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					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	T	P	CREDITS
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

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*				
BTEC603	EC	Discrete Time Signal Processing	60	20	20	30	20	3	1	2	5

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

Course Objective:

This course will introduce the basic concepts and techniques for processing of discrete time signals. To familiarize with the important methods in DSP, including digital filter design, transform-domain processes and Multirate processing.

Course Outcome:

After completion of this course the students are expected to be able to demonstrate following attributes:

1. Student will be able to represent discrete time signal analytically and visualize them in the time & frequency domain and also understand the different transforms techniques & their significance.
2. Student will be able to analyze and design the discrete time system and design different digital filters using the concept of digital signal processing.

Syllabus:

UNIT I
10 Hrs.

Discrete-Time Signals and Systems: Discrete-time signals, discrete-time systems, system properties (linearity, time-invariance, memory, causality, BIBO stability), analysis of discrete-time LTI systems, discrete time systems described by difference equation, solution of difference equation

UNIT II

10 Hrs.

z-Transform: The direct z-transform, Region of Convergence , properties of ROC, properties of the z-transform, inverse z transform, analysis of linear time-invariant systems in the z- domain, pole-zero plots, time-domain responses of simple pole-zero plots, causality and stability.

UNIT III

10 Hrs.

Discrete Fourier Transform: DFT, Properties of the DFT, Efficient computation of the DFT: Decimation-in-time and Decimation-in frequency Fast Fourier transform algorithms, decomposition for 'N' composite number.

UNIT IV

10 Hrs.

Digital filters Design Techniques: Design of IIR digital filters: Approximation of Derivatives, Impulse invariant and Bilinear transformation, Lowpass/Highpass Butterworth & Chebyshev filter design, Design of FIR digital filters: windowing techniques Rectangular, Hamming, Hanning windows.

UNIT V

10 Hrs.

Multi rate digital signal processing: Introduction, design of practical sampling rate converters, Decimators, Interpolators, signal flow graph, Polyphase decompositions.

Text Books:

1 John. G Proakis & D.G. Manolakis, "Digital Signal Processing: Principles, Algorithms and Application", 4th Edition, Pearson Education,2007.
2 S.Salivahanan, A Vallavaraj & C.Gnanapriya, "Digital Signal Processing", 3rd Edition, TMH, 2017.
3 A.V. Oppenheim & R.W. Schaffer, "Digital Signal Processing", 3rd Edition, PHI, 2010.

References:

1 Rabiner and Gold: Theory and Application of Digital Signal Processing, Ist Edition, PHI Learning, 2009.
2 Ingle and Proakis: Digital Signal Processing- A MATLAB based Approach, 3rd Edition, Thompson, Cengage Learning, 2010.
3 S. K. Mitra, "Digital Signal Processing: A Computer Based Approach", 4th Edition, TMH, 2013.

List of Experiment:

1. Generate, analyze and plot various discrete-time signals.
2. Verify the operations on sequences (addition, multiplication, scaling, shifting, folding etc).
3. Implement linear time-invariant (LTI) systems and test them for stability and causality.

Chairperson
Board of Studies

Registrar

4. Analyze and Compute z-transforms of various discrete time signals.
5. Compute DFT of sequences and generate the phase and frequency plots.
6. Generate linear convolution of two sequences and plot the response.
7. Generate circular convolution of two sequences and plot the response.
8. Design IIR Filter for the given parameters.
9. Design FIR Filter for the given parameters.
10. Implement Up sampling and Down sampling of a sinusoidal signal and analyze the results.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

SUBJECT CODE	Cate-gory	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	T	P	CREDITS
BTECIOT602		Data Analytics 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 Educational Objectives (CEOs):

The objective of this course is to:
1. Explore the fundamental concepts of big data analytics.
2. Learn the different ways of data analysis.
3. Understand the various search methods and visualization techniques.
4. Learn to use advance analytics technology and tools.

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. Learn the big data using intelligent techniques.
2. Work with big data tools and its analysis techniques.
3. Perform analytics on data streams
4. Learn NoSQL databases and management.

Syllabus

UNIT I
08 Hrs.
Introduction to Big Data analytics
Big data overview: state of the practice in analytics, key roles for the big data ecosystem.
Data analytics lifecycle: Discovery, data preparation, model planning, model building, communicate result, operationalize

UNIT II
09 Hrs.
Review of basic data analytics using R
Introduction to R, R GUI, data import and export, attribute and data types, descriptive statistics, exploratory data analytics, dirty data, data exploration versus presentation, statistical methods for evaluation, hypothesis test, wilcoxon rank-sum test, ANOVA.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

UNIT III   08 Hrs.
Advance analytical theory and methods
Association rules: Overview, Apriori algorithm, evaluation of candidate rules, application of association rules, validation and testing, diagnostics.
Regression: Linear regression, Logistic regression, reason to choose and cautions, additional regression model.

UNIT IV   09 Hrs.
Advance analytical theory and methods
Time series analysis: overview, Box-jenkins methodology, ARIMA model
Text analysis: Collection, representation, term frequency-inverse document frequency (TFIDF), categorization, determining sentiments, gaining insights

UNITV   09 Hrs.
Advance analytics- Technology and tools
Map Reduce and Hadoop: Analytics for unstructured data, the Hadoop ecosystem (pig, hive, hbase, mahout, NoSQL).
In-Database analytics: SQL essentials, in-database text analysis, advanced SQL

Text Books:
1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Anand Rajaraman And Jeffrey David Ullman, Mining Of Massive Datasets,Cambridge University Press, 2012.
3. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/Elsevier Publishers, 2013.

References:
1. Bill Franks, Taming The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics, John Wiley & Sons, 2012.
2. Glenn J. Myatt, Making Sense Of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O"Reilly, 2011.
3. Jiawei Han, Micheline Kamber "Data Mining Concepts And Techniques", Second Edition, Elsevier, Reprinted 2008.

List of Experiments:
1. To study and implement basic functions and commands in R Programming.
2. Write a program to find the factorial of a number using R programming.
3. Write a program to find the Fibonacci sequence using recursion in R programming.
4. To implement clustering program using R programming.
5. To find Term Frequency and Inverse Document Frequency (tf-idf) Matrix for Recommendation Systems and Plot TF Using R.
Prepare a database of a music website where users listen to various tracks then,Write a map reduce program to get-
6. Number of unique listeners.
7. Number of times track was shared with others.
8. Number of times track was listened to on the radio.
9. Number of times track was listened to in total.
10. Number of times track was skipped on the radio.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

SUBJECT CODE	Cate-gory	SUBJECT 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*				
BTECIOT603	EC	IOT Architecture and Protocols	60	20	20	0	0	3	1	0	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 Educational Objectives(CEOs):
The objective of this course is to-
1. To Understand the Architectural Overview of IoT.
2. To Understand the IoT Reference Architecture and RealWorld Design Constraints
3. To Understand the various IoT Protocols (Datalink, Network, Transport, Session, Service)

Course Outcomes(COs):
After completion of this course the students will be able -
1. To impart knowledge on IoT architecture and various protocols.
2. To implement IoT systems.

UNIT I
Overview
08 Hrs

IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals-Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management
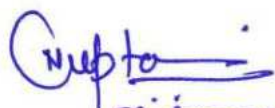
UNIT II
Reference Architecture
08 Hrs

IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture- Introduction, Functional View, Information View, De loyment and Operational View, Other Relevant architectural views. Real-World Design Constraints-Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control

UNIT III
IOT Data Link Layer & Network Layer Protocols
08 Hrs

PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), WirelessHART, ZWave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

UNIT IV
08 Hrs
Transport & Session Layer Protocols
Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer- HTTP, CoAP, XMPP, AMQP, MQTT

UNIT V
08 Hrs
Service Layer Protocols & Security
Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 , 6LoWPAN, RPL, Application Layer

Text Book
1. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM –MUMBAI, 2015
2. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642 19156-5 e-ISBN 978-3-642-19157-2, Springer

Reference Books
1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
3. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on- Approach)", 1st Edition, VPT, 2014.
4. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

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					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	T	P	CREDITS
BTEC525	EC	FPGA Based System Design	60	20	20	30	20	3	1	2	5

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

Course Educational Objectives
The objective of this course is to-
1. Introduce basic concepts of Verilog Hardware Description Language.
2. Describe FPGA implementation of digital systems.

Course Outcomes
After completion of this course the students will be able to-
1. Describe digital hardware in terms of its structure or behavior using Verilog HDL.
2. Configure FPGA boards for specific design need.

Syllabus

UNIT I   9 Hrs.
Programmable Logic Devices and Computer Aided Design Tools:
Introduction to design of digital hardware, Programmable Logic Devices- PAL, PLA, CPLD and FPGA.CAD Tools: Introduction, Design flow, Synthesis, RTL Synthesis, Overview of Synthesis Steps, Net List Generation, Gate Optimization, Technology Mapping, Simulation, Functional and Timing Simulation, Physical Design Steps- Placement , Routing and Static Timing Analysis.

UNIT II   9 Hrs.
Verilog HDL Basics
Introduction of HDL, Verilog and VHDL, Top Down and Bottom Up design, Data Flow Modeling , Structure and Behavioral Modeling, Verilog Basic Constructs, White Space, Comments, Nets and Variables, Data Types, Identifiers, Signal Values, Numbers, Parameters.
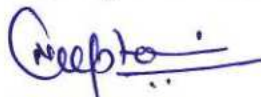Module and Ports- Module Declaration, List of Ports, Port Types, Port Declaration, Port Connection Rules.

UNIT III   9 Hrs.
Concurrent Statements
Verilog Operators:Arithmetic,Bitwise, Logical, Reduction, Relational,Shift,Conditional, Concatenation, Replication. Operator Precedence, Gate Instantiation, Signal Assignments, Continuous Assignment, Delays, Data Flow Modeling and Structure Modeling, Module Instantiation,Design of various Combinational Logic Circuits i.e. Adders, Multiplexers, Encoders and Decoders.

Chairperson   **Registrar**

UNIT IV   **9 Hrs.**

Procedural Statements

Always and Initial Block, Sensitivity List, Blocking and Non Blocking Assignments, If-else Statements,Case Statements, For Loop, While Loop, Repeat and Forever Loop, Generate statement, Verilog Function and Task, Finite State Machines- Melay and Moore Models, Behavioral Modeling of Various Combinational Circuits. Behavioral Modeling of Various Sequential Circuits- Latches and Flip Flops, Shift Registers and Counters, Mealy and Moore Finite State Machines.

UNIT V   **9 Hrs.**

Test Bench

Verification Concepts, Test Bench Overview, Linear Test bench, File I/O Based Test bench, State Machine based Test bench, Task based Test bench, Self Checking Test bench, Stimulus Generator, Bus Functional Models, Driver, Receiver, Protocol Monitor, Scoreboard, Checker, Coverage. Code Coverage, Functional Coverage, Task and Function.

Text Books:

1. Stephen Brown I Zvanko Vranesic, "Fundamentals of Digital Logic with Verilog Design", 3rd Edition, Mc Graw Hill, 2014.
2. Samir Palnitkar : Verilog HDL – A Guide to Digital Design and Synthesis, 2nd Edition, Pearson, , 2003.

References :

1. Peter Wilson: Design Recipes for FPGA using Verilog and VHDL, 2nd Edition, Newnes Publication, 2016.
2. M. Morris Mano, Michael D. Cilletti: Digital Design With An Introduction to The Verilog HDL, 5th Edition, Pearson, 2012.

List of Experiments:

Students should implement and verify digital logic design using Verilog HDL. After synthesis and simulation the design should be implemented on FPGA board.

1. Design of Boolean Functions using Gate Instantiation.
2. Design of various Adders Circuits.
3. Design of various Multiplexers.
4. Design and analysis of Encoder and Decoders.
5. Design of various Latches and Flip Flops with Preset and Clear capability.
6. Design of various Shift registers.
7. Design Johnson and Ring counters.
8. Design Synchronous and Asynchronous Up/Down Counters.
9. Design of Frequency Divider Circuit.
10. Design of Mealy and Moore Finite State Machines.

Chairperson
Board of Studies

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya

Shri Vaishnav Vidyapeeth Vishwavidyalaya

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*				
BTEI604	EC	Digital Image Processing	60	20	20	30	20	3	1	2	5

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

Course Educational Objectives (CEOs):

1. To understand the fundamentals of digital image processing.
2. To create awareness about various types of Image transform used in digital image processing.
3. To give knowledge about the different types of Image enhancement techniques used in digital image processing.
4. Aware of the Image compression and Segmentation used in digital image processing.

Course Outcomes (COs):

Student will be able to:
1. Understand origin and use of digital image processing.
2. Explain the image fundamentals and mathematical transforms necessary for image processing.
3. Apply the image enhancement, compression, and restoration techniques.
4. Implement the image segmentation and representation techniques.

Syllabus:

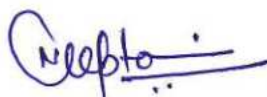**UNIT I**   **9 Hrs**
Elements of Visual Perception, Image Sensing and Acquisition, Image Sampling and Quantization, Relationships between pixels. Image Transforms: 2-D FFT, Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, K-L Transform.

UNIT II   **8 Hrs**
Gray level transformations, Histogram processing, Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filtering. Frequency Domain: Introduction to Fourier Transform, Smoothing and Sharpening frequency domain filters, Ideal, Butterworth and Gaussian filters.

Chairperson
Board of Studies

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya

UNIT III   **9 Hrs**

Image Restoration: Model of Image Degradation/restoration process, Noise models, Inverse filtering, Least mean square filtering, Constrained least mean square filtering, Blind image restoration, Pseudo inverse, Singular value decomposition.

UNIT IV   **8 Hrs**

Image Segmentation: Edge detection, Edge linking via Hough transform, Thresholding, Region based segmentation, Region growing, Region splitting and Merging, Segmentation by morphological watersheds basic concepts, Dam construction, Watershed segmentation algorithm.

UNIT V   **10 Hrs**

Need for data compression, Huffman coding, Run Length Encoding, JPEG standard, MPEG. Variable length coding, LZW coding, Bit plane coding, predictive coding.
Color Imaging: Color fundamentals, Color models, Color transformation, Smoothing and Sharpening, Color segmentation

Text Books:

1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", 4th Edition, Pearson, 2018.
2. Wilhelm Burger, "Principles of Digital Image Processing: Advanced Methods", 2012.

References:

1. Rafael C. Gonzalez, Richard E. Woods & Steven L. Eddins, "Digital Image Processing using MATLAB", 2nd Edition, 2010.
2. Munesh Chandra Trivedi, "Digital Image Processing", 1st Edition, 2014.
3. Ikvinderpal Singh, "Digital Image Processing", 1st Edition, 2015.
4. Ashish Jain, "Digital Image Processing (Implementation Using MATLAB)", 2012.

List of Experiments:

1. Study of Matlab Image processing Toolbox.
2. Analysis of Pixel distance measurement Methods
3. Implementation of Image Input Output Techniques.
4. Perform Image representation Techniques.
5. Analysis of Image Display Techniques.
6. Perform Image reshaping Techniques.
7. Implementation Image filtering Techniques.
8. Analysis of Image Compression.
9. Analysis of Image Segmentation.
10. Analysis of Image Restoration.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Name of Program: Bachelor of Technology in Electronics & Communication

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	T	P	CREDITS
BTEC714	EC	Embedded Systems for Robotics	60	20	20	30	20	3	1	2	5

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

Course 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.
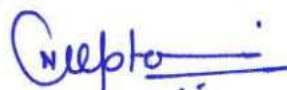
UNIT-II   8   Hrs.
Sensors: Sensor Categories, Binary Sensor, Analog versus Digital Sensors. Shaft Encoder, A/D Converter, Position Sensitive Device, Compass, Gyroscope, Accelerometer, Inclinometer, Digital Camera.

UNIT- III   8   Hrs.
Actuators: DC Motors, H-Bridge, Pulse Width Modulation, Stepper Motors, Servos, On-Off Control, PID Control, Velocity Control and Position Control, Multiple Motors – Driving Straight.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya

UNIT- IV   **9   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   **14   Hrs.**

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

Text Books:
1. Embedded Systems and Robotics with Open Source Tools, Nilanjan Dey, Amartya Mukherjee, CRC Press, 1 edition (April 1, 2016).
2. Embedded Robotics: Mobile Robot Design and Application with Embedded Systems, III Edition, Springer, 2008.

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

List of Practicals:
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.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya

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

SUBJECT CODE	Category	SUBJECT 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*				
BTECIOT604	EC	Embedded System with Raspberry pi and Arduino	0	0	0	30	20	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.

Course Educational Objectives (CEOs):

1. To describe the basic functionality of Raspberry Pi B+ board.
2. To present the basics of the Python programming language to prepare students for programming on the Raspberry Pi.
3. To communicate with devices through the pins of the Raspberry Pi.

Course Outcomes (COs):
After completing this course, students will be able to:
1. Setup and operate the Raspberry Pi
2. Understand the basics of the Linux OS used on the Pi and the basics of the X Windows System (the GUI environment)
3. Program the Pi for different applications

Syllabus:

UNIT I
Introduction and familiarization with Arduino
Introduction to Arduino with Hardware Overview board with pin layout, Download and Installation of the Arduino IDE, Arduino IDE and Sketch Overview, Understanding Arduino Syntax, Program notation: variables, functions, control flow, Arduino conventions, Analog I/O and Serial Communications.
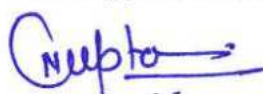
UNIT II
Microcontroller overview with specifications
Microcontroller overview and Architecture Atmel ATmega 328 / AVR family, overview of main features such as I/O Ports, Timers, interrupts serial port, PWM, ADC, Timers, PWM, analog / digital IO, , Pin functions, Atmega328p specifications, I/O interfacing with Atmega328p.

UNIT III
Interfacing with Arduino board
Introduction to Arduino IDE, writing, saving, compiling and uploading sketches, interfacing discrete LEDs, Binary counter, Seven Segment LEDs, Interfacing LCD, switch Interface, Interfacing with different type of sensors and communication modules.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya

UNIT IV
Introduction and familiarization with Raspberry Pi board
Introduction to Raspberry Pi board and installation, introduction to Linux, preparation of Boot SD card, configuration of Raspberry Pi and networking with host computer, interfacing with Raspberry Pi board, accessing GPIO pins.

UNIT V
Introduction to Python Programming
Python IDE for Raspberry Pi, Python expressions, functions and operations for controlling the pins of Raspberry Pi,

Text Books:
1. Mike McRoberts: "Beginning Arduino" Apress, 2nd Edition, 2013
2. Adrian McEwen, Hakim Cassimally "Designing the Internet of Things", John Wiley & Sons, 2013

References:
1. Massimo Banzi, "Getting Started with Arduino", O'Reilly Media, Inc." 2011
2. Wolfram Donat "Learn Raspberry Pi programming in python", Apress ,2014
3. Richard Grimmett, "Raspberry Pi Robotics Essentials", Packt Publishing Ltd 2015

List of Experimentss:
1. Understanding Arduino IDE and Arduino board family.
2. Understanding I/O access on ATMega328p.
3. Experimenting data transfer using Serial Communication.
4. Experimenting data transfer using SPI Communication.
5. Establishing i2c interface with ATMega328p.
6. Understanding Raspberry Pi Board Architecture.
7. Installing and configuring Raspbian OS on Raspberry Pi.
8. Blinking LED using Raspberry Pi.
9. Network configuration on Raspberry Pi.
10. Interfacing Sensor using Raspberry Pi.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav VidhyapeethVishvavidhyalaya, Indore

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

SUBJECT CODE	Cate-gory	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	T	P	CREDITS
BTEC507	EC	Programming in Python	0	0	0	30	20	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.

Course Objective:
1. Learn Syntax and Semantics and create Functions in Python.
2. Handle Strings and Files in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Implement Object Oriented Programming concepts in Python

Course Outcome:
After learning the course, the student will be able:
1. To develop proficiency in creating applications using the Python Programming Language.
2. To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
3. To be able to do testing and debugging of code written in Python.
4. To be able to draw various kinds of plots using PyLab.
5. To be able to do text filtering in Python

Syllabus
UNIT I
Introduction: History of Python, Need of Python Programming, Running Python Scripts, Variables, Assignment, Operators and Expressions: Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations.

UNIT II
Data Structures: Lists, Tuples, Sets, Dictionaries, Sequences.
Control Flow - if, if-elif-else, for, while, break, continue. Functions - Defining Functions, Calling Functions, Passing Arguments. Modules: Creating modules, import statement, from ..import statement, name spacing.

UNIT III
Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

Chairperson
Board of Studies

Registrar

UNIT IV
Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data Hiding.

UNIT V
File Handling: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data.

List of Experiments:
1. Develop programs to understand the control structures of python.
2. Develop programs to learn different types of structures (list, dictionary, tuples) in python.
3. Write a Python program to sum all the items in a list.
4. Write a Python program to get the largest and smallest number from a list.
5. Develop programs for data structure algorithms using python – searching and sorting.
6. Write a Python Program to perform Linear Search.
7. Write a Python Program to perform Binary Search.
8. Write a Python Program to perform Selection sort.
9. Write a Python Program to perform Insertion sort.
10. Write a Python Program to perform Merge sort.
11. Write a Python program to get a list, sorted in increasing order by the last element in each tuple from a given list of non-empty tuples: Sample List: [(2, 5), (1, 2), (4, 4), (2, 3), (2, 1)] Expected Result: [(2, 1), (1, 2), (2, 3), (4, 4), (2, 5)]
12. Write a Python program to check a list is empty or not.
13. Write a Python program to remove duplicates from a list.
14. Programs that take command line arguments (word count).
15. Write a Program that Reads a Text File and Counts the Number of Times a Certain Letter Appears in the Text File.
16. Write a Program to Read a Text File and Print all the Numbers Present in the Text File.
17. Write a Program to find the most frequent words in a text read from a file.
18. Implement Object Oriented Programming concepts in Python.
19. Write A Program to Append, Delete and Display Elements of a List Using Classes.
20. Write A Program to Create a Class and Compute the Area and the Perimeter of the Circle.
21. Write A Program to Create a Class which Performs Basic Calculator Operations.
22. Write A Program to Create a Class in which One Method Accepts a String from the User and another prints it.
23. Learn to plot different types of graphs using PyPlot.

References:
1. John V Guttag. "Introduction to Computation and Programming Using Python", 2nd edition,Prentice Hall of India, 2013
2. Wesley J. Chun. "Core Python Programming" 2nd Edition, Prentice Hall, 2006
3. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", Wiley, 2013
4. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication, 1st edition, 2011

Chairperson

Registrar