, and Genetic Algorithms - Synthesis and Applications", by S. Rajasekaran and G.A. VijayalaksmiPai, (2005), Prentice Hall, Chapter 1-15, page 1-435.
2. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig, (2002), Prentice Hall, Chapter 1-27, page 1-1057.
3. Waterman D.A., A guide to Expertsystem, Adision - Wesley, Reading
4. Artificial Intelligence Hand book, Vol. 1-2, ISA, Research Triangle Park.
5. Haykin S, Artificial Neural Networks-Comprehensive Foundation, Asea, Pearson.
6. Barr A, Fergenbaub E.A. and Cohen PR. Artificial Intelligence, Addison Wesley, Reading

LIST OF EXPERIMENTS:

1. Write a program to implement Tic-Tac-Toe game problem.
2. Write a program to implement BFS (for 8 puzzle problem or Water Jug problem or any AI search problem).
3. Write a program to implement DFS (for 8 puzzle problem or Water Jug problem or any AI search problem)
4. Write a program to implement Single Player Game (Using Heuristic Function)
5. Write a program to Implement A* Algorithm.
6. Write a program to solve N-Queens problem.
7. Write a program to solve 8 puzzle problems.
8. Write a program to solve travelling salesman problem.

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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*				
BTIT611	UG	INFORMATION STORAGE AND MANAGEMENT	60	20	20	30	20	3	1	2	5

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:
1. An ability to understand various storage architecture & technologies.
2. An ability to understand various technologies used to provide backup & recovery.
3. An ability to understand various techniques used to provide security.
4. Ability to identified information storage system requirements.
5. An ability to develop policy for information storage system.
6. An ability to develop policy for backup& recovery.

COURSE OUTCOMES:
 On completion of the course students will be able to:
1. Describe & apply storage technologies.
2. Identified storage technologies that provide cost effective IT solution for medium to large scale businesses& data centers.
3. Manage Virtual Server & Storage between Remote locations.
4. Design analysis and manage clusters of resources.

Syllabus

Unit-I:
Introduction: Digital data and its types, Information storage, Key characteristics of data center, Evolution of computing platforms. Introduction to storage technology: Data Proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Information life Cycle Management, Data categorization.

Unit-II:

Storage System Architecture: Intelligent disk subsystems overview, Contrast of integrands modular array, Component Architecture of Intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

Unit-III:

Introduction to network storage: JBOD, DAS, NAS, SAN & CAS evolution and comparison, Applications, Elements, Connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN

Unit-IV:

Hybrid storage solutions and virtualization: memory, network, server, storage & appliances. Data centre concepts & requirements, Backup and disaster recovery. Industry Management standards, standard framework applications, Key management metrics.

Unit-V:

Information storage on clouds: concept of cloud, cloud computing, storage on cloud, Cloud benefits, Cloud computing evolution. Application & services on cloud, cloud service providers, cloud deployment models, Essential characteristics of cloud computing.

TEXT BOOK:
1. G. Somasundaram&AlokShrivastava editors, ISM: Storing, Managing, and Protecting Digital Information; Wiley India

REFERENCES:
1. Saurabh; Cloud Computing : Insight into New era Infrastructure; Wiley India.
2. Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein; Storage Network explained: Basic and application of fiber channels, SAN, NAS, ISESI, INFINIBAND and FCOE, Wiley India.
3. Sosinsky, Cloud Computing Bible, Wiley India.

List of Experiments:
1. Install The VNXE Simulator
2. Discover The Infrastructure
3. Navigate The Storage System
4. Create A Block Device
5. Create A File Device
6. Fc San Configuration
7. Fc San Trace
8. IP San Configuration
9. ISCSI San Trace

10. Multipath Array-Based Protection
11. Configuring LUN Protection Monitoring and Reporting.

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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*				
BTCS613	UG	SOFTWARE TESTING & QUALITY ASSURANCE	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. 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.

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SEMESTER VI

SYLLABUS

UNIT–I
BASIC CONCEPTS: Basic Testing Vocabulary, Quality Assurance versus Quality Control, The Cost of 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-acceptance testing-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.
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 Career 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 http://www.tutorialspoint.com/uml/

LIST OF EXPERIMENTS:

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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SEMESTER VI

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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*				
BTIT606	UG	MINOR PROJECT	-	-	-	30	20	-	-	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 skills will 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:

➢ 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.

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- **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 behaviour 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.

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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
- 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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