Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Electronics & Communication-IOT)

SEMESTER VI

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCSIO T601	CS	Web Programming	60	20	20	30	20	3	1	2	5

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

COURSE OBJECTIVES:

1. Student shall be able to determine the importance and building blocks of "Web Technology" and "E-Commerce" and study of various networking protocols.
2. Student shall be able to apply the knowledge of various web technologies like Server-side, Client-side etc. to multidisciplinary areas for developing effective websites.
3. Student shall be able to describe and implement the concepts of E-commerce, its various business models and advanced Security Techniques.
4. Student shall be able to implement advanced on-line payment Systems and security techniques to resolve hacking issues.

COURSE OUTCOMES:

1. Ability to determine the importance of "Web Technology" and "E-Commerce" and study of various protocols related to same.
2. Ability to design, develop and deploy the effective websites in multidisciplinary areas.
3. Ability to implement the concept of E-commerce web-site and its models.
4. Able to implement advanced on-line payment Systems and security techniques.

SYLLABUS

UNIT–I

Web Engineering: Introduction, History, Evolution and Need, Time line, Motivation, Categories& Characteristics of Web Applications, Web Engineering Models, Software Engineering v/s WebEngineering. World Wide Web: Introduction to TCP/IP and WAP, DNS, Email, TelNet, HTTPand FTP.

UNIT–II

Browser and search engines: Introduction, Search fundamentals, Search strategies,Directories search engines and Meta search engines, Working of the search engines. **Web Servers:** Introduction, Features, caching, case study-IIS, Apache.

UNIT–III

HTML and DHTML: Introduction, Structure of documents, Elements, Linking, Anchor Attributes,Image Maps, Meta Information, Image Preliminaries, Layouts, Backgrounds, Colors and Text,Fonts, Tables, Frames and layers, Audio and Video Support with HTML Database

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integration,CSS, Positioning with Style sheets, Forms Control, Form Elements.Introduction to CGI, PERL, JAVA SCRIPT, JSP, PHP, ASP & AJAX.Cookies: Creating and Reading.

UNIT–IV

XML: Introduction, HTML Vs XML, Validation of documents, DTD, Ways to use, XML for datafiles, Embedding XML into HTML documents, Converting XML to HTML for Display, DisplayingXML using CSS and XSL, Rewriting HTML as XML, Relationship between HTML, SGML andXML, web personalization , Semantic web, Semantic Web Services, Ontology.

UNIT–V

Electronic Payment Systems: RTGS, NEFT, Internet Banking, Credit/DebitCard. **Security:** Digital Certificates & Signatures, SSL, SET, 3D Secure Protocol.

TEXT BOOKS:

1. Web Technology, AchyutGodbole, AtulKahate, TMH.
2. Henry Chan, Raymond Lee, Tharam Dillon , E-Commerce Fundamental and Applications, Willey
3. Publication.
4. Minoli&Minoli, Web Commerce Technology Hand Book, TMH.

REFERECNES:

1. Satyanarayana, E-Government, PHI
2. Uttam K: Web Technologies, Oxford University Press.
3. G. Winfield Treese, Lawrence C. Stewart, Designing Systems for Internet Commerce, Longman Pub.
4. Charles Trepper, E Commerce Strategies, Microsoft Press.

List of Practicals:

1. Installation and Configuration of Web Servers.
2. Home page design.
3. Form validation.
4. Catalog design and Search techniques.
5. Access control mechanism (session management).
6. Payment systems.
7. Security features.
8. Creating Web Site to integrate web Services.
9. A mini project.
10. A research paper is desirable.

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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*				
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 **8 Hours**

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

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UNIT II **10 Hours**

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 Hours**

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 Hours**

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 **7 Hours**

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.

2 S.Salivahanan, A Vallavaraj & C.Gnanapriya, "Digital Signal Processing", 3rd Edition, TMH, 2017.

References:

1 A.V. Oppenheim & R.W. Schaffer, "Digital Signal Processing", 2nd Edition, PHI.

2 Rabiner and Gold, "Theory and Application of Digital Signal Processing", I st Edition, PHI Learning, 2009.

3 Monson H. Hayes, "Schaums Outline of Digital Signal Processing", 2nd Edition, McGraw-Hill Education.

4 Hwei P Hsu, "Schaum's Outline of Signals and Systems", 3rd Edition, McGraw-Hill Education.

5 S. K. Mitra, "Digital Signal Processing: A Computer Based Approach", 3rd Edition, TMH.

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List of Practicals:

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.
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.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTECIOT601	EC	Data Communication and Computer Networks	60	20	20	0	0	3	1	2	5

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

Course Objectives:

1. Introduce the concept of communication protocols and give an overview of Data Communication Standards.
2. Allow the student to gain expertise in specific areas of networking such as the design and maintenance of individual networks.

Course Outcomes:

1. Understand the principles of Open Systems and the Transport/Application protocols, which facilitate them.
2. Analyze the services and features of the various layers of data networks.
3. Explain the importance of data communications and the Internet in supporting business communications and daily activities.

Syllabus:

UNIT I **08 Hours**

Introduction: data communications, network criteria, categories of networks, network performance and transmission impairments, network devices, protocols and standards, data representation, data transmission, transmission modes, transmission media, LAN topologies, network models, layered tasks, the OSI model, TCP/IP protocol suite, addressing, encoding, switching technique and multiplexing.

UNIT II **10 Hours**

Data link control, point-to-point and multi-point links, flow control techniques, error control techniques, HDLC as a bit oriented link control protocol, Ethernet, fast Ethernet, gigabit Ethernet, token ring, token bus, FDDI , multiple access protocols-pure and slotted aloha, wireless LANs: IEEE 802.11 and Bluetooth, introduction to virtual circuit switching including frame relay, X.25.

UNIT III **10 Hours**

Network layer design issues, routing versus forwarding, static and dynamic routing, unicast and multicast routing, distance-vector, link-state, shortest path computation, dijkstra's algorithm, congestion control algorithms, network layer protocols (IP, ICMP, ARP, RARP, DHCP, BOOTP), IP addressing, IPv4, IPv6.

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UNIT IV **10 Hours**

UDP, TCP and SCTP, multiplexing with TCP and UDP, principles of congestion control, Approaches to congestion control, Quality of service, flow characteristics, techniques to improve QoS.

UNIT V **07 Hours**

Domain name system , domain name space, dynamic domain name system, electronic mail and file transfer, WWW, HTTP, SNMP, overview of digital signature and digital certificates technology, cryptography – basic concepts, public/private key encryption.

Text Books:

1. Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw–Hill, Fourth Edition, 2011.
2. Andrew S. Tanenbaum, "Computer Networks", Pearson education, Fourth Edition, 2009.

References:

1. Prakash C. Gupta, "Data Communications and Computer Networks", PHI, Second Edition, 2014.
2. Ajit Pal, "Data Communications and Computer Networks", PHI, First Edition, 2014.
3. Wayne Tomasi , "Introduction to Data communications and Networking", Pearson education, First Edition, 2009.

List of Practicals:

1. To study of Different Types of Network Equipment's.
2. To perform data transmission using RS-232 Interface.
3. To perform Synchronous and Asynchronous transmission.
4. To perform Parallel and Serial transmission.
5. To implement Ring topology using DB-9.
6. To implement cross cable connection and straight cable connection.
7. To study of network IP.
8. To implement & simulate various types of routing algorithm using Network Simulator.
9. To simulate STOP AND WAIT Protocols on NS-2.
10. To simulate various Routing Protocol on NS-2.
11. To simulate various Network Topologies on NS-2.
12. To configure routers, bridges and switches and gateway on NS-2.

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			THEORY			PRACTICAL		T h	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTECIO T602	EC	Wireless and Mobile Communication	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 subject aims to provide the student with:

1. To impart fundamental concepts in models of mobile radio channels, wireless technologies adapted and wireless networks.
2. Be acquainted with different interference factors influencing wireless and mobile communications.
3. To efficiently use the background behind developing different path loss and/or radio coverage in mobile environment.
4. To expose the students to the most recent technological developments in mobile communication systems.

