Shri Vaishnav Vidyapeeth Vishwavidyalaya

Name of Program: Bachelor of Technology in Electronics & Communication

(w.e.f. 2018)

SUBJECT CODE	CATEGORY	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*				
BTEC702	EC	Advanced Communication Systems	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:

1. To develop an understanding of OFDM and MIMO systems.
2. To enable the students to differentiate between various type of receiver and fading characteristics.
3. To provide the knowledge of cognitive and cooperative systems.

Course Outcomes:

The student will be able to:

1. Analyze MIMO and OFDM systems and design systems with different fading channels.
2. Understand the concepts of 5G and its technologies
3. Analyze the concept of cognitive and cooperative communication systems.

Syllabus:

UNIT I **8 Hrs.**

Introduction, principle of OFDM, implementation of transceivers, frequency-selective channels, channel estimation, peak to average power ratio, inter carrier interference, adaptive modulation and capacity, multiple access, Code division multiple access, multi carrier code division multiple access, single carrier modulation with frequency-domain equalization.

UNIT II **8 Hrs.**

Smart antennas, multiple input multiple output systems, spatial multiplexing, multi user MIMO, transmitter diversity, receiver diversity, Channel state information, MIMO System Model, Zero Forcing Receiver, MMSE receiver, Singular Value Decomposition of MIMO Channel, MIMO capacity, Asymptotic MIMO Capacity, Alamouti and Space-time codes.

UNIT III **9 Hrs.**

Introduction to 5G, 5G Requirements, 5G Technology, Massive MIMO and its advantages and challenges, Homogeneous and Heterogeneous Network Scenarios, Millimetre Communication Technology, millimetre wave Propagation characteristics and beamforming, Filter bank multi-carriers (FBMC) and Universal filtered multi-carrier (UFMC).

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

UNIT IV **8 Hrs**

Introduction and motivation for Cooperative Communication, fundamentals of relaying, relaying with multiple parallel relays, routing and resource allocation in multi hop networks, routing and resource allocation in collaborative networks, applications, network coding.

UNIT V **9 Hrs**

Cognitive Radios, Problem description, cognitive transceiver architecture, principle of interweaving, spectrum sensing, spectrum management, spectrum sharing, overlay, underlay. Primary user detection techniques – energy detection, feature detection, matched filtering, cooperative detection and other approaches, Spectrum Sharing Models of Dynamic Spectrum Access – Unlicensed and Licensed Spectrum Sharing, Fundamental Limits of Cognitive Radio.

Text Books:

1. David Tse, Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2011.
2. Aditya K. Jagannatham, "Principles of Modern Wireless Communication System", McGraw Hill, 1st Edition, 2017
3. Molisch, "Wireless Communications", Wiley India, 2nd Edition , 2013.
4.

References:

1. Gordon L. Stuber, "Principles of Mobile Communication", Springer International Ltd, 3rd Edition 2011.
2. Marvin K. Simon, Mohamed-Slim Alouini, "Digital Communication over Fading Channels", Wiley-IEEE Press, 2nd Edition., 2004.
3. Long Zhao, Hui Zhao, Kan Zheng and Wei Xiang, "Massive MIMO in 5G Networks: Selected Applications", Springer.

List of Experiments:

1. To study SIMULINK.
2. To study BerTool.
3. To implement SIMULINK model for BPSK
4. To implement SIMULINK model for QPSK
5. Implementation of CDMA
6. Implementation of orthogonal frequency division multiple access
7. To calculate the bit error rate for OFDM system.
8. Channel capacity of MIMO systems in Wireless communication.
9. Energy detection simulation for cognitive radio.
10. Water filling model in a MIMO system.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

BBAI501 HUMAN VALUES AND PROFESSIONAL ETHICS

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	-	-	4	-	-	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 Behaviour and Systems
2. Characteristics of Moral Standards
3. Values Vs Ethics Vs Morality
4. Impression Formation and Management

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

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

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***. Athlone Press: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.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Name of Program: Bachelor of Technology in Electronics & Communication

Specialization in IOT (w.e.f. 2018)

SUBJECT CODE	CATEGORY	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*				
BTEC723	EC	Advanced Microcontroller and Embedded Systems	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:

1. To teach programming for MSP432 using high level language such as C.
2. To teach students how a microcontroller can be used as a computer within a single integrated circuit.
3. To present the microcontrollers input/output interface capabilities for developing embedded systems with microcontrollers.
4. To illustrate how a microcontroller is a component within embedded systems controlling the interaction of the environment with system hardware and software.

Course Outcomes:

After successful completion of the course, student will be able:

1. To understand the generalized architecture of advanced microcontroller MSP432 and its programming.
2. To interface MSP432 with analog peripherals & communication systems.
3. To design an embedded system using MSP432 for a particular task.

Syllabus

UNIT I **9 Hrs**

Introduction to Microcontrollers & Embedded System

Background of Microcontrollers: Definition, Classification, Features & Applications, Architecture of Cortex M4 and its features, MSP–EXP432P401R and its Booster Packs, Energia: Development Environment, Libraries, Fundamental Programming Concepts.

Embedded System: Definition, Characteristics, Block diagram, Design Process, Case study: Weather monitoring system.

UNIT II **7 Hrs**

MSP432 Operating Parameters and Interfacing

Operating Parameters, Input Devices, Output Devices, High Power DC Interfaces, Interfacing to DC Devices, AC Devices, Educational Booster Pack Mk-II, Grove Starter Kit for LaunchPad Application.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

UNIT III **9 Hrs**

MSP432 Memory System and Power System

Memory System: Basic Memory Concepts, Memory Operations in C Using Pointers, Memory Map, Flash Memory, Direct Memory Access (DMA), External Memory: Bulk Storage with an MMC/SD Card.

Power Systems: Operating Modes and Speed of Operation, Power Supply System, Power Control Module, Operating Modes, Transition PSS and PCM Registers, Battery Operation.

UNIT IV **8 Hrs**

Time-Related Systems, Resets and Interrupts

Time-related Signal Parameters: Frequency, Period, Duty Cycle, MSP432 Clock System, Energia-related Time Functions, Watchdog Timer, Timer32, Timer A, Real-Time Clock, MSP432 Resets, Interrupts, MSP432 Interrupt System, Energia Interrupt.

UNIT V **9 Hrs**

Analog Peripherals & Communication Systems

Programming the MSP432 ADC System, Voltage Reference, Comparator, Serial Communication Concepts, MSP432 UART, Serial Peripheral Interface-SPI, Inter-Integrated Communication - I2C Module

Text Books:

1. Dung Dang, Daniel J. Pack, Steven F. Barrett, "Embedded Systems Design with the Texas Instruments MSP432 32-bit Processor" Morgan & Claypool Publisher, 2017.
2. Ying Bai, "Microcontroller Engineering with MSP432: Fundamentals and Applications" Taylor & Francis,CRC Press, 2017

References:

1. Chris Nagy, "Embedded Systems Design using the TI MSP430 Series" Newnes, 2003.
2. John H. Davies, "MSP430 Microcontroller Basics" Newnes, 2008.
3. Manuel Jiménez, Rogelio Palomera, Isidoro Couvertier, "Introduction to Embedded Systems: Using Microcontrollers and the MSP430" Springer, 2014.
4. Raj Kamal, "Embedded Systems: Architecture, Programming and Design" TMH, 2008.

List of Experiments:

1. Introduction to MSP–EXP432P401R Launch Pad, Code Composer Studio and Energia.
2. Interfacing LED using MSP432.
3. Interfacing 7-segment display to MSP432.
4. Interfacing dot-matrix display to MSP432.
5. Setting up communication interface using IR sensors.
6. Interfacing MSP432 with various sensors
7. Driving stepper motor using MSP432.
8. Interfacing memory to MSP432
9. Setting up wireless communication Network.
10. Setting up IoT link for various sensors using MSP432.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in the Light of NEP-2020
B.Tech. in Robotics and Automation w.e.f. 2024

SUBJECT CODE	Category	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*				
BTECIOT711	EC	Principles of Artificial Intelligence and Machine Learning	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 on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
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.

Course Outcomes (COs):
Upon completion of the subject, students will be able to:
1. Describe the key components of the artificial intelligence (AI) field.
2. Identify and describe artificial intelligence techniques, including search heuristics, knowledge representation, automated planning and agent systems, machine learning, and probabilistic reasoning.
3. 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.
4. Analyze and understand the machine learning and various algorithms

Syllabus:

UNIT I **7 Hrs.**

Introduction To AI

Introduction to AI, Problem formulation, 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.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Chairperson
Faculty of Studies
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Controller of Examinations
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

UNIT II **6 Hrs.**

Representation of knowledge

Knowledge Representation Issues: Representations and Mappings, Approaches to Knowledge Representation. Knowledge representation using Predicate logic, Knowledge representation using other logic, Structured representation of knowledge.

UNIT III **7 Hrs.**

Knowledge inference

Knowledge Inference, Production based system, Frame based system. Inference, Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning, Certainty factors, Bayesian Theory.

UNIT IV **8 Hrs.**

Machine Learning (ML)

Types of ML, Supervised ML. Unsupervised ML, Semi Supervised ML. Reinforcement ML. Regression Algorithms: Simple Linear Regression, Multiple Regression, Polynomial Regression, Support Vector Regression SVR, Decision Tree Regression, Random Forest Regression.

UNIT V **7 Hrs.**

Classification of Algorithms

Supervised ML: K Nearest Neighbours, Support Vector Machine (SVM), Kernel SVM, Decision Trees Classification, Random Forest Classification, Semi-supervised learning with EM using labeled and unlabeled data, Unsupervised Learning: Dimension Reductionality, PCA and LDA, clustering and Association algorithm.

Text books:

1. Rich E and Knight K, "Artificial Intelligence", Third Edition, TMH, 2017.
2. Nelsson N.J., "Principles of Artificial Intelligence", First Edition, Springer Verlag, Berlin.
3. Oliver Theobald, "Machine Learning for Absolute Beginners: A Plain English Introduction", 2nd Edition, 2017.

Reference Books:

1. S. Rajasekaran and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Systems and Evolutionary Algorithms: Synthesis and Applications, 2nd ed., PHI Learning, 2017.
2. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, 4th ed. Harlow, UK: Pearson, 2020.
3. E. Alpaydin, Introduction to Machine Learning, 4th ed. Cambridge, MA, USA: The MIT Press, 2020.

List of Experiments

1. Implement Depth First Search (DFS) and Breadth First Search (BFS) for a simple graph using Python.
2. Apply Hill Climbing Algorithm to find the maximum of a mathematical function.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Chairperson
Faculty of Studies
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Controller of Examinations
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

3. Represent Knowledge using Propositional and Predicate Logic with simple Python examples.
4. Develop a Rule-Based Expert System (e.g., suggesting fruits based on color/taste).
5. Implement Forward Chaining to derive new facts from a set of rules and facts.
6. Implement Backward Chaining for problem-solving in Python.
7. Apply Bayes' Theorem to solve a simple probabilistic inference problem (e.g., medical diagnosis).
8. Implement Linear Regression using scikit-learn on a small dataset.
9. Classify Data using K-Nearest Neighbors (KNN) (e.g., Iris dataset classification).
10. Build a Decision Tree Classifier for a simple dataset (e.g., predicting student pass/fail from marks).

Shri VaishnavVidyapeethVishwavidyalaya, Indore
Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in the Light of NEP-2020
B. Tech. EC w.e.f. 2023

COURSE CODE	CATE GORY	COURSE 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*				
BTEC702	EC	Optical & Satellite Communication	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 (CEOs):

1. The objective of this course is to have an introduction of optical and satellite communication with an increased emphasis on the various optical sources, detectors, amplifiers, test equipments & components.
2. Students will also get to know about the detailed working of satellite transmission & its applications.
3. This course will enable the students to understand the fundamentals of optical communication and detailed working of satellites.

Course Outcomes (COs):

The students will be able to:

1. Classify optical components, test equipment, source and detector & their characteristics.
2. Analyze various optical amplifiers and understand advance optical fiber systems.
3. Understand space segment of satellite & its link design.
4. Understand earth segment and the satellite applications.

Syllabus

UNIT I

Overview of Optical Fiber Communication: Elements of an optical Fiber transmission link, WDM, Light emitting diode (LEDs) structures, materials, Figure of merits, characteristics & Modulation. Laser Diodes: Modes & threshold conditions, Diode Rate equations, resonant frequencies, characteristics and figure of merits.

UNIT II

Optical Amplifier & Advances in Optical Fiber Systems: Semiconductor optical Amplifier, EDFA, Raman Amplifier, Wideband Optical Amplifiers, Principles of WDM, DWDM, Telecommunications & broadband application, SONET/SDH, MUX, Analog & Digital broadband, optical switching.

UNIT III

Optical Components & Measurement: Optical couplers, Tunable sources and Filters, optical MUX/DEMUX, Arrayed waveguide grating, optical add drop multiplexer (OADM), optical circulators, attenuators, optical cross connects, wavelength converter, Mach-Zender

Chairperson	Chairperson	Controller of Examinations	Registrar
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		

Interferometer Test Equipment, OTDR.

UNIT IV

Space Segment and Satellite Link Design: Spacecraft Technology, Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis and Design, link budget, E/N calculation- performance impairments-system noise.

UNIT V

Earth Segment & Satellite Applications: INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS), Direct to home Broadcast (DTH), Digital audio broadcast (DAB), World space services, Business TV(BTV), GRAMSAT.

Text Books:

1. J. M. Senior, "Optical Fiber Communications: Principles and Practice", 3rd ed. London, UK: Pearson / Prentice-Hall, 2009.
2. G. Keiser, "Optical Fiber Communications", 5th ed. New York, NY: McGraw-Hill, 2013.
3. T. Pratt, C. W. Bostian, and J. Allnutt, "Satellite Communications", Wiley India.

Reference Books:

1. G. P. Agrawal, "Fiber-Optic Communication Systems", 5th ed. Hoboken, NJ: Wiley, 2021.
2. D. C. Agarwal, "Satellite Communications", 7th ed. Delhi, India: Khanna Publishers, 2021.
3. M. Mitra, "Satellite Communication", PHI Learning: New Delhi, India, 2005.

List of Experiments:

1. Setting up of Analog link and study of FM.
2. Setting up of Digital link and study of PWM.
3. To study Time Division Multiplexing.
4. To calculate Numerical Aperture.
5. To calculate Attenuation and Bending Loss.
6. To measure propagation loss in optical fiber using optical power meter.
7. To set up a satellite communication link and study of change in uplink and downlink frequency.
8. To establish an Audio-Video satellite link between Transmitter and Receiver.
9. To calculate look angle using MATLAB.
10. To calculate limit of visibility using MATLAB.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Technology and Science
Department of Electrical and Electronics Engineering
Choice Based Credit System (CBCS) in the Light of NEP-2020
B. Tech. EC/ ECIOT/ EC-VLSI/ RA/ MTX w.e.f. 2024

SUBJECT CODE	Category	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*				
BTEC714		Embedded Systems for Robotics	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 on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. To inculcate the concepts of robotic features including actuator and control processes.
2. To explore robot learning in the context of current robots.
3. To impart knowledge of designing robots to perform tasks from simple movement to complex interactions with the world.
4. To explore robotic concepts with hands-on experiments using the Microchips-AVR Controller.

Course Outcomes:

Students will be able to

1. Design and create robots to perform tasks from simple movement to complex interactions with the world.
2. Articulate design decisions and create a diary describing learning experiences that form a portfolio of competence.
3. Discuss emergent behavior and distinguish this from normal robotic behavior.

Syllabus:

UNIT I **6 Hrs.**

Basics of Embedded Systems and Robotics: Introduction, Classifications of Embedded Systems, Application-Specific Processors, Mobile Robots Embedded Controllers, Operating System. Logic Gates, Function Units Registers and Memory, Arithmetic Logic Unit, Control Unit, Central Processing Unit.

UNIT II **7 Hrs.**

Sensors: Sensor Categories, Binary Sensor, Analog versus Digital Sensors. Shaft Encoder, A/D Converter, Position Sensitive Device, Compass, Gyroscope, Accelerometer, Inclinometer, Digital Camera.

UNIT III **7 Hrs.**

Actuators: DC Motors, H-Bridge, Pulse Width Modulation, Stepper Motors, Servos, On-Off

Chairperson	Chairperson	Controller of Examinations	Registrar
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		

Control, PID Control, Velocity Control and Position Control, Multiple Motors, Driving Straight.

UNIT IV **6 Hrs.**

Embedded Communication Interface: I2C Communication, SPI and SCI Communication, UART Communication, USB Communication, Hard and Soft Real-Time System, Thread-Oriented Design.

UNIT V **7 Hrs.**

Case Study: Line followers, Balancing Robots, Walking Robots, Robots manipulator, Maze exploration, Map generation, Robot Soccer.

Text Books:

1. Nilanjan Dey, Amartya Mukherjee, "Embedded Systems and Robotics with Open-Source Tools", CRC Press, 1 Edition, April 1, 2016.
2. S. Kim, "Embedded Robotics: Mobile Robot Design and Application with Embedded Systems", 3rd Edition, Springer, 2008.

References:

1. Subrata Ghoshalm, "Embedded Systems & Robots Projects Using the 8051 Microcontroller", 1st Edition, Cengage, 2009.
2. Bräunl, Thomas, "Embedded Robotics, Mobile Robot Design and Applications with Embedded Systems", III Edition, Springer-Verlag Berlin Heidelberg, 2013.
3. Mazidi and Mazidi, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Pearson Education India, 2 Edition, 2007.
4. Muhammad Ali Mazidi, Sarmad Naimi, and Sepehr Naimi, "AVR Microcontroller and Embedded Systems: Using Assembly and C", Education India, 2010.

List of Experiments:

1. Introduction to Microcontrollers like AVR Controller, etc.
2. Interfacing with LED and Buzzer.
3. Interfacing with LCD Display.
4. Interfacing with DC motors.
5. Interfacing with IR sensors
6. Interfacing with White-line sensors
7. Interfacing with Position sensors
8. Interfacing with Sharp sensors
9. Line following robot
10. Project based on typical system design.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Name of Program: Bachelor of Technology in Electronics & Communication with Specialization in IOT

SUBJECT CODE	Category	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*				
BTECIOT601	EC	Application Development for IOT	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 Objective:

1. To understand the concept of Web Application Development and its Architecture.
2. To understand and practice web page designing techniques.
3. To understand embedded dynamic scripting on client side Internet Programming.
4. To understand the differences between client side & server side technologies to develop Web Application.

Course Outcome:

After completion of the course students will be able to:

1. Describe the concepts of WWW including browser and HTTP protocol.
2. List the various HTML tags and use them to develop the user friendly web pages.
3. Define the CSS with its types and use them to provide the styles to the web pages at various levels.
4. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.
5. Use the JavaScript to develop the dynamic web pages.
6. Use server side scripting with PHP to generate the web pages dynamically using the database connectivity.

Syllabus:

UNIT I **08 Hrs.**

Introduction to WWW and Internet Protocols, HTTP Protocol: Request and Response, Web browser and Web servers, web page designing using HTML, introduction to dynamic web pages.

Chairperson
Board of Studies

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya

Introduction to HTML: HTML Elements, Attributes, Standard HTML Document Structure, HTML Headings, Paragraphs and Line Break Tags, Commenting, HTML Formatting, Fonts, Styles, Colors, HTML Links, Images, Tables, HTML Lists, Forms, Frames.

UNIT II **08 Hrs.**

Introduction to HTML5: HTML5 - New standard for HTML, Rules for HTML5, Browser Support, New Elements in HTML5, New Markup Elements, New Media Elements, The Canvas Element, New Input Type Attribute Values, New Form Elements and Attributes, HTML5 Event Attributes, Audio and Video on the Web, various audio and video Formats and Attributes.

UNIT III **08 Hrs.**

Introduction to CSS, need for CSS, basic syntax and structure, CSS Selectors, Inline Styles, Embedding Internal Style Sheets, Linking External Style Sheets, Creating Classes and IDs, Specifying class within HTML document, Style placement: Inline style, Span & div tags, header styles, Colors and properties, Backgrounds, Manipulating Texts, Fonts, Borders and Boxes, Margins and Padding, Box properties and Positioning using CSS.

UNIT IV **08 Hrs.**

Introduction to JavaScript: Utility of JavaScript, Client side scripting with JavaScript, Differences between Client-Side vs. Server-Side scripting, Statements, JavaScript Data types, Variable Declarations, Operators and Operator Precedence, Implementing Control Constructs, Functions, JavaScript and objects, JavaScript own objects, String, Date and Array Objects, Introduction to DOM.

UNIT V **08 Hrs.**

PHP : Introduction and basic syntax of PHP, Installation and configuration, Declaring variables, Data types, arrays, strings, operators, expressions, control structures, Functions, PHP Form handling.

PHP and MySQL : Connecting to database, Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables.

Text Books:

1 Ralph Moseley and M. T. Savaliya, "Developing Web Applications", Wiley India, 2nd edition, 2013.
2 Steven M. Schafer, "HTML, CSS, JavaScript, Perl, Python and PHP", Wiley India, 1st edition 2005.

References:

1 Paul S. Wang, G. Keller,'S. Katila, "An Introduction to Web Design + Programming", Cengage Learning. 2016
2 Robin Nixon, "Learning PHP, MySQL, and JavaScript", O'Reilly Publications, 2009.

Chairperson
Board of Studies

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya

3 Jeffrey C. Jackson, "Web Technologies-A Computer Science Perspective", Pearson Education, 2007.
4 Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education.

List of Experiments:

1. Create a simple html file to demonstrate the use of different tags.
2. Create a webpage with HTML describing you. Use paragraph and list tags. Apply various colors to suitably distinguish key words. Also apply font styling like italics, underline and two other fonts to words you find appropriate. Also use header tags.
3. Create a web page that contains form, frame, table, list, link using HTML.
4. Create a registration form using table.
5. Create an html file to link to different html page which contains images, tables, and also link within a page.
6. Create an html page to explain the use of various predefined functions in a string and math object in java script.
7. Create an html registration form and validate the form using javascript code.
8. Create an html page to change the background color for every click of a button using javascript.
9. Write down a simple php program that displays a welcome message.
10. Write a program for creating form using buttons, textboxes and other form elements using $_GET and $_POST method to retrieve data.
11. Write a php script to connect php with mysql database.
12. Write a php script to retrieve data contains in mysql databse.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in the Light of NEP-2020
B. Tech. in Robotics and Automation w.e.f. 2024

SUBJECT CODE	Category	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*				
BTECIOT701		Real Time Operating Systems	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 on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The subject aims to provide the student with:
1. To understand the concepts of Operating System.
2. To obtain hands-on experience in programming Real time OS.

Course Outcomes (COs):
After completion of the course, the students will be able to:
1. Explain the operating system concepts and types of operating system.
2. Demonstrate deadlock and memory management techniques.
3. Demonstrate concepts of real-time operating system implementation

Syllabus

UNIT I **7 Hrs.**
Introduction to Operating System, Goals of an OS, Operation of an OS, Computer Architecture, Classes of Operating Systems, Structure of an Operating System, Memory Management: Single User Contiguous Scheme, Dynamic Partitions, Best-Fit Versus First-Fit Allocation, Deallocation, Paged Memory Allocation, Demand Paging, Page Replacement Policies, Segmented Memory Allocation.

UNIT II **6 Hrs.**
Process Management: Processes and programs, Implementing processes, Threads, Process Synchronization, Semaphores, Monitors, Scheduling terminology and its concepts, Deadlock: Detection, Prevention and Avoidance.

UNIT III **8 Hrs.**
Introduction to RTOS, Cortex-M Processor Architecture, ARM Cortex-M Assembly Language, Pointers in C, Memory Management, MSP432 I/O programming, Interrupts, First in First Out (FIFO) Queues, Edge-triggered Interrupts, UART Interface, Basic principles of Input Capture, Pulse Width modulation on MSP432, OS Considerations for I/O Devices, Debugging.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Chairperson
Faculty of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Controller of Examinations
Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

UNIT IV **7 Hrs.**

Thread Management: Parallel, distributed and concurrent programming, Introduction to threads, States of a main thread, Two types of threads, Thread Control Block, Creation of threads, Switching threads, Profiling the OS, Semaphores, Thread Synchronization, Process Management, Dynamic loading and linking

UNIT V **6 Hrs.**

Time Management: Cooperation, Blocking semaphores, First in First out Queue, Thread Sleeping, Deadlocks, Monitors, Fixed Scheduling.

Real-time Systems: Data Acquisition Systems, Priority scheduler, Debouncing a switch, Texas Instruments RTOS, FreeRTOS.

Text Books:

1. Dhananjay M. Dhamdhere, "Operating Systems: A Concept-Based Approach", McGraw Hill Education; Third Edition, 2017.
2. Ann Mciver Mchoes, Ida M. Flynn, "Understanding Operating Systems"., Cengage Learning Sixth Edition.
3. Jonathan W. Valvano, "Real-Time Operating Systems for ARM Cortex-M Microcontrollers", Volume 3, Fourth Edition, 2017.

References:

1. Rob Williams, "Real Time Systems Development"., First Edition, Elsevier 2006.
2. Phillip A. Laplante, Seppo J. Ovaska, "Real Time Systems Design and Analysis: Tools for the Practitioner", Fourth Edition IEEE Press, 2012.
3. Andrew S. Tanenbaum, Herbert Bos "Modern Operating Systems", Pearson, Fourth Edition, 2012

List of Experiments:

1. To develop the process of scheduling algorithms.
2. Study and Installation of TINY OS.
3. Creation of tasks and task communication using TINY OS.
4. Task pending and deletion from TINY OS.
5. Task Suspension in TINY OS.
6. Understand DEADLOCK in TINY OS.
7. Porting TINY OS on microcontroller.
8. Traffic light controller using TINY OS.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Technology and Science
Department of Electrical and Electronics Engineering
Choice Based Credit System (CBCS) in the Light of NEP-2020
B. Tech. EC/ ECIOT/ EC-VLSI w.e.f. 2024

COURSE CODE	CATE-GORY	COURSE 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*				
BTEC703		**System Verilog based Design and Verification Lab**	0	0	0	30	20	0	0	4	2

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 goal of the course is to familiarize the students with various design and verification methods based on Verilog.

Prerequisites: Digital Logic Design.

Course Outcomes (COs):
At the end of the course the student will be able to
1. Understand the concepts of verification methodologies and data types.
2. Summarize the concepts of procedural statements, routines and assertions.
3. Illustrate the concepts of OOP terminology.
4. Demonstrate the randomization in System Verilog.
5. Analyze the concepts of functional coverage.

List of Experiments:

1. Design of combinational circuits using system Verilog.
2. Design of sequential circuits using system Verilog.
3. Design of FSM using system Verilog.
4. Understanding the basics of verification.
5. Understanding the concept of OOPS in system Verilog.
6. Understanding Inter-process communication using event, semaphore and mailbox.
7. Understanding the Transaction class in system Verilog.
8. Understanding the Generator Class in System Verilog.
9. Understanding the Driver Class in System Verilog.
10. Understanding the Monitor class in System Verilog.
11. Understanding the score board in System Verilog.
12. Develop a project for FIFO verification.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Chairperson
Faculty of Studies
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Controller of Examinations
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore