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SEMESTER VII

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC 701	EC	Optical & Satellite 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 Objectives:

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:

1. Will be able to classify optical source and detector & their characteristics.
2. Will be able to analyze various optical amplifiers and understand advance optical fiber systems.
3. Will be able to understand various optical components & test equipments.
4. Will be able to understand space segment of satellite & its link design.
5. Will be able to understand earth segment and the satellite applications.

Syllabus:

UNIT I **9 Hrs**

Overview of Optical fiber Communications: Elements of an optical fiber transmission link with the functional description of each block, WDM concepts, Light emitting diode (LEDs)-structures, materials, Figure of merits, characteristics & Modulation. Laser Diodes -Modes & threshold conditions, Diode Rate equations, resonant frequencies, structures, characteristics and figure of merits, Principles of operation.

UNIT II **7 Hrs**

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.

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UNIT III **8 Hrs**

Optical Components & Measurement: Optical couplers, Tunable sources and Filters ,optical MUX/DEMUX, Arrayed waveguide grating, optical add drop multiplexer (OADM), optical cirulators, attenuators, optical cross connects, wavelength converter, Mach-Zender Interferometer Test Equipments, OTDR , Set ups for Measurement of Attenuation, Dispersion, NA and EYE pattern.

UNIT IV **9 Hrs**

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, inter modulation and interference, Propagation Characteristics and Frequency considerations- System reliability and design lifetime.

UNIT V **12 Hrs**

Earth Segment & Satellite Applications: Introduction, receive-only home TV systems, master antenna TV system, Community antenna TV system, transmit-receive earth station.
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)- Worldspace services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet.

Text Books:

1. John M Senior, "Optical Fiber Communication", Third Edition, , Pearson
2. Gerd Keiser, "Optical Fiber Communication", Fifth Edition, , Tata McGraw Hill
3. Timothy Pratt, "Satellite Communication" , Wiley India
4. Roddy, "Satellite Communications", TMH

References:

1. Ghatak and Thyagrajan, "Fiber Optics and Lasers", Macmillan India Ltd.
2. Agarwal, "Fiber Optic Communication Systems", Wiley India.
3. Agarwal, "Satellite Communications", Khanna Publishers
4. Monojit Mitra, "Satellite Communication", PHI Learning.

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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*				
BTEC702	EC	Advanced Communication System	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. Design various MIMO receivers.
3. Analyze and design 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, multi carrier code division multiple access, single carrier modulation with frequency-domain equalization.

UNIT II 7 Hrs

MIMO systems: spatial multiplexing, System model, Pre-coding, Beam forming, transmitter diversity, receiver diversity, Channel state information, capacity in fading and non-fading channels.

UNIT III **8 Hrs**

Smart antennas, multiple input multiple output systems, MIMO Technology, Traditional MIMO, multi user MIMO, MIMO System Model, Zero Forcing Receiver, MMSE receiver, Singular Value Decomposition of MIMO Channel, Asymptotic MIMO Capacity, Alamouti and Space-time codes.

UNIT IV **9 Hrs**

Introduction to 5G, 5G Requirements, 5G Technology, Massive MIMO, Homogeneous and Heterogeneous Network Scenarios, Physical Layer and Networking Technology, Massive

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UNIT V **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.

Cognitive Radios, Problem description, cognitive transceiver architecture, principle of interweaving, spectrum sensing, spectrum management, spectrum sharing, overlay, underlay.

Text Books:

1. David Tse, Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press.
2. Aditya K. Jagannatham, "Principles of Modern Wireless Communication System", McGraw Hill.
3. Ramji Prasad and Richard Van Nee, "OFDM Wireless Multimedia Communication", Artech House.
4. Long Zhao, Hui Zhao, Kan Zheng and Wei Xiang, "Massive MIMO in 5G Networks: Selected Applications", Springer.

References:

1. Proakis, "Digital Communication", McGraw Hill.
2. Molisch, "Wireless Communications", Wiley India.
3. Gordon L. Stuber, "Principles of Mobile Communication", Springer International Ltd., 2001.
4. Marvin K. Simon, Mohamed-Slim Alouini, "Digital Communication over Fading Channels", 2nd Ed., Wiley-IEEE Press 2004.

List of Practicals:

1. To study SIMULINK.
2. To study BerTool.
3. To calculate the bit error rate for OFDM system.
4. Channel capacity of MIMO systems in Wireless communication.
5. To observe the BER performance of DS-CDMA using mixed codes in multipath channel using RAKE receiver for single user case.
6. Energy detection simulation for cognitive radio.
7. Water filling model in a MIMO system.
8. MIMO Rayleigh fading Channel Capacity.

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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*				
BTEC713	EC	Wireless Networks	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 study about Wireless networks, protocol stack and standards.
2. To study about fundamentals of 3G Services, its protocols and applications.
3. To study about evolution of 4G Networks, its architecture and applications.

Course Outcomes:

After completing the course, the students will be able to

1. Conversant with the latest 3G/4G and WiMAX networks and its architecture.
2. Design and implement wireless network environment for any application using latest wireless protocols and standards.
3. Implement different type of applications for smart phones and mobile devices with latest network strategies

Syllabus:

UNIT I **9 Hrs**

Wireless LAN: Introduction to WLAN technologies: Infrared, UHF narrowband, spread spectrum -IEEE802.11: System architecture, protocol architecture, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX.

UNIT II **8 Hrs**

Mobile Network Layer Introduction – Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6-Network layer in the internet- Mobile IP session initiation protocol – mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing.

UNIT III **9 Hrs**

Mobile Transport Layer TCP enhancements for wireless protocols – Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility – Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP – TCP over 3G wireless networks.

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UNIT IV **8 Hrs**

Wireless Wide Area Network Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.

UNIT V **10 Hrs**

4G & 5G Networks Introduction to 4G- features and challenges, Applications of 4G Technologies, Next generation (5G) wireless technologies, Upper Gigahertz and Terahertz wireless communications, Millimeter wave networking, Directionality and beamforming, Mobility and signal blockage, IEEE 802.11ad (60 GHz WLAN) MAC and PHY overview.

Text Books:

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012.
2. Vijay Garg , "Wireless Communications and networking", First Edition, Elsevier 2007.

References:

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy kuri, "Wireless Networking", First Edition, Elsevier 2011.
3. Simon Haykin , Michael Moher, David Koilpillai, "Modern Wireless Communications", First Edition, Pearson Education 2013
4. Principles of WirelessNetworks, K. Pahlavan and P. Krishnamurthy, Pearson Education, 2002.

List of Practicals:

1. To study and simulate Bluetooth architecture.
2. Introduction to Network Simulator.
3. To create Network Node in Network Simulator.
4. To control Network Traffic in Network Simulator.
5. Configure a Network Topology using Network Simulator.
6. Configure a Network using Distance Vector Routing Protocol.
7. Configure a Network using Link State Vector Routing Protocol.
8. To implement FTP using TCP using Network Simulator.
9. To Simulate ARP and RARP.
10. Configure Host IP, Subnet Mask and Default Gateway in a system in LAN (TCP/IP configuration).

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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*				
BTEC723	EC	Advance Microcontrollers & Embedded System	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 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.

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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 Practicals:

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.

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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*				
BTEI601	EI	Biomedical Instrumentation	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:

1. It gives the introductory idea about human physiology system which is very important with respect to design consideration.
2. With widespread use and requirements of medical instruments, knowledge of the principle of operation of biomedical instruments.
3. It attempts to render a broad and modern account of biomedical instruments.

Course Outcome:

1. Students will have a clear knowledge about human physiology system.
2. They will have knowledge of the principle operation of biomedical instruments
3. Student will be able to understand the design and the background knowledge of biomedical instruments and specific applications of biomedical engineering.

Syllabus:

UNIT I **8Hrs**

Bioelectric Signals and Electrodes: Bio-potentials and their origin: ECG, EEG, EMG, ENG, ERG, EOG, MEG. Bio-potential electrodes, generalized medical instrumentation system-Man machine interface.

UNIT II **9 Hrs**

Diagnostic Equipments: ECG: normal and abnormal waveform, diagnosis interpretation, ECG leads connections, Einthoven triangle, Plethysmography, Blood pressure measurement: direct and indirect methods, Cardiac output measurements, Phonocardiography. Respiratory volume measurement, Impedance pneumograph, EEG: signal amplitudes and frequency bands, EEG machine, Blood-cell counter, Pulse oximeters.

