Shri Vaishnav Vidyapeeth Vishwavidyalaya

B. Tech. (CSE with specialization in Information and Cyber Security)

Choice Based Credit System (CBCS) 2018-19

SEMESTER VII

SUBJECT CODE	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
		THEORY			PRACTICAL		L	T	P	CREDITS
		END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BBAI501	Human Values and Professional Ethics	60	20	20	0	0	4	0	0	4

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

Course Objectives

The objective of the course is to disseminate the theory and practice of moral code of conduct and familiarize the students with the concepts of "right" and "good" in individual, social and professional context

Course Outcomes

1. Help the learners to determine what action or life is best to do or live.
2. Right conduct and good life.
3. To equip students with understanding of the ethical philosophies, principles, models that directly and indirectly affect business.

COURSE CONTENT

Unit I: Human Value

1. Definition, Essence, Features and Sources
2. Sources and Classification
3. Hierarchy of Values
4. Values Across Culture

Unit II: Morality

1. Definition, Moral Behavior and Systems
2. Characteristics of Moral Standards
3. Values Vs Ethics Vs Morality
4. Impression Formation and Management

Unit III: Leadership in Indian Ethical Perspective.

1. Leadership, Characteristics
2. Leadership in Business (Styles), Types of Leadership (Scriptural, Political, Business and Charismatic)
3. Leadership Behavior, Leadership Transformation in terms of Shastras (Upanihads, Smritis and Manu-smriti).

Unit IV: Human Behavior – Indian Thoughts

1. Business Ethics its meaning and definition
2. Types, Objectives, Sources, Relevance in Business organizations.
3. Theories of Ethics, Codes of Ethics

Unit V: Globalization and Ethics

1. Sources of Indian Ethos & its impact on human behavior
2. Corporate Citizenship and Social Responsibility – Concept (in Business),
3. Work Ethics and factors affecting work Ethics.

Suggested Readings

1. Beteille, Andre (1991). ***Society and Politics in India***. AthlonePress:New Jersey.
2. Chakraborty, S. K. (1999). ***Values and Ethics for Organizations***. oxford university press
3. Fernando, A.C. (2009). ***Business Ethics - An Indian Perspective*** **.**India: Pearson Education: India
4. Fleddermann, Charles D. (2012). ***Engineering Ethics***. New Jersey: Pearson Education / Prentice Hall.
5. Boatright, John R (2012). ***Ethics and the Conduct of Business.***Pearson. Education: New Delhi.
6. Crane, Andrew and Matten, Dirk (2015). ***Business Ethics***. Oxford University Press Inc:New York.
7. Murthy, C.S.V. (2016). Business ***Ethics – Text and Cases***. Himalaya Publishing House Pvt. Ltd:Mumbai
8. Naagrajan, R.R (2016). ***Professional Ethics and Human Values***. New Age International Publications:New Delhi.

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B. Tech. (CSE with specialization in Information and Cyber Security)

Choice Based Credit System (CBCS) 2018-19

SEMESTER VII

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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*				
BTCS601	-	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:

- To introduce the major concept areas of language translation and compiler design
- To enrich the knowledge in various phases of compiler and its use
- To provide understanding of steps of programming necessary for constructing a compiler

Course Outcomes:

- Ability to apply the knowledge of lex tool &yacc tool to develop a scanner & parser
- Ability to design and develop software system for backend of the compiler
- Ability to comprehend and adapt to new tools and technologies in compiler design

Syllabus

Unit – I:

Introduction: Compiler, 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 and 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: Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate languages**,** Declarations, Assignment Statements, Boolean Expressions, Case Statements, Three Address code, Back patching, Procedure calls.

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.

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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 Quadruple.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

B. Tech. (CSE with specialization in Information and Cyber Security)

Choice Based Credit System (CBCS) 2018-19

SEMESTER VII

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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*				
BTCS702	-	**BIG DATA AND HADOOP**	60	20	20	30	20	3	0	2	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 objectives of this course are to make the students to:

1. Introduce students to Big Data Analysis using hadoop
2. Introduce to Hadoop Eco System, HDFS, commands, management and map reduce.
3. Understating machine learning concept and Introduce JAQL, pig and HIVE
4. Data stream, partitioning, debugging and toolkits

Course Outcomes:

At the end of the course, students shall be able to:

1. Install Hadoop, configure HDFS, Install Zookeeper , Pig Installation, Sqoop Installation, Hbase Installation run commands
2. Use Zookeeper , Sqoop, Hbase, JAQL, PIG & HIVE
3. Use BigInsite, data streams, partitioning and other toolkits
4. appreciate the influence of big data for business decisions and approach

Syllabus:

UNIT I

Introduction about big data ,Describe details Big data: definition and taxonomy , explain Big data value for the enterprise , Setting up the demo environment ,Describe Hadoop Architecture , Hadoop Distributed File System, MapReduce & HDFS , First steps with the Hadoop , Deep to understand the fundamental of MapReduce

UNIT II -

Hadoop ecosystem, Installing Hadoop Eco System and Integrate With Hive Installation , PigInstallation ,Hadoop , Zookeeper Installation , Hbase Installation , , Sqoop Installation, Installing Mahout Introduction to Hadoop , Hadoop components: MapReduce/Pig/Hive/HBase, Loading data into Hadoop, Getting data from Hadoop.

UNIT III

Using Hadoop to store data, Learn NoSQL Data Management, Querying big data with Hive, Introduction to the SQL Language , From SQL to HiveQL , Querying big data with Hive, Introduction to HIVE e HIVEQL, Using Hive to query Hadoop files. Moving the Data from RDBMS to Hadoop , Moving the Data from RDBMS to Hbase , Moving the Data from RDBMS to Hive

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UNIT IV

Machine Learning Libraries for big data analysis,Machine Learning Model Deployment, Machine learning tools , Spark &SparkML , H2O , Azure ML.

UNIT V

Monitoring The HadoopCluster , Monitoring Hadoop Cluster, Monitoring Hadoop Cluster with Nagios , Monitoring Hadoop Cluster, Real Time Example in Hadoop , Apache Log viewer Analysis , Market Basket AlgorithmsBig Data Analysis in Practice , Case Study , Preparation of Case Study Report and Presentation , Case Study Presentation

Text Books:

1. Tom White," Hadoop: The Definitive Guide Paperback – 2015" Shroff Publishers & Distributers Private Limited - Mumbai; Fourth edition (2015).
2. V. K. Jain (Author)," Big Data and Hadoop" Khanna Publishers; 1 edition (1 June 2015)
3. Jason Bell (Author) "Machine Learning for Big Data: Hands-On for Developers and Technical Professionals" Wiley (2014)
4. Big Data Analytics &Hadoop by IBM ICE Publications

References:

1. Big data. Architettura, tecnologie e metodi per l'utilizzo di grandibasi di dati, A. Rezzani, Apogeo Education, 2013
2. Hadoop For Dummies, Dirk deRoos, For Dummies, 2014
3. Cohen et al."MAD Skills: New Analysis Practices for Big Data", 2009
4. Ullman, Rajaraman, Mining of Massive Datasets, Chapter 2
5. Stonebraker et al., "MapReduce and Parallel DBMS's: Friends or Foes?", Communications of the ACM, January 2010.
6. Dean and Ghemawat, "MapReduce: A Flexible Data Processing Tool", Communications of the ACM, January 2010.

List of Practical's:

1. Installing Hadoop, configure HDFS, Install Zookeeper , Pig Installation, Sqoop Installation, Hbase Installation
2. Configuring Hadoop
3. Running jobs on Hadoop
4. Working on HDFS
5. Hadoop streaming
6. Creating Mapper function using python.
7. Creating Reducer function using python
8. Python iterator and generators
9. Twitter data sentimental analysis using Flume and Hive
10. Business insights of User usage records of data cards
11. Wiki page ranking with hadoop
12. Health care Data Management using Apache Hadoop ecosystem

Shri Vaishnav Vidyapeeth Vishwavidyalaya

B. Tech. (CSE with specialization in Information and Cyber Security)

Choice Based Credit System (CBCS) 2018-19

SEMESTER VII

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTICS701	=	Mobile and Cloud Security	2	0	2	3	60	20	20	30	20

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:

1. To understand modern trend of cloud and mobile computing security.
2. to acquire knowledge about the methodology followed in developing secure computing applications

Course Outcomes:

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

1 Research in the field of mobile and cloud security and privacy.
2 Generalize the Data Centre operations, encryption methods and deployment details.
3 Provide recommendations for using and managing the customer's identity and choose the type of virtualization to be used.
4 Understand the Mobile platform security models and Mobile Commerce Security.
5 Design secured cloud and mobile networks that optimize accessibility whilst minimizing vulnerability to security risks

Syllabus:

UNIT I - Cloud Computing Security Architectural Framework:

Cloud Benefits, Business scenarios, Cloud Computing Evolution, cloud vocabulary, Essential Characteristics of Cloud Computing, Cloud deployment models, Cloud Service Models, Multi- Tenancy, Approaches to create a barrier between the Tenants, cloud computing vendors, Cloud Computing threats, Cloud Reference Model, The Cloud Cube Model, Security for Cloud Computing, How Security Gets Integrated.

UNIT II - Mobile Security Framework:

Mobile system architectures, Overview of mobile cellular systems, GSM and UMTS Security architecture & Attacks, Vulnerabilities in Cellular Services, Cellular Jamming, Attacks & Mitigation, Security in Cellular VoIP Services, Mobile application security.

UNIT III - Mobile platform security models and Mobile Commerce Security:

Android, iOS Mobile platform security models, Detecting Android malware in Android markets, Reputation and Trust, Intrusion Detection, Vulnerabilities, Analysis of Mobile commerce platform, secure authentication for mobile users, Mobile commerce security, payment methods, Mobile Coalition key evolving Digital Signature scheme for wireless mobile Networks.

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UNIT IV -Data Center Operations and security challenges:

Data Center Operations, Security challenge, Implement Five Principal Characteristics of Cloud Computing, Data center Security Recommendations. Encryption and Key Management: Encryption for Confidentiality and Integrity, Encrypting data at rest, Key Management Lifecycle, Cloud Encryption Standards, Recommendations.

UNIT V - Computing Paradigms:

Virtualization Vulnerabilities, Hypervisor Security-Related Issues, Side Channel Attacks, Data Segregation, ubiquitous, grid, cloud, pervasive, green, ad hoc (mobile, vehicular, flying) networks.

TEXT BOOKS:

1.Tim Mather, Subra Kumaraswamy, Shahed Latif, ―Cloud Security and Privacy, An Enterprise Perspective on Risks and Compliance‖, Oreilly Media 2009.
2. S. Kami Makki, Peter Reiher, Kia Makki, Niki Pissinou, Shamila Makki, "Mobile and Wireless Network Security and Privacy", Springer, ISBN 978-0-387-71057-0, 09-Aug2007.
3. Anurag Kumar, D. Manjunath, Joy Kuri "Wireless Networking" Morgan Kaufmann Publishers, First edition, 2009.

REFERENCE BOOKS:

1.Vic (J.R.) Winkler, ―Securing the Cloud, Cloud Computer Security Techniques and Tactics, Syngress, April 2011.
2. C. Siva Ram Murthy, B.S. Manoj, "Adhoc Wireless Networks Architectures and Protocols", Prentice Hall, ISBN 9788131706885, 2007
3. Noureddine Boudriga, "Security of Mobile Communications", ISBN 9780849379413,2010.
4. Kitsos, Paris; Zhang, Yan, "RFID Security Techniques, Protocols and System-On-Chip Design ", ISBN 978-0-387-76481-8, 2008.
5. Johny Cache, Joshua Wright and Vincent Liu," Hacking Wireless Exposed:Wireless Security Secrets & Solutions ", second edition, McGraw Hill, ISBN: 978-0-07-166662-6,2010.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

B. Tech. (CSE with specialization in Information and Cyber Security)

Choice Based Credit System (CBCS) 2018-19

SEMESTER VII

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTICS702	-	Cyber Investigation and Digital Forensic	2	1	0	3	60	20	20	0	0

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:

1. To understand the Cyber Crime Investigation, digital evidence and cyber trails.
2. Understand key terms and concepts in cyber law, intellectual property and cyber crimes, trademarks and domain theft.
3. Determine computer technologies, digital evidence collection, and evidentiary reporting in forensic acquisition.
4. Secure both clean and corrupted systems, protecting personal data, securing simple computer networks, and safe Internet usage.

Course Outcomes:

Upon completion of the subject, students will be able to:
1 Analyze the Digital evidence in real time applications.
2 Analyze the nature and effect of cybercrime in society.
3 Interpret the basic concepts how to Handling the digital crime scene, digital evidence examination guidelines.
4 Analyze Computer Crime and Criminals and Liturgical Procedures.
5 Apply the laws and regulations to the applications
6 Analyse the email tracking cyber applications

Syllabus:

UNIT I - Forensics Overview:

Computer Forensics Fundamentals, Benefits of Computer Forensics, Computer Crimes, Computer Forensics Evidence and the Courts, Legal Concerns and Privacy Issues

UNIT II - Introduction to Digital Forensics:

Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics,Biometric Security.

UNIT III - Forensics Process:

Forensics Investigation Process, Securing the Evidence and Crime Scene, Chain of Custody, Law Enforcement Methodologies, Forensics Evidence, Evidence Sources. Evidence Duplication, Preservation, Handling, and Security, Forensics Soundness, Order of Volatility of Evidence, Collection of Evidence on a Live System, Court Admissibility of Volatile Evidence

UNIT IV - Acquisition and Duplication:

Sterilizing Evidence Media, Acquiring Forensics Images, Acquiring Live Volatile Data, Data Analysis, Metadata Extraction, File System Analysis, Performing Searches, Recovering Deleted, Encrypted, and Hidden files, Internet Forensics, Reconstructing Past Internet Activities and Events, E-mail Analysis, Messenger Analysis: Yahoo, MSN, Gmail Chats.

UNIT V - Mobile Device Forensics:

Evidence in Cell Phone, PDA, Blackberry, iPhone, iPod, and MP3. Evidence in CD, DVD, Tape Drive, USB, Flash Memory, Digital Camera, Court Testimony, Testifying in Court, Expert Witness Testimony, Evidence Admissibility

Text Books:

1. Jason Luttgens, Matthew Pepe, Kevin Mandia, Incident Response & Computer Forensics, McGraw-Hill Osborne Media, 3rd edition , 2014.
2. Keith J. Jones, Richard Bejtlich, Curtis W. Rose, Real Digital Forensics: Computer Security and Incident Response, Paperback – Import, 2005.

References:

1. John Sammons, The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics Paperback, February 24, 2012.
2. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, JoelScambray and George Kurtz, McGraw-Hill, 2005.

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SEMESTER VII

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS711	=	Soft computing	60	20	20	0	0	2	1	0	3

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 (04-05)

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

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.

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B. Tech. (CSE with specialization in Information and Cyber Security)

Choice Based Credit System (CBCS) 2018-19

SEMESTER VII

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

.

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

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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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS715	-	Quantum Computing	60	20	20	0	0	2	1	0	3

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 objective of this course is to impart necessary knowledge to the learner so that he/she can develop and implement algorithm and write programs using these algorithm.

COURSE OUTCOMES
Upon completion of the subject, students will be able to:
1. Explain the working of a Quantum Computing program, its architecture and program model
2. Develop quantum logic gate circuits
3. Develop quantum algorithm
4. Program quantum algorithm on major toolkits

SYLLABUS

UNIT–I
Introduction to Quantum Computing: Motivation for studying Quantum Computing, Major players in the industry (IBM, Microsoft, Rigetti, D-Wave etc.), Origin of Quantum Computing, Overview of major concepts in Quantum Computing: Qubits and multi-qubits states, Bra-ket notation, Bloch Sphere representation, Quantum Superposition, Quantum Entanglement.

UNIT–II
Math Foundation for Quantum Computing: Matrix Algebra: basis vectors and orthogonality, inner product and Hilbert spaces, matrices and tensors, unitary operators and projectors, Dirac notation, Eigen values and Eigen vectors.

UNIT–III
Building Blocks for Quantum Program: Architecture of a Quantum Computing platform, Details of q-bit system of information representation: Block Sphere, Multi-qubits States, Quantum superposition of qubits (valid and invalid superposition),Quantum Entanglement, Useful states from quantum algorithmic perceptive e.g. Bell State, Operation on qubits: Measuring and transforming using gates, Quantum Logic gates and Circuit: Pauli, Hadamard, phase shift, controlledgates, Ising, Deutsch, swap etc, Programming model for a Quantum Computing Program: Steps performed on classical computer, Steps performed on Quantum Computer, Moving data between bits and qubits.

UNIT–IV
Quantum Algorithms: Basic techniques exploited by quantum algorithms, Amplitude amplification, Quantum Fourier Transform, Phase Kick-back, Quantum Phase estimation, Quantum Walks, Major Algorithms: Shor's Algorithm, Grover's Algorithm, Deutsch's Algorithm, Deutsch -Jozsa Algorithm,

UNIT–V

OSS Toolkits for implementing Quantum program: IBM quantum experience, Microsoft Q, Rigetti PyQuil (QPU/QVM)

TEXT BOOKS:

1. Michael A. Nielsen, "Quantum Computation and Quantum Information", Cambridge University Press.
2. David McMahon, "Quantum Computing Explained", Wiley.
3. IBM Experience:
https://quantumexperience,ng,bluemix.net
4. Microsoft Quantum Development Kit
https://www.microsoft.com/en-us/quantum/development-kit
5. Forest SDK PyQuil:
https://pyquil.readthedocs.io/en/stable/

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Choice Based Credit System (CBCS) 2018-19

SEMESTER VII

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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*				
BTCS716	-	Virtual Reality	60	20	20	0	0	2	1	0	3

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 objective of this course is to provide a detailed understanding of the concepts of Virtual Reality and its applications.

COURSE OUTCOMES
Upon completion of the subject, students will be able to:
1. Understand geometric modelling and Virtual environment.
2. Study about Virtual Hardware and Software
3. Develop Virtual Reality applications.

SYLLABUS

UNIT–I
Introduction to Virtual Reality: Virtual Reality and Virtual Environment: Introduction, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark.
3D Computer Graphics: Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, 3D clipping, Colour theory, Simple 3D modelling, Illumination models, Reflection models, Shading algorithms, Radiosity, Hidden Surface Removal, Realism-Stereographic image.

UNIT–II
Geometric Modeling: Geometric Modeling: Introduction, From 2D to 3D, 3D space curves, 3D boundary representation.
Geometrical Transformations: Introduction, Frames of reference, Modeling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection.
Generic VR system: Introduction, Virtual environment, Computer environment, VR technology, Model of interaction, VR Systems.

UNIT–III
Virtual Environment: Animating the Virtual Environment: Introduction, The dynamics of numbers, Linear and Nonlinear interpolation, the animation of objects, linear and non-linear translation, shape & object inbetweening, free from deformation, particle system.
Physical Simulation: Introduction, Objects falling in a gravitational field, Rotating wheels, Elastic collisions, projectiles, simple pendulum, springs, Flight dynamics of an aircraft.

UNIT–IV

VR Hardware and Software: Human factors: Introduction, the eye, the ear, the somatic senses.
VR Hardware: Introduction, sensor hardware, Head-coupled displays, Acoustic hardware, Integrated VR systems.
VR Software: Introduction, Modelling virtual world, Physical simulation, VR toolkits, Introduction to VRML

UNIT–V

VR Applications: Introduction, Engineering, Entertainment, Science, Training.
The Future: Virtual environment, modes of interaction

TEXT BOOKS & REFERENCES:

1. John Vince, "Virtual Reality Systems ", Pearson Education Asia, 2007.
2. Anand R., "Augmented and Virtual Reality", Khanna Publishing House, Delhi.
3. Adams, "Visualizations of Virtual Reality", Tata McGraw Hill, 2000.
4. Grigore C. Burdea, Philippe Coiffet , "Virtual Reality Technology", Wiley Inter Science, 2nd Edition, 2006.
5. William R. Sherman, Alan B. Craig, "Understanding Virtual Reality: Interface, Application and Design", Morgan Kaufmann, 2008.
6. www.vresources.org
7. www.vrac.iastate.edu
8. www.w3.org/MarkUp/VRM

Shri Vaishnav Vidyapeeth Vishwavidyalaya

B. Tech. (CSE with specialization in Information and Cyber Security)

Choice Based Credit System (CBCS) 2018-19

SEMESTER VII

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*				
BTCS706	=	Project	-	-	-	120	80	-	-	8	4

Guideline and instruction for Project

S.No	Particular
1.	Group formation and Submission of Project Topic (At least three(03))
2.	Guide allotment and Topic Finalization
3.	Presentation –I Contents: 1. Problem Domain 2. Literature Survey 3. Feasibility Study 4. References
4.	Synopsis Submission
5.	Presentation – II Contents: 1. SRS / URD 2. Conceptual Design
6.	Presentation – III Contents: 1. Detail Design 2. Implementation & Test Plan
7.	Project Report Submission

Chairperson
Board of Studies
(Computer Science & Engineering,
Information Technology & Computer Applications)
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore