Shri Vaishnav Vidyapeeth Vishwavidyalaya
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Bachelor of Technology (CSE- Artificial Intelligence and Machine Learning-Microsoft)
SEMESTER- VII

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BBAI501	AECC	Human Values and Professional Ethics	60	20	20	0	0	3	0	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 Educational Objectives (CEOs):

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 (COs):

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 Behaviour 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 Behaviour, 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 organisations.
3. Theories of Ethics, Codes of Ethics

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Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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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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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTAIML709N	DCC	Architecting AI Solution	60	20	20	30	20	3	0	2	4

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

1. To learn the concept of Architecting AI Solution
2. To get acquainted with UML Diagrams
3. To understand Architecting AI Solution

COURSE OUTCOMES:

1. Understand AI in Azure
2. Gain exposure to Building Speech-Enabled Applications,
3. To apply AI for projects

SYLLABUS

UNIT–I 10 HOURS

Introduction to AI on Azure, Introduction to AI. AI in Azure, Developing AI Apps with Cognitive Services, Using Cognitive Services for Enterprise Applications, Getting Started with Natural Language Processing, Analyzing Text, Translating Text.

UNIT–II 9 HOURS

Building Speech-Enabled Applications, Speech Recognition and Synthesis, Speech Translation, Creating Language Understanding Solutions, Creating a Language Understanding App, Publishing and Using a Language Understanding App, Using Language Understanding with Speech, Building a QnA Solution, Creating a QnA Knowledge Base, Publishing and Using a QnA Knowledge Base

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTAIML709N	DCC	Architecting AI Solution	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT–III **8 HOURS**

Conversational AI and the Azure Bot Service, Bot Basics, Implementing a Bot, Getting Started with Computer Vision, Analyzing Images, Analyzing Videos, Developing Custom Vision Solutions, Image Classification, Object Detection.

UNIT–IV **7 HOURS**

Detecting, Analyzing, and Recognizing Faces, Detecting Faces with the Computer Vision Service, Using the Face Service, Reading Text in Images and Documents, Reading text with the Computer Vision Service, Extracting Information from Forms with the Form Recognizer service,

UNIT–V **8 HOURS**

Creating a Knowledge Mining Solution, Implementing an Intelligent Search Solution . 115, Developing Custom Skills for an Enrichment Pipeline . 119, Creating a Knowledge Store,

TEXTBOOKS:

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTAIML709N	**DCC**	**Architecting AI Solution**	**60**	**20**	**20**	**30**	**20**	**3**	**0**	**2**	**4**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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REFERENCES:

LIST OF EXPERIMENTS:

Chairperson	Chairperson	Controller of Examination	Joint Registrar
Board of Studies	Faculty of Studies	Shri Vaishnav Vidyapeeth	Shri Vaishnav Vidyapeeth
Shri Vaishnav Vidyapeeth	Shri Vaishnav Vidyapeeth	Vishwavidyalaya,Indore	Vishwavidyalaya,Indore
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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS504N	**DCC**	**Internet of Things**	**60**	**20**	**20**	**30**	**20**	**3**	**0**	**2**	**4**

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

1. The objective of this course is to impart necessary and practical knowledge of components of Internet of Things and develop skills required to build real-life IoT based projects.

COURSE OUTCOMES

1. Upon completion of the subject, students will be able to:
2. Understand internet of Things and its hardware and software components
3. Interface I/O devices, sensors & communication modules
4. Remotely monitor data and control devices
5. Develop real life IoT based projects

SYLLABUS:

UNIT-I 10 HOURS

Introduction to IoT:Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing,Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices andgateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role ofCloud in IoT, Security aspects in IoT.

UNIT-II 9 HOURS

Elements of IoT:Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing,Actuation, I/O interfaces. Software Components- Programming API's (using Python/Node.js/Arduino) for Communication.Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

UNIT-III 8 HOURS

IoT Application Development:Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration.

UNIT-IV 7 HOURS

Device data storage: Unstructured data storage on cloud/local server,Authentication, authorization of devices.

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BTCS504N	**DCC**	**Internet of Things**	**60**	**20**	**20**	**30**	**20**	**3**	**0**	**2**	**4**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT–V **8 HOURS**

IoT Case Studies: IoT case studies and mini projects based on Industrial automation,Transportation, Agriculture,Healthcare, Home Automation

TEXTBOOKS:

1. Vijay Madisetti, ArshdeepBahga, İnternet of Things, “A Hands on Approach”, UniversityPress.
2. Dr. SRN Reddy, RachitThukral and Manasi Mishra, “Introduction to Internet of Things: ApracticalApproach”,ETI Labs.
3. Pethuru Raj and Anupama C. Raman, “The Internet of Things: Enabling Technologies,Platforms, and UseCases”, CRC Press
4. Jeeva Jose, “Internet of Things”, Khanna Publishing House, Delhi.
5. Adrian McEwen, “Designing the Internet of Things”, Wiley.
6. Raj Kamal, “Internet of Things: Architecture and Design”, McGraw Hill.
7. CunoPfister, “Getting Started with the Internet of Things”, O Reilly Media.

LIST OF PRACTICALS:

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LEDfor 1 sec after every2 seconds.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write aprogram to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to printtemperature and humidityreadings.
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ONmotor when pushbutton is pressed.
6. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature andhumidity readingson it.
7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor datato smartphone usingBluetooth.
8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to

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BTCS504N	**DCC**	**Internet of Things**	**60**	**20**	**20**	**30**	**20**	**3**	**0**	**2**	**4**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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9. turn LED ON/OFFwhen ‘1’/’0’ isreceived from smartphone using Bluetooth.
10. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data tothingspeak cloud.
11. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data fromthingspeak cloud.
12. To install MySQL database on Raspberry Pi and perform basic SQL queries.
13. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
14. Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature dataand print it.
15. Write a program to create TCP server on Arduino/Raspberry Pi and respond with humiditydata to TCP clientwhen requested.
16. Write a program to create UDP server on Arduino/Raspberry Pi and respond with humiditydata to UDP clientwhen requested.

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BTCS707N	SEC	Technical presentation skill	0	0	0	0	50	0	0	2	1

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Course Educational Objectives (CEOs):

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 Outcomes (COs):

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

GUIDELINES:

During the Presentation Session each student is expected to prepare and present a topic on engineering/technology, for 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.

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.

Chairperson	Chairperson	Controller of Examination	Joint Registrar
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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS707N	SEC	Technical presentation skill	0	0	0	0	50	0	0	2	1

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.

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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BTCS705N	SEC	Industrial Training	0	0	0	0	50	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Educational Objectives (CEOs):

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BTCS706N	SEC	Project	0	0	0	120	80	0	0	8	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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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 Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore	Chairperson Faculty of Studies Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore	Controller of Examination Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore	Joint Registrar Shri Vaishnav Vidyapeeth Vishwavidyalaya,Indore

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BTDSE711N	DSE	Soft Computing	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Educational Objectives (CEOs):

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 (COs):

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 machine 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

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BTDSE711N	DSE	**Soft Computing**	60	20	20	30	20	3	0	2	4

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

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:

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BTDSE711N	DSE	**Soft Computing**	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.

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 Practicals:

1. Implementation of Fuzzy Operations.
2 Implementation of Fuzzy Relations (Max-min Composition)
3 Implementation of Fuzzy Controller (Washing Machine)
4 Implementation of Simple Neural Network (McCulloh-Pitts model)
5 Implementation of Perceptron Learning Algorithm
6 Implementation of Unsupervised Learning Algorithm
7 Implementation of Simple Genetic Application
8 Study of ANFIS Architecture
9 Study of Derivative-free Optimization
10 Study of research paper on Soft Computing.

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SEMESTER- VII

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE715N	DSE	**Quantum Computing**	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Educational Objectives (CEOs):

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

Course Outcomes (COs):

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

1. Explain the working of a Quantum Computing program, its architecture and programmodel
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 playersin 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 Spherere presentation, Quantum Superposition, Quantum Entanglement.

UNIT–II

Math Foundation for Quantum Computing: Matrix Algebra: basis vectors and orthogonality, innerproduct and Hilbert spaces, matricesand 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 ofq-bit system of information representation:Block Sphere, Multi-qubits States, Quantum superpositionof 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, swapetc, 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

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BTDSE715N	DSE	**Quantum Computing**	60	20	20	30	20	3	0	2	4

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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, RigettiPyQuil (QPU/QVM)

TEXT BOOKS And REFERENCES:

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/.

List of Practicals:

1.Implementation of Qubits.
2. Visualization of Bloch Spherere.
3. Implementation of Shor's Algorithm.
4. Implementation of Grover's Algorithm.
5. Implementation of Deutsch's Algorithm.
6. Implementation of Deutsch -Jozsa Algorithm.

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BTDSE716N	DSE	**Virtual Reality**	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Educational Objectives (CEOs):

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

Course Outcomes (COs):

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, Computergraphics, Real time computergraphics, Flight Simulation, Virtual environment requirement, benefits ofvirtual 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, Colourtheory, Simple 3D modelling, Illumination models, Reflection models, Shading algorithms,Radiosity, Hidden Surface Removal, Realism-Stereographic image.

UNIT–II

Geometric Modelling: Geometric Modelling: Introduction, From 2D to 3D, 3D space curves, 3Dboundary representation.
Geometrical Transformations: Introduction, Frames of reference, Modelling 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 Nonlinearinterpolation, the animation of objects, linear and non-linear translation, shape & objectinbetweening, free from deformation, particle system.
Physical Simulation: Introduction, Objects falling in a gravitational field, Rotating wheels,

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BTDSE716N	DSE	**Virtual Reality**	60	20	20	30	20	3	0	2	4

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Elasticcollisions, 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 And 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.

List of Practicals:
1. Study of tools like Unity, Maya, 3DS MAX, AR toolkit, Vuforia and Blender.
2. Use the primitive objects and apply various projection types by handling camera.
3. Download objects from asset store and apply various lighting and shading effects.
4. Model three dimensional objects using various modelling techniques and apply texturesover them.
5. Create three dimensional realistic scenes and develop simple virtual reality enabled mobileapplications which have limited interactivity.
6. Add audio and text special effects to the developed application.
7. Develop VR enabled applications using motion trackers and sensors incorporating fullhaptic

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BTDSE716N	**DSE**	**Virtual Reality**	60	20	20	30	20	3	0	2	4

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interactivity.
8. Develop AR enabled applications with interactivity like E learning environment, Virtualwalkthroughs and visualization of historic places.
9. Develop AR enabled simple applications like human anatomy visualization, DNA/RNAstructure visualization and surgery simulation.
10. Develop simple MR enabled gaming applications.

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Board of Studies	Faculty of Studies	Shri Vaishnav Vidyapeeth	Shri Vaishnav Vidyapeeth
Shri Vaishnav Vidyapeeth	Shri Vaishnav Vidyapeeth	Vishwavidyalaya,Indore	Vishwavidyalaya,Indore
Vishwavidyalaya,Indore	Vishwavidyalaya,Indore		

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BTDSE717N	DSE	**Computer Graphics and Multimedia**	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Educational Objectives (CEOs):

The student will have ability to:
1. Understood basic concepts of computer graphics.
2. Extract the various computer graphics hardware and display technologies.
3. Evaluate various algorithms for scan conversion and filling of basic objects and their comparative analysis.
4. Acquire knowledge about drawing basic shapes such as lines, circle, ellipse, polygon.
5. Remembering knowledge about two- and three-dimensional transformations.
6. Analyze the line and polygon clipping algorithms of the basic shapes.
7. Understood the various Multimedia Operation and file formats.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes.
The students will be able to
1. Apply basic concepts of computer graphics.
2. Able to perform processing of basic shapes by various processing algorithms /techniques.
3. Design two and three-dimensional graphics.
4. Analyse all the types of clipping algorithms for line and polygon.
5. Apply the acquire knowledge about Visible Surface Detection methods, Illumination Models and Surface Rendering.
6. Able to perform various types of color model implication.
7. Acquire knowledge to apply advanced techniques such as fractals, introduction to open GL and Multimedia Systems.

Syllabus:

UNIT I **9HRS**

Introduction to Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, CRT color monitors,Beam Penetration CRT, The Shadow - Mask CRT, DVST, Graphics input devices, Graphics software and standards.

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BTDSE717N	DSE	**Computer Graphics and Multimedia**	60	20	20	30	20	3	0	2	4

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UNIT II **10HRS**

Points and Lines,DDA line drawing algorithm, Bresenham's drawing algorithm, Mid-point Circle drawing algorithm, Mid-point circle drawing algorithm, Mid-point Ellipse drawing algorithm, Parametric Cubic Curves: - Bezier and B-Spline curves, Filled Area Primitives: - Scan line polygon fill algorithm, Pattern fill algorithm Inside-Outside Tests, Boundary fill algorithms, Flood fill algorithms

UNIT III **10HRS**

2D transformation: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogenous coordinate system, Matrices Transformation, Composite Transformation.

3D transformations: translation, rotation, scaling. Parallel & Perspective Projection, Types of Parallel & Perspective Projection.Composite transformations Projections, Back Surface detection method Depth Buffer method Scan line method BSP tree method, Area Subdivision method.

UNIT IV **8HRS**

Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping, Cohen Sutherland, Midpoint Line clipping algorithms, Polygon Clipping: Sutherland –Hodgeman, Weiler-Atherton algorithms.
Basic Illumination Model, Diffuse reflection, Specular reflection, Phong Shading Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV.

UNIT V **9HRS**

Multimedia System: An Introduction, Multimedia hardware, Multimedia System Architecture. Data & File Format standards. i.e RTF, TIFF, MIDI, JPEG, DIB, MPEG, Audio: digital audio, MIDI, processing sound, sampling, compression. Video: Avi, 3GP, MOV, MPEG, compression standards, compression through spatial and temporal redundancy. Multimedia Authoring.

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SEMESTER- VII

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BTDSE717N	DSE	**Computer Graphics and Multimedia**	60	20	20	30	20	3	0	2	4

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Textbooks:

1. John F. Hughes, Andries Van Dam, Morgan Mc Guire ,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley ," Computer Graphics: Principles and Practice", , 3rd Edition, Addison- Wesley Professional,2013.
2. Donald Hearn and Pauline Baker M, "Computer Graphics", Prentice Hall, New Delhi, 2007.

References:

1. .Computer Graphics, C Version, 2e Paperback – 2002
2. Foley, Vandam, Feiner, Huges, "Computer Graphics: Principles & Practice ", Pearson Education, second edition 2003.
3. Judith Jeffcoate, "Multimedia in practice technology and Applications", PHI, 1998.
4. David F Rogers, "Procedural elements for Computer Graphics", Tata McGraw Hill, Second Edition.
5. Foley, VanDam, Feiner and Hughes, "Computer Graphics Principles & Practice in C", Second edition, Pearson Education.
6. David Hillmaa, "Multimedia Technology & Applications, Delmar, 1998.

List of Practical:

1. Implement DDA Line Drawing algorithm
2. Implement Bresenham's line drawing algorithm.
3. Implement Mid-Point circle drawing algorithm.
4. Implement Mid-Point ellipse drawing algorithm.
5. Implement cubic Bezier curve.
6. Implement a menu-driven program for 2D transformations.
7. Implement Line clipping algorithm using Cohen-Sutherland
8. Implement Polygon Clipping using Sutherland Hodgeman.
9. Implement Scan line fill algorithm.
10. Study of Multimedia and Program for Flash.

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BTCS602N	DSE	**Object Oriented Analysis and Design**	60	20	20	30	20	3	0	2	4

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

1. To learn the concept of Object-Oriented Software Development Process
2. To get acquainted with UML Diagrams
3. To understand Object Oriented Analysis Processes

COURSE OUTCOMES:

1. Understand Object Oriented Software Development Process
2. Gain exposure to Object Oriented Methodologies & UML Diagrams
3. To apply Object Oriented Analysis Processes for projects

SYLLABUS

UNIT-I 10 HOURS

Introduction: About Object Orientated Technology, Development and OO Modeling History. Modeling Concepts: Modeling design Technique, Three models, Class Model, State model and Interaction model.

UNIT-II 9 HOURS

Class Modeling: Object and class concepts, link and association, Generalization and Inheritance, Advanced class modeling- aggregation, Abstract class meta data, constraints. State Modeling:Event, state, Transition and conditions, state diagram, state diagram behavior, concurrency, Relation of Class and State models. Interaction Modeling:Use case Models, sequence models, activity models

UNIT-III 8 HOURS

Analysis and Design: Development Life cycle, Development stages, Domain Analysis-Domain class model, domain state model, domain interaction model, Iterating and analysis. Application Interaction model, Application class model, Application state Model, Adding operation.

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BTCS602N	DSE	**Object Oriented Analysis and Design**	60	20	20	30	20	3	0	2	4

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UNIT-IV **7 HOURS**

System Design: Estimating Performance, Making a reuse plan, breaking system into sub systems identifying concurrency, allocation of subsystems, management of data storage, Handling Global resources, choosing a software control strategy, Handling boundary condition, common Architectural style.

UNIT-V **8 HOURS**

Class design: Overview of class design, designing algorithms recursing downward, refactoring, design optimization, Adjustment of Inheritance, Rectification of Behavior.

TEXTBOOKS:

1. Michael Blaha and J. Rumbugh, "Object oriented Modeling and design with UML", Pearson Education

REFERENCES:

1. Satzinger, Jackson and Burd, "Object oriented Analysis and design with the Unified Process", CENGAGE Learning.
2. O' Docherty, " Object Oriented Analysis and Design Understanding, System Development with UML2.0", Wiley India.

LIST OF EXPERIMENTS

1. How to write a Problem Statement
2. Perform the system analysis: Requirement analysis, SRS.
3. Perform the function-oriented diagram: DFD and Structured chart.
4. Perform the user' s view analysis: Use case diagram.
5. Draw the structural view diagram: Class diagram, object diagram.
6. Draw the behavioral view diagram: Sequence diagram, Collaboration diagram.
7. Draw the behavioral view diagram: State-chart diagram, Activity diagram.
8. Draw the implementation view diagram: Component diagram.
9. Draw the environmental view diagram: Deployment diagram.