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UNI III **9 Hrs**

Therapeutic Equipments:Heart lung machine, Dialyzers: basic principle of dialysis, different types of dialyzer, membranes, portable type. Cardiac pacemakers: external and Implantable pacemaker. Cardiac defibrillator: DC defibrillator, implantable defibrillator and defibrillator analyzer.Short wave diathermy, microwave diathermy, ultrasonic therapy unit.

UNIT IV **10 Hrs**

Imaging Instruments:Digital X-Rays: Principles and production of soft and hard x-rays, Scattered radiation, Image intensifier, Radiationdetectors, X-ray Computerized Tomography (X-ray CT) – imaging modes and types.

Magnetic Resonance Imaging (MRI): Physics of nuclear magnetic resonance, T1and T2 relaxation time, spin-echo sequences.

Ultrasound and other Techniques:Propagation of ultrasound waves in fluids, solids and tissue. Doppler Effect, Ultrasonic transducers and instrumentation, modes of ultrasonic imaging

UNIT V **8 Hrs**

Patient Safety: Electric shock hazards, leakage currents, electrical safety analyzer, testing of biomedical equipments. Calibration and testing of biomedical equipments.

Text Books:

1. R.S.Khandpur, "Handbook of Biomedical Instrumentation", TMH Third Edition 2014.
2. Cromwell, "Biomedical Instrumentation and Measurements", Prentice Hall of India, New Delhi, 2007.

References:

1. Joseph J. Carr and John M. Brown, "Introduction to Biomedical Equipment Technology", Pearson Education India, Delhi, 2004.
2. Webster, "Medical Instrumentation – Application & Design," John Wiley and sons Inc, Netherlands, 2009.
3. Arumugam.M."Biomedical Instrumentation", Anuradha Agencies Publishers, Kumbakonam, 2006.

List of Practicals:

1. To study various types of electrodes.
2. Measure blood pressure using sphygmomanometer.
3. Measure respiration rate using respiration rate-meter
4. Measure body temperature using analog and digital thermometer.
5. Identify various leads selector network of ECG machine.
6. Obtain Lead –I, II, III, aVr , aVl , V1 … v6 type of ECG.
7. Demonstrate the Performance of EMG.
8. Demonstration of Phono-cardiograph machine.
9. EEG Alpha RMS Derivation – (VIRTUAL Lab IIT Roorkee)
10. EEG Entropy Calculation -(VIRTUAL Lab IIT Roorkee)

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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 in 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 **10 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 **10 Hrs**

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 **7 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.

UNIT IV **8 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 **15 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.
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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			END SEM University Exam	Term Two 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 **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.

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.

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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 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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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 Web Engineering. World Wide Web: Introduction to TCP/IP and WAP, DNS, Email, TelNet, HTTP and 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

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, Displaying XML using CSS and XSL, Rewriting HTML as XML, Relationship between HTML, SGML and XML, web personalization , Semantic web, Semantic Web Services, Ontology.

UNIT–V

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

TEXT BOOKS:

1. Achyut Godbole, AtulKahate, "Web Technology", TMH.
2. Henry Chan, Raymond Lee, Tharam Dillon, "E-Commerce Fundamental and Applications", Wiley Publication.
3. 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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Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Electronics and Communication)

SEMESTER VII

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

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

Course Objectives:

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

Course Outcomes:

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

Syllabus:

UNIT I

Human Value

Definition, Essence, Features and Sources
Sources and Classification
Hierarchy of Values
Values Across Culture

UNIT II

Morality

Definition, Moral Behaviour and Systems
Characteristics of Moral Standards
Values Vs Ethics Vs Morality
Impression Formation and Management

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UNIT III

Leadership in Indian Ethical Perspective.

Leadership, Characteristics

Leadership in Business (Styles), Types of Leadership (Scriptural, Political, Business and Charismatic)

Leadership Behaviour, Leadership Transformation in terms of Shastras (Upanihads, Smritis and Manu-smriti).

UNIT IV

Human Behavior – Indian Thoughts

Business Ethics its meaning and definition

Types, Objectives, Sources, Relevance in Business organisations.

Theories of Ethics, Codes of Ethics

UNIT V

Globalization and Ethics

Sources of Indian Ethos & its impact on human behavior

Corporate Citizenship and Social Responsibility – Concept (in Business),

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.

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