Course Outcomes (COs):

1. Students will get familiar with basic terminology as mobile station, base station and mobile telephone switching office.
2. Develop the capability to analyze and design propagation models for mobile radio channel.
3. Learn how to reduce co-channel and non co-channel interference.
4. Know about principle of CDMA, GSM and OFDM technologies.

Syllabus:

UNIT I **08 Hours**

Introduction To Cellular Mobile Systems: Limitations of Conventional Mobile Telephone System, Basic Cellular Systems,Concept of Frequency Reuse, Co-channel Interference Reduction Factor, Desired C/I in An Omni-directional Antenna System, Sectoring and Cell Splitting, System Capacity,Concept of Handoff, Types of Handoff, Queuing of Handoff.

UNIT II **12 Hours**

Cell Coverage for Signal: Signal Reflections in Flat and Hilly Terrain, Effect of Human Made Structures, Phase Difference between Direct and Reflected Path, General Formula for Mobile Propagation Between Two Fixed Station Over Water and Flat Open Area.

Interference in Cellular Mobile System: Co-channel Interference: Design of an Omni-directional Antenna System and Directional Antenna System, Lowering the Antenna Height, Power Control, Reduc-

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tion in C/I by Tilting Antenna, Umbrella Pattern Effect. Non Co-channel Interference: Adjacent-Channel Interference, Next Channel Interference and Neighboring Channel Interference, Near-End Far-End Interference.

UNIT III **08 Hours**

Introduction to wireless standards (2G/3G/4G), BER performance of Communication system in AWGN channel, modeling of Wireless systems, Rayleigh fading channel, BER performance of wireless system, channel estimation.

Wireless Propagation channels Statistical description of the wireless channel: time invariant and variant two path models, small-scale fading with and without a dominant component, Doppler spectra, and temporal dependence of fading, large scale fading.

UNIT IV **07 Hours**

Diversity: Introduction, micro diversity, macro diversity and simulcast, combination of signals, error probability in fading channels with diversity reception, transmit diversity.

Equalizers: Introduction, linear equalizers, decision feedback equalizers, maximum likelihood sequence estimation (Viterbi detector), and comparison of equalizer structures, fractional spaced equalizers, blind equalizers.

UNIT V **10 Hours**

Multiple Access Techniques: Principle of OFDM, Transmitter and Receiver block diagram of OFDM, FDMA/FDD, TDMA/TDD, CDMA, SDMA and OFDMA/SC-FDMA/SOFDMA/MIMO, GSM System Architecture, GSM Radio Subsystem, GSM Channel Types, Frame Structure for GSM, Signal Processing in GSM, GPRS and EDGE.

Text Books:

1. William C. Y. Lee, "Mobile Cellular Telecommunications: Analog and Digital Systems", 2nd Edition, Tata McGraw Hill Publication, 1995.
2. Theodore S. Rappaport, "Wireless Communications: Principles and Practice", 2nd Edition,Pearson / PHI Publication, 1996.
3. Aditya Jagannatham, "Principles of Modern Wireless Communication Systems: Theory & Practice", 1st Edition, McGraw Hill, 2016.

References:

1. Iti Saha Misra, "Wireless Communications and Networks: 3G and Beyond", 2nd Edition, Tata McGraw Hill Publication, 2013.
2. Gordon L. Stuber, "Principles of Mobile Communications", Springer International 2nd Edition, 2007.
3. William Stallings, "Wireless Communications and Networks", 2nd Edition, Pearson Education, 2005.
4. Andreas. F. Molisch, "Wireless Communications", John Wiley – India, 2nd Edition.

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assess-ment*	END SEM University Exam	Teachers Assess-ment*				
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.

UNIT 1 **6 Hours**

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 2 **8 Hours**

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 3 **8 Hours**

Concurrent Statements:
Verilog operators: Arithmetic, bitwise, reduction, equality, logical, relational, shift, conditional, concatenation, replicate. Operator precedence, gate instantiation, signal assignments, continuous assignment, data flow modeling and structure modeling, module instantiation, case statements, design of various combinational logic circuits i.e. Adders, multiplexers, encoders and decoders.

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UNIT 4 **9 Hours**

Procedural Statements:
Always and initial block, sensitivity list, blocking and non blocking assignments, if-else statements, for loop, while loop, repeat and forever loop, Generate statement, verilog function and task, Finite State Machines- Melay and Moore models, Design of various sequential circuits- latches and flip flops, shift registers and counters, Mealy and Moore machines.

UNIT 5 **14 Hours**

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 Book
1. Stephen Brown I Zvanko Vranesic :Fundamentals of Digital Logic with Verilog Design, The Mc Graw Hill, Third Edition 2014.

References
1. Peter Wilson: Design Recipes for FPGA using Verilog and VHDL, Newnes publication, Second Edition 2016.
2. M. Morris Mano, Michael D. Cilletti: Digital Design with an introduction to the Verilog HDL,Pearson, Fifth Edition 2012.

List of Practicals:

Students should implement and verify digital systems through Verilog. After synthesis and simulation the design should be implemented on FPGA board.

1. Boolean functions using gate instantiation.
2. Implementation of adders circuits.
3. Design and analysis of various multiplexers.
4. Design and analysis of Encoder and Decoders.
5. Implementation of 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 a frequency divider circuit.
10. Implementing Mealy and Moore machine.

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
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 Objectives:

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:

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 **10 Hours**

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 **09 Hours**

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.

UNIT III **10 Hours**

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.

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UNIT IV **8 Hours**

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 **8 Hours**

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 Practicals:

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.

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
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 Objectives:

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 Hours**

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 Hours**

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

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UNIT III **8 Hours**

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.

UNIT IV **9 Hours**

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 Hours**

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.
2. Embedded Robotics: Mobile Robot Design and Application with Embedded Systems, III Edition, Springer.

References:

1. Embedded Systems & Robots Projects Using The 8051 Microcontroller, Subrata Ghoshalm, hardcover 2009, I Edition, Cengage.
2. Embedded Robotics, Mobile Robot Design and Applications with Embedded Systems, Bräunl, Thomas, III Edition, Springer-Verlag Berlin Heidelberg.
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; 1/e

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.

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SEMESTER VI

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC606	ML	Technical Communication and Soft Skills	0	0	50	0	0	1	0	0	1

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

Course Objective:

The Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

1. To improve the students' accuracy and fluency in English through a well-developed vocabulary, and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. To enable students face competitive exams and placement activities.
3. To enable them communicate their ideas relevantly and coherently in writing.

Course Outcomes:

Students will be able to use language accurately, fluently and appropriately.

1.They will be able to show their skills of listening, understanding and interpreting.
2.They will be able to write project reports, reviews and resumes.
3.They will be able to express their ideas relevant to given topics.
4.Students will also exhibit advanced skills of interview, debating and discussion.

Syllabus:

UNIT I

Information Design and Development: Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

UNIT II

Technical Writing, Grammar and Editing: Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Hunan factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

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SEMESTER VI

UNIT III

Self Development and Assessment: Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, self esteem.

UNIT IV

Communication and Technical Writing: Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

UNIT V

Ethics: Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

Text Books:

1. David F. Beer and David McMurrey, "Guide to writing as an Engineer", John Willey, New York, 2004.
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
3. Shiv Khera, "You Can Win", Macmillan Books, New York, 2003.
4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.

References:

1. Dale Jungk,"Applied Writing for Technicians", McGraw Hill, New York, 2004. (ISBN:07828357-4)
2. R. Sharma and K. Mohan, "Business Correspondence and Report Writing", TMH New Delhi 2002.
3. Xebec, "Presentation Book", TMH, New Delhi, 2000. (ISBN 0402213)

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