Department of ELECTRONICS & COMMUNICATION ENGINEERING

Master of Technology ECE (Wireless Communication)

MTWC-101-18- Wireless Communication

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Implement physical models of wireless channels	√	√		√	√	√		√	√	√	Implementation	yes	MSTs, Class Tests, Quizes, ESE
CO 2: Gain knowledge of key concepts of wireless communication	√	√	√	√	√		√	√	√	√	Understanding	no	MSTs, Class Tests, Quizes, ESE
CO 3:Measure capacity of AWGN channel, LTI Gaussian channels and various fading channels	√	√	√	√	√	√		√	√	√	Analysis	yes	MSTs, Class Tests, Quizes, ESE
CO4: Study uplink and downlink model of AWGN channel, fading channels and multiuser diversity	√	√		√				√	√	√	Understanding	Yes	MSTs, Class Tests, Quizes, ESE

MTWC-102-18- Information Theory & Coding

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the fundamentals of information theory.	√	√		√	√	√		√		√	Understanding	Yes	MSTs, Class Tests, Quizes, ESE
CO 2: Encode text, audio, speech, image and video signals through various coding and compression techniques.	√	√	√	√	√	√		√	√	√	Implementation	Yes	MSTs, Class Tests, Quizes, ESE

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO 3: Detect and correct errors in the received signals through error detecting and correcting codes	√	√	√	√	√	√				√	Analysis	No	MSTs, Class Tests, Quizes, ESE

MTWC-PE1-18- Wireless Sensor Networks

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Gain insights of Wireless Sensor Network(WSN) background, its challenges, constraints along with its advantages and applications.	√	√	√	√	√	√	√	√	√	√	Understanding	no	MSTs, Class Tests, Quizes, ESE
CO 2: Know the architecture of WSN and its sub-systems.	√	√	√	√	√					√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 3: Explain node structure along with the technologies used in WSN.	√	√	√		√		√	√	√	√	Learning	No	MSTs, Class Tests, Quizes, ESE
CO 4: Study various Wireless Propagation Models and discuss the various MAC protocols, communication protocols and routing protocols	√	√	√	√	√					√	Discussing	no	MSTs, Class Tests, Quizes, ESE

MTWC-PE1B-18- RF MEMS FOR WIRELESS COMMUNICATION SYSTEM

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: 1. Understand the key concepts in RF based MEMS wireless communication system.	√	√					√	√	√	√	Understanding	no	MSTs, Class Tests, Quizes, ESE
CO 2: Design RF based circuits through modelling.	√	√	√	√	√	√				√	Implementation	yes	MSTs, Class Tests, Quizes, ESE
CO 3: Understand the usage of RF based circuit elements to reconfigure the circuit design.	√	√	√		√			√	√		Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 4: Study various oscillators and filters.	√	√	√	√	√					√	Understanding	no	MSTs, Class Tests, Quizes, ESE

MTWC-PE1C-18- ADVANCED DIGITAL SIGNAL PROCESSING

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Apply digital transform techniques on signals.	√		√		√	√	√	√	√	√	Implementation	no	MSTs, Class Tests, Quizes, ESE
CO 2: Design digital FIR and IIR filters.	√		√	√	√	√	√			√	Implementation	yes	MSTs, Class Tests, Quizes, ESE
CO 3: Predict and estimate errors in digital signal processing systems.	√							√	√	√	Analysis	yes	MSTs, Class Tests, Quizes, ESE
CO 4: Handle multirate DSP and use adaptive filters.	√	√	√	√	√	√				√	Understanding	no	MSTs, Class Tests, Quizes, ESE

MTWC-PE1D-18- AUDIO AND VIDEO SIGNAL PROCESSING

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Learn the audio and video signal processing systems.	√					√	√	√	√	√	Understanding	no	MSTs, Class Tests, Quizes, ESE
CO 2: Code and decode the image, audio and video signals.	√					√	√			√	Implement	yes	MSTs, Class Tests, Quizes, ESE
CO 3: Modulate and demodulate digital signal processing systems.	√	√	√		√					√	Learning	no	MSTs, Class Tests, Quizes, ESE

MTWC-PE2A-18-ADVANCED COMMUNICATION SYSTEM

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Differentiate between analog and digital communication systems.	√				√	√		√	√	√	Understanding	no	MSTs, Class Tests, Quizes, ESE
CO 2: Transmit data through various digital modulation techniques	√				√	√				√	Understanding	no	MSTs, Class Tests, Quizes, ESE
CO 3: Understand optical and satellite communication systems.	√				√			√	√	√	Understanding	no	MSTs, Class Tests, Quizes, ESE
CO 4: Recognize mobile communication systems, access techniques and transmission protocols.	√	√	√	√	√	√				√	Analysis	no	MSTs, Class Tests, Quizes, ESE

MTWC-PE2B-18-DETECTION AND ESTIMATION THEORY

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Know the background of the signals, variables and processes.	√					√			√	√	Understanding	no	MSTs, Class Tests, Quizes, ESE
CO 2: Test the data through statistical tools.	√		√	√		√			√	√	Analysis	no	MSTs, Class Tests, Quizes, ESE
CO 3: Learn the ways to detect non-parametric, random and deterministic signals.	√						√	√	√	√	Understanding	no	MSTs, Class Tests, Quizes, ESE
CO 4: Familiarize with the estimation of signal parameters	√	√	√	√	√	√				√	Understanding	yes	MSTs, Class Tests, Quizes, ESE

MTWC-PE2C-18- MOBILE ADHOC NETWORKS

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Know the features, applications, models and characteristics of adhoc networks.	√	√	√	√				√	√		Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Learn the protocols followed in MAC layer, Network layer, Transport layer, Security layer and Cross layer design.	√				√	√	√	√	√	√	Understanding	yes	MSTs, Class Tests, Quizes, ESE
CO 3: Learn how to integrate adhoc networks with mobile-IP networks.	√	√	√	√						√	Understanding	yes	MSTs, Class Tests, Quizes, ESE

MTWC-PE2D-18- OPTICAL NETWORK AND PHOTONIC SWITCHING

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Know the optical transmission and reception	√	√	√	√					√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Apply the compensation techniques to the lost data/signals.	√	√	√	√	√	√	√	√	√	√	Implementation	yes	MSTs, Class Tests, Quizes, ESE
CO 3:Learn the architecture and protocols of passive optical networks.	√	√	√	√				√	√	√	Learning	No	MSTs, Class Tests, Quizes, ESE
CO 4: Learn the process of wire line techniques.	√	√	√	√				√	√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE

MTRM-101-18 RESEARCH METHODOLOGY & IPR

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: 1. Understand research, research process, define and redefine research problem through literature survey.	√	√	√	√	√	√	√	√	√	√	Understanding	Yes	MSTs, Quizes, ESE
CO 2: Know the primary and secondary sources of data collection and select sample size based on the requirement.	√	√	√	√	√	√	√	√	√	√	Implementation	yes	MSTs, Quizes, ESE
CO 3: Utilize the resources efficiently.	√	√	√	√	√	√	√	√	√	√	Implementation	no	MSTs, Quizes, ESE

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO 4: Critically analyse the data through various statistical measures, perform experiment, gather data and reach to a conclusion based on some hypothesis.	√	√	√	√	√	√	√	√	√	√	Implementation	Yes	MSTs, Quizes, ESE
CO5:5. Know the intellectual property rights									√	√	Understanding	Yes	MSTs, Quizes, ESE
CO6:6. Write up the report and research article.			√	√	√	√		√	√	√	Implementation	Yes	MSTs, Quizes, ESE

MTAC-AO1-18-English for research paper writing

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand that how to improve your writing skills and level of readability	√	√	√	√					√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Learn about what to write in each section	√	√	√	√	√	√	√	√	√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 3:Understand the skills needed when writing a Title	√	√	√	√				√	√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 4: Ensure the good quality of paper at very first-time submission.	√	√	√	√	√	√	√	√	√	√	Implementation	No	MSTs, Class Tests, Quizes, ESE

MTAC-A02-18-Disaster Management

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO

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Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.	√	√	√	√					√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.	√	√	√	√	√	√	√	√	√	√	Analysis	No	MSTs, Class Tests, Quizes, ESE
CO 3:Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.	√	√	√	√				√	√	√	Implementation	yes	MSTs, Class Tests, Quizes, ESE
CO 4: Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.	√	√	√	√	√	√	√	√	√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE

MTWC-103-18 Advanced Wireless Communication

Head

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Review the fundamentals of wireless communication	√	√	√	√	√					√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Compare the performance of different digital modulation techniques over wireless channels.	√	√	√	√	√	√		√			Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 3: Design OFDM system and data transmission through multicarrier modulation.	√	√	√	√	√	√	√	√	√	√	Implementation	yes	MSTs, Class Tests, Quizes, ESE
CO 4: Describe OFDMA system, its operation and applications.	√	√	√	√	√					√	Understanding	No	MSTs, Class Tests, Quizes, ESE

MTWC-104-18- Soft Computing Techniques

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Study basic concept of soft computing and differentiate between supervised, unsupervised and reinforced learning methods.	√	√	√	√	√					√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Learn various artificial neural network techniques, fuzzy sets, fuzzification and defuzzification.	√	√	√	√	√		√			√	Understanding	yes	MSTs, Class Tests, Quizes, ESE
CO 3: Optimize solutions using Genetic Algorithm	√	√	√	√	√	√	√	√	√	√	Impementation	yes	MSTs, Class Tests, Quizes, ESE

| CO 4: Use hybrid soft computing techniques. | √ | √ | √ | √ | √ | | | | √ | √ | √ | Impementation | Yes | MSTs, Class Tests, Quizes, ESE |

MTWC-105-18- SIMULATION OF WIRELESS COMM. SYSTEMS

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Study the role of simulation in communication system and random processes	√	√	√	√	√					√	Understanding	No	Practical File, Internal Viva, Semester End External Viva
CO 2: Review stochastic processes and parameter estimation	√	√	√	√	√	√	√	√	√	√	Understanding	yes	Practical File, Internal Viva, Semester End External Viva
CO 3:Model wireless communication systems through numerical methods.	√	√	√	√	√	√	√	√	√	√	Impementation	yes	Practical File, Internal Viva, Semester End External Viva
CO 4: Study communication channel models and perform Monte Carlo Simulation.	√	√	√	√	√			√	√	√	Understanding	Yes	Practical File, Internal Viva, Semester End External Viva

MTWC-PE3A-18- Smart Antennas

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the significance of smart antennas and its historical development.	√	√									Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Know the architecture of Smart antennas, types, applications	√	√	√	√	√	√			√	√	Learning	No	MSTs, Class Tests, Quizes, ESE

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO 3: Learn antenna array fundamentals criteria and beam forming basics	√	√					√		√	√	Understanding	no	MSTs, Class Tests, Quizes, ESE
CO 4: Explain the Spatial Processing techniques for CDMA Smart Antennas	√	√	√	√	√				√	√	Understanding	no	MSTs, Class Tests, Quizes, ESE

MTWC-PE3B-18 Wireless Network Planning, Optimization and Management

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO 1: Understand the Radio Network planning and optimization	√	√									Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Know the technologies of WCDMA and GSM	√	√	√	√		√			√	√	Understanding	Yes	MSTs, Class Tests, Quizes, ESE
CO 3: . Learn the fundamentals of Radio Resource Management		√							√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE

MTWC-PE3C-18 Microwave and RF Design

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the significance of Microwave and RF designs	√	√	√						√		Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Know the fundamentals behind Microwave Amplifiers/Oscillators designs.	√			√		√		√			Understanding	No	MSTs, Class Tests, Quizes, ESE

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO 3: Technical know-how of Microwave and RF antennas concepts.	√		√	√		√	√	√	√	√	Understanding	yes	MSTs, Class Tests, Quizes, ESE

MTWC-PE3D-18- Multimedia Comunication and Technologies

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Learn multimedia system design techniques.	√	√	√	√	√	√	√			√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Implement compression and decompression techniques on data.	√	√	√	√	√	√	√	√	√	√	Implementation	yes	MSTs, Class Tests, Quizes, ESE
CO 3: Understand the concepts of storage and retrieval technologies.	√	√	√	√	√				√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 4: Learn multimedia design application.	√	√	√	√	√			√	√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE

MTWC-PE4A-18- Cryptography and Wireless

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the significance of Cryptography.	√	√	√	√	√	√	√			√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Know its Integrity, Authentication and Management.	√	√	√	√	√	√	√	√	√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 3: Learn the concepts of Security and threats to wireless systems.	√	√	√	√	√				√	√	Understanding	yes	MSTs, Class Tests, Quizes, ESE

MTWC-PE4B-18-Software Defined Radio & Cognitive Radio

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the fundamental concepts of software defined radio and cognitive radio networks.	√	√		√						√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Develop the cognitive radio, as well as techniques for spectrum holes detection that cognitive radio takes advantages in order to exploit it.	√	√	√	√		√	√	√	√	√	Implementation	yes	MSTs, Class Tests, Quizes, ESE
CO 3: Understand fundamental issues regarding dynamic spectrum access, the radio-resource management and trading, as well as a number of optimisation techniques for better spectrum exploitation.	√	√		√			√	√	√		Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 4: Apply SDR principles to smart antennas.	√	√	√	√	√	√	√	√	√	√	Application	Yes	MSTs, Class Tests, Quizes, ESE

MTWC-PE4C-18- Wireless and Optical Communication Networks

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Learn Wireless Communication Network layers/technology.	√			√	√		√		√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Understand basic network components of Wireless and Optical Networks.	√			√	√					√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 3: Explain their applications	√			√	√				√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE

MTWC-PE4D-18- MIMO Systems

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand Basic MIMO communication systems.	√			√	√		√		√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Explore Space-time block codes & Space-time trellis codes.	√	√	√	√	√				√		Understanding	yes	MSTs, Class Tests, Quizes, ESE
CO 3: MIMO systems for frequency-selective (FS) fading channels.	√	√				√		√	√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE

MTWC-PE5A-18- Millimeter Wave Communication Technology

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Familiarization with the concept of Millimeter wave communication.	√	√	√	√	√				√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO 2: Calculate the performance parameters in millimeter wave antennas.	√			√	√	√	√	√	√	√	Analysis	yes	MSTs, Class Tests, Quizes, ESE
CO 3: Model the millimeter wave link budget.	√			√				√	√		Implementation	No	MSTs, Class Tests, Quizes, ESE
CO 4: Analyze the millimeter wave with multiple antennas.	√			√					√	√	Implementation	No	MSTs, Class Tests, Quizes, ESE

MTWC-PE5B-18- Space Time Wireless Communication

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand Space Time Channel Characterization.	√	√	√	√				√	√		Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Explain Capacity of Multiple Antenna Channels.	√	√	√	√		√	√	√	√	√	Understanding	yes	MSTs, Class Tests, Quizes, ESE
CO 3: Learn ST OFDM, Spread Spectrum.	√			√				√	√	√	Learning	No	MSTs, Class Tests, Quizes, ESE

MTWC-PE5C-18- Advanced Techniques for Wireless Reception

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand Wireless Signaling Environment.	√		√	√	√			√	√		Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Explain the usage of Multiuser detection.	√		√	√	√		√	√	√		Explain	No	MSTs, Class Tests, Quizes, ESE
CO 3: Learn CDMA, OFDM, MIMO systems	√	√	√			√	√	√	√	√	Learning	No	MSTs, Class Tests, Quizes, ESE

MTWC-PE5D-18- Emerging Technologies of Wireless Communication

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the concept of cellular/wireless communication	√	√	√	√	√				√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Explain the Mobile Radio Propagation and Multiuser systems.	√	√		√	√	√			√	√	Explain	No	MSTs, Class Tests, Quizes, ESE
CO 3: Learn technologies of GPRS, UMTS, WiFi, WiMAX, Ultra Wideband communications, 4G and beyond 4G.	√	√					√	√	√	√	Learning	Ni	MSTs, Class Tests, Quizes, ESE

MTWC-PE5E-18- Microstrip Antennas

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the basic concept of micro-strip antennas, methods of analysis and configurations.	√	√	√	√	√				√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Explain micro-strip antennas arrays.	√			√	√	√	√		√	√	Explain	No	MSTs, Class Tests, Quizes, ESE
CO 3: Understand the physical significance of discontinuities	√			√	√				√	√	Understanding	no	MSTs, Class Tests, Quizes, ESE
CO 4: Learn coupled micro-strip line with multiband and broadband behavior	√			√	√	√				√	Learning	yes	MSTs, Class Tests, Quizes, ESE

MTOE-301A-18- Cost Management of Engineering Projects

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Understand the cost calculation for decision-making about an engineering research project	√	√	√	√	√				√	√	Understanding	No	MSTs, Class Tests, Quizes, ESE
CO 2: Able to define Role of each member in the project team	√			√	√	√	√		√	√	Describe	No	MSTs, Class Tests, Quizes, ESE
CO 3:Manage the project by applying Quantitative techniques for cost management	√			√	√	√			√	√	Management	Yes	MSTs, Class Tests, Quizes, ESE

MTWC-111-18-Wireless Communication Lab

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1:To design Path-Loss models	√	√	√	√	√	√			√	√	Implementation	Yes	Practical File, Internal Viva, Semester End External Viva
CO2:To investigate Fading environments in wireless channels	√	√		√	√	√	√	√	√	√	Understand	No	Practical File, Internal Viva, Semester End External Viva
CO3:To develop MATLAB codes for Block codes, Cyclic codes and Convolutional codes.	√	√		√	√	√		√	√	√	Coding	Yes	Practical File, Internal Viva, Semester End External Viva

MTWC-112-18-Information Theory and Coding Lab

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1:To understand the programming of Entropies and Mutual Information	√	√	√	√	√	√				√	Understand	No	Practical File, Internal Viva, Semester End External Viva
CO2:To learn and practice programming for generation and evaluation of various codes	√	√		√	√	√	√	√		√	Implementation	Yes	Practical File, Internal Viva, Semester End External Viva
CO3:To develop MATLAB codes for Block codes, Cyclic codes and Convolutional codes	√	√	√	√	√	√		√	√	√	Coding	Yes	Practical File, Internal Viva, Semester End External Viva

MTWC-105-18- SIMULATION OF WIRELESS COMM. SYSTEMS Laboratory

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
To understand the programming of OFDM based Transmitter & Receiver.	√	√	√	√	√					√	Understanding	No	Practical File, Internal Viva, Semester End External Viva
To learn and practice MATLAB programming for implementing Digital modulation techniques.	√	√	√	√	√	√	√	√	√	√	Implementation	yes	Practical File, Internal Viva, Semester End External Viva
To find the vacant spaces for secondary users in Cognitive Radio Networks..	√	√	√	√	√	√	√	√	√	√	Impementation	yes	Practical File, Internal Viva, Semester End External Viva

MTWC-MP1-18-Mini Project

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Acquire practical knowledge of the chosen field.	√	√	√	√	√	√	√		√	√	Acquire	No	Report,Internal viva-voce and external viva-voce.
CO2 Identify, analyze, formulate & handle programming projects with systematic approach.	√	√	√	√	√	√	√	√	√	√	Analysis	yes	Report,Internal viva-voce and external viva-voce.
CO3: Contribute as a team leader in the development of technical projects.	√	√	√	√	√		√		√		Implementation	yes	Report,Internal viva-voce and external viva-voce.
CO4: Develop communication skills for the presentation of project related activities.	√	√	√	√	√			√		√	Implementation	yes	Report,Internal viva-voce and external viva-voce.

MTWC-DS1-18 DISSERTATION PHASE I

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Critically analyse and evaluate existing knowledge about the chosen problem	√	√	√	√	√	√	√		√	√	Understanding	No	Report,Internal viva-voce and external viva-voce.

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO 2: Find the gaps and motivation through literature survey.	√	√	√	√	√	√	√	√	√	√	Analysis	yes	Report,Internal viva-voce and external viva-voce.
CO 3:Design the framework to optimize the solution for the problem	√	√	√	√	√			√		√	Implementation	yes	Report,Internal viva-voce and external viva-voce.
CO 4: Construct the research proposal.	√	√	√	√	√			√		√	Implementation	yes	Report,Internal viva-voce and external viva-voce.

MTWC-DS2-18- DISSERTATION PHASE II

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1: Implement the proposed framework practically or through simulation	√	√	√	√	√	√	√		√	√	Implementation	yes	Report,Internal viva-voce and external viva-voce.
CO 2: Gather the results and publish in the research articles.	√	√	√	√	√	√	√	√	√	√	Implementation	yes	Report,Internal viva-voce and external viva-voce.
CO 3: Write-up the proposed work, results with conclusion and future work in the form of thesis	√	√	√	√	√			√		√	Implementation	yes	Report,Internal viva-voce and external viva-voce.

CO4: Present the research work before a committee.	√	√	√	√	√			√		√	Presentation		yes	Report,Internal viva-voce and external viva-voce.

Signature of Head of Department

Name of the Department: B.Tech. Electronics and Communication Engineering

Subject: Mapping of Course Outcomes with Program Outcomes of B Tech

Ref No   Date:

CO No.	(BTEC-301-18: Electronic Devices)	Engineering Knowledge PO 1	Problem Analysis PO 2	Design/development of solutions PO 3	Conduct investigations of complex problems PO 4	Modern tool usage PO 5	The engineer and society PO 6	Environment and sustainability PO 7	Ethics PO 8	Individual and team work PO 9	Communication PO 10	Project management and finance PO 11	Life-long Learning PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand physics of semiconductors and behavior of charge carriers within semiconductors	√	√			√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO2	Understand the working of semiconductor diodes supported with mathematical explanation.	√	√		√	√							√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Understand the working of BJT and MOSFET with their equivalent small signal models.	√	√		√	√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests

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CO No.	(BTEC-302-18: Digital System Design)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO4	Understand the chemical processes used in fabrication of integrated circuits.	√	√		√	√							√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO1	Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.	√	√			√								Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	To understand and examine the structure of various number systems and its application in digital design.	√	√			√								Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	The ability to understand, analyze and design various combinational and sequential circuits.	√	√			√								Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Ability to identify basic requirements for a design application and propose a cost effective solution.	√	√											Understand	No	MSTs, ESE, Class/Quiz Tests

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CO No.	(BTEC-303-18: Electromagnetic Waves)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO5	The ability to identify and prevent various hazards and timing problems in a digital design.	√	√			√								Understand	No	MSTs, ESE, Class/Quiz Tests
CO1	Understand characteristics & wave propagation through transmission lines	√	√		√	√						√		Analyze	No	MSTs, ESE, Class/Quiz Tests
CO2	understand Maxwell's equations for electromagnetic waves	√	√		√	√						√		Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Characterize uniform plane wave	√	√		√	√						√		Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Calculate reflection and transmission of waves at media interface	√	√		√	√						√		Apply	No	MSTs, ESE, Class/Quiz Tests

CO No.	(UC-BTAM-303-18: Engineering Mathematics-III)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	The mathematical tools needed in evaluating multiple integrals and their usage	√	√		√									Apply	No	MSTs, ESE, Class/Quiz Tests

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO2	The effective mathematical tools for the solutions of differential equations that model physical processes.	√	√		√									Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems	√	√		√									Apply	No	MSTs, ESE, Class/Quiz Tests
CO4	To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering	√	√		√									Understanding	No	MSTs, ESE, Class/Quiz Tests
CO5	To provide an overview of probability and statistics to engineers	√	√		√									Understanding	No	

CO No.	(BTEC-304-18: Network Theory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Analyze linear networks using network theorems	√	√		√	√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO2	Use Laplace transform to analyze transient & steady state response of linear networks	√	√		√								√	Apply	No	MSTs, ESE, Class/Quiz Tests

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO3	Comprehend network parameters to analyze two port networks.	√	√		√									Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Realize one port networks using Foster's and Cauer's methods.	√	√		√								√	Apply	No	MSTs, ESE, Class/Quiz Tests

CO No.	(BTEC-311-18: Electronic Devices Laboratory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Realization using resistors and diodes in circuits with proper understanding to their working	√	√		√	√								Implementati	Yes	Practical notebooks,Internal viva,End sem external viva
CO2	Understand characteristics & working of transistor in different configurations.	√				√							√	Understanding	no	Practical notebooks,Internal viva,End sem external viva
CO3	Understand characteristics & working of MOSFET in circuits		√			√							√	Understanding	no	Practical notebooks,Internal viva,End sem external viva
CO4	Think and design working circuits based on resistors,diodes, transistors and MOSFETs	√	√		√	√							√	implementatio	Yes	Practical notebooks,Internal viva,End sem external viva

CO No.	(BTEC-312-18: Digital System Design Laboratory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO

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CO No.	Description	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Realize combinational circuits using logic gates	√	√		√	√								Implementatio	no	Practical notebooks,Internal viva,End sem external viva
CO2	Realize sequential circuits using logic gates	√			√	√							√	Implementatio	no	Practical notebooks,Internal viva,End sem external viva
CO3	Write & simulate VHDL programs for combinational & sequential circuits.	√	√		√	√								Understanding	Yes	Practical notebooks,Internal viva,End sem external viva
CO4	Think and design working projects using digital 74XX Ics	√	√	√	√								√	Implementatio	Yes	Practical notebooks,Internal viva,End sem external viva

CO No.	(HSMC101-18: Devlopment of Societies)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the Origin of Family, Clan and Society.								√				√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Understand the Forms of Government, like Democracy, Monocracy, Dictatorship and others								√				√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Understand the Basic concepts of Economic, Barter system and Jajmani system : Socialism, Capitalism, and Marxism..								√				√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Know about the Development process before, during and after British Rule in India.								√				√	Understand		MST,s ESE, Class/Quiz Tests

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BTEC-321-18: 4-Weeks Institutional Training

CO No.	(BTEC-321-18: 4-Weeks Institutional Training)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Exposure to Practical Aspects of the Discipline	√	√		√	√				√			√	Analyze	Yes	Practical notebooks,Internal viva,End sem external viva
CO2	Realization of common and simple circuits with proper understanding to their working	√	√		√	√				√			√	Apply	Yes	Practical notebooks,Internal viva,End sem external viva
CO3	Think and design working circuits based on common Electronic components	√	√		√	√				√			√	Analyze	Yes	Practical notebooks,Internal viva,End sem external viva

BTEC-331-18: Mentoring and Professional Development

CO No.	(BTEC-331-18: Mentoring and Professional Development)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Development of Overall Personality and Aptitutde						√	√	√	√	√		√	Analyze	Yes	Aptiitude Skills Tests, Viva
CO2	General Awareness both Current affairs & GK						√	√	√	√	√		√	Examine	Yes	Aptitude Skills Tests, Viva
CO3	Development of Communication Skills						√	√	√	√	√		√	Analyze	Yes	Aptitude Skills Tests, Viva
CO4	Development of Presentation Skills						√	√	√	√	√		√	Apply	Yes	Aptitude Skills Tests, Viva

BTEC-401-18: Analog Circuits

CO No.	(BTEC-401-18: Analog Circuits)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the biasing of transistors and analyze BJT/FET amplifiers	√	√		√	√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO2	Analyze various rectifier and amplifier circuits	√			√	√							√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Analyze sinusoidal and non-sinusoidal oscillators	√	√		√	√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Understand various types of Power Amplifiers	√	√			√							√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO No.	(BTEC-402-18: Microprocessors and Microcontrollers)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand architecture &functionalities of different building block of 8085 microprocessor.	√	√		√	√								Analyze	No	MSTs, ESE, Class/Quiz Tests
CO2	Understand working of different building blocks of 8051 microcontroller.	√	√		√								√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Comprehend and apply programming aspects of 8051 microcontroller.	√	√		√								√	Analyze	No	MSTs, ESE, Class/Quiz Tests

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CO No.	(BTEC-403-18: Signals and Systems)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO4	Interface & interact with different peripherals and devices.	√	√		√									Apply	No	MSTs, ESE, Class/Quiz Tests
CO1	Mathematically characterize different types of signals and systems.	√	√		√									Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Analyze the behavior of linear-shift invariant systems.	√	√		√									Analyze	No	MSTs, ESE, Class/Quiz Tests
CO3	Apply concepts of Fourier and Laplace Transforms to analyze continuous-time signals and systems.	√	√		√									Apply	No	MSTs, ESE, Class/Quiz Tests
CO4	Investigate discrete-time signals and systems using Discrete-Time Fourier and Z-Transforms and simple Probability concepts.	√	√		√									Analyze	No	MSTs, ESE, Class/Quiz Tests

CO No.	(HSMC-122-18: Universal Human Values-2)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the core of Universal Human Values.								√				√	Understand	No	MSTs, ESE, Class/Quiz Tests

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO		
CO2	Understand the Harmony and Self Exploration.							√					√	Understand	No	MSTs, ESE, Class/Quiz Tests		
CO3	Understand the Basic Human Aspiration.							√					√	Analyze	No	MSTs, ESE, Class/Quiz Tests		
CO4	Know about the Professional Ethics.							√					√	Understand		MST,s ESE, Class/Quiz Tests		

CO No.	(EVS-101-18:Environmental Sciences)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO		
CO1	Students will enable to understand environmental problems at local and national level through literature and general awareness							√					√	Undertsand	No	MSTs, ESE, Class/Quiz Tests		
CO2	The students will gain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various environmental Issues							√					√	Undertsand	No	MSTs, ESE, Class/Quiz Tests		

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO3	The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to mitigate these problems							√					√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO4	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world							√					√	Analyse	No	MSTs, ESE, Class/Quiz Tests

CO No.	(BTEC-411-18: Analog Circuits Lab)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
C01	Study and verify the characteristics of BJTs in circuits with proper understanding to their working.	√	√		√	√							√	Understanding	no	Practical notebooks, Internal viva, End sem external viva
CO2	Understand frequency response & working of various types of Oscillators	√			√	√								Understanding	no	Practical notebooks, Internal viva, End sem external viva
CO3	Understand characteristics & working of different types of Power amplifiers		√		√								√	Understanding	yes	Practical notebooks, Internal viva, End sem external viva

CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO	
CO4	Design working circuits of oscillators, emitter follower circuit and power amplifier	√	√			√	√						√	Implementatio	Yes	Practical notebooks, Internal viva, End sem external viva	
CO No.	(BTEC-412-18: Microprocessors and Microcontrollers Lab)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO	
CO1	Understanding the architecture &functionalities of different building blocks of 8085 microprocessor.		√		√	√								Understanding	yes	Practical notebooks, Internal viva, End sem external viva	
CO2	Programming for controlling stepper and DC motors using 8085 Microprocessor(s).	√	√			√							√	Implementatio	yes	Practical notebooks, Internal viva, End sem external viva	
CO3	Programs to generate waveforms and interface ADC and DAC using 8051 Microcontroller.	√	√			√	√							Implementatio	Yes	Practical notebooks, Internal viva, End sem external viva	
CO No.	(UC-BTEC-501-18: Analog and Digital Communication)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO	

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CO1	Analyze and compare different analog modulation schemes for their efficiency and bandwidth	√	√			√								Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Analyze the behavior of a communication system in presence of noise.	√	√											Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Investigate pulsed modulation system and analyze their system performance.	√	√			√						√		Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Analyze different digital modulation schemes and can compute the bit error performance.	√	√			√						√		Understand	No	MSTs, ESE, Class/Quiz Tests

CO No.	(UC-BTEC-502-18: Digital Signal Processing)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Represent signals mathematically in continuous and discrete time and frequency domain	√	√			√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Get the response of an LSI system to different signals	√	√										√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Design of different types of digital filters for various applications	√	√			√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests

CO No.	(UC-BTEC-503-18: Linear Integrated Circuits)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Represent signals mathematically in continuous and discrete time and frequency domain	√	√			√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Get the response of an LSI system to different signals	√	√			√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Design of different types of digital filters for various applications	√	√			√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests

CO No.	(UC-BTEC-504-18: Control Systems)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Characterize a system and find its steady state behaviour	√	√	√	√									Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Investigate stability of a system using different tests	√	√	√	√									Analyze	No	MSTs, ESE, Class/Quiz Tests
CO3	Design various controllers	√	√	√	√								√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Solve linear, non-linear and optimal control problems	√	√	√	√								√	Apply	No	MSTs, ESE, Class/Quiz Tests

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CO No.	(UC-BTEC-901A-18: AC & DC Motors)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the principle of energy conversion	√				√								Analyze	No	MSTs, ESE, Class/Quiz Tests
CO2	Explain the working principle, construction and applications of DC motors		√			√								Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Explain the working principle, construction and applications of AC motors				√									Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Gain knowledge about the fundamentals of Special motors	√	√		√	√								Apply	No	MSTs, ESE, Class/Quiz Tests

CO No.	(UC-BTEC-901C-18: Satellite Communication)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Interpret & define basics of Satellite communication, understand the complete link design along with and the interference effects on it		√											Understand	No	MSTs, ESE, Class/Quiz Tests

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO2	Understand various fixed and demand assignment multiple access techniques	√	√			√								Analyze	No	MSTs, ESE, Class/Quiz Tests
CO3	Understand the special purpose communication satellites.	√	√			√								Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Have knowledge of laser satellite communication and CATV system.	√				√								Apply	No	MSTs, ESE, Class/Quiz Tests

CO No.	(UC-BTEC-901F-18: JAVA Programming)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Apply the concepts and basics of JAVA	√	√			√								Analyze	No	MSTs, ESE, Class/Quiz Tests
CO2	Demonstrate the knowledge of operators and control statements		√			√								Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Ability to learn about Inheritance, Interface, Applets													Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Learn about JAVA database connectivity	√				√								Apply	No	MSTs, ESE, Class/Quiz Tests

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CO No.	(UC-BTEC-511-18: Analog and Digital Communication Laboratory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Study the characteristics and output waveforms of AM, FM, PCM	√	√		√	√								Understanding	no	Practical notebooks,Internal viva,End sem external viva
CO2	Study and compare noise in AM and FM systems	√	√		√	√								Understanding	no	Practical notebooks,Internal viva,End sem external viva
CO3	Investigate the output responses of PAM, PCM, PSK, FSK, MSK and QAM.	√	√										√	implementatio	yes	Practical notebooks,Internal viva,End sem external viva
CO4	Digital link simulation & error estimation in a digital link using MATLAB (SIMULINK)/ communication simulation packages.	√			√	√							√	Implementatio	yes	Practical notebooks,Internal viva,End sem external viva

CO No.	(UC-BTEC-512-18: Digital Signal Processing Laboratory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Develop a MATLAB program to generate standard sequences and various signals	√	√		√	√							√	implementatio	no	Practical notebooks,Internal viva,End sem external viva
CO2	Configuring Audio Codec of C6xxx Boards	√	√		√	√							√	implementatio	yes	Practical notebooks,Internal viva,End sem external viva

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CO No.	(UC-BTEC-513-18: Linear Integrated Circuits Laboratory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO3	Develop programs to verify convolution and design FIR & IIR filters.	√	√		√	√							√	implementation	yes	Practical notebooks,Internal viva,End sem external viva
CO4	Implementation of Audio Delay Line, Echo and Audio Reverberation	√	√		√	√				√			√	Implementation	Yes	Practical notebooks,Internal viva,End sem external viva

CO No.	(UC-BTEC-513-18: Linear Integrated Circuits Laboratory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Study the configurations of Differential amplifiers	√	√		√	√			√			√		Understanding	no	Practical notebooks,Internal viva,End sem external viva
CO2	Determine the performance parameters of an OP-Amp	√	√			√								Understanding	no	Practical notebooks,Internal viva,End sem external viva
CO3	Design various applications using Op-Amps				√	√			√			√		Implementation	yes	Practical notebooks,Internal viva,End sem external viva
CO4	Examine the operation of a Phase lock loop			√	√	√						√		Understanding	no	Practical notebooks,Internal viva,End sem external viva

CO No.	(UC-BTEC-601-18: Wireless Communication)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the basic elements of Cellular Radio Systems and its design	√	√		√	√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests

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CO No.	(BTCS-504-18: Computer Networks)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO2	Learn about the concepts Digital communication through fading multipath channels	√	√		√	√							√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Understand various Multiple Access techniques for Wireless communication	√	√		√	√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Know about the Wireless standards and systems	√	√		√	√							√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO No.	(BTCS-504-18: Computer Networks)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Explain the functions of the different layer of the OSI Protoco													Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Describe the function of each block of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs)													Analyze	No	MSTs, ESE, Class/Quiz Tests
CO3	Develop the network programming for a given problem related TCP/IP protocol													Implement	No	MSTs, ESE, Class/Quiz Tests

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO4	Learn about DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.													Understand	No	MSTs, ESE, Class/Quiz Tests

CO No.	(UC-BTEC-602-18: Opticsl Fibres and Communication)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Recognize and classify the structures of Optical fiber and types.	√	√			√						√		Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Discuss the channel impairments like losses and dispersion and analyze various coupling losses.	√	√									√		Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Classify the Optical sources and detectors and to discuss their principle.	√	√			√						√		Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Familiar with Design considerations of fiber optic systems and sources and detectors	√	√	√	√							√		Understand	No	MSTs, ESE, Class/Quiz Tests
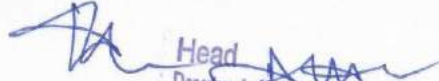
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CO No.	(UC-BTEC-603-18: Microwave and Antenna Engineering)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the working and operation of various Microwave Tubes and Microwave Solid-state devices.	√	√		√	√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO2	Learn about various important Microwave Components and the Microwave measurements that can be carried out	√	√		√	√								Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Explain the basic concepts and types of Antennas and its regions.	√			√									Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Describe the important concepts of Antenna Arrays and Antenna Aperture	√	√	√	√	√							√	Apply	No	MSTs, ESE, Class/Quiz Tests

CO No.	(UC-BTEC-902B-18: Power Electronics)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Attain the ability and to handle the concept of construction and characteristics of Power semiconductor devices and fundamental of thyristors and family		√		√	√								Analyze	No	MSTs, ESE, Class/Quiz Tests
CO2	Demonstrate and build a various single phase AC-DC power converter circuits and understand their applications		√		√	√								Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Illustrate the operating principle and construct a various types of DC-DC converters	√	√			√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Simulate power electronic converters and their control scheme.	√	√		√								√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO No.	(UC-BTEC-902C-18: Mobile ADHOC nETWORKS)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
C01	Understand the principles of mobile ad hoc networks, and their models.	√	√		√	√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO2	Understand and develop information dissemination protocols for mobile adhoc networks	√	√		√	√								Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Analyze the challenges in designing, routing and security in mobile adhoc networks.	√	√			√						√		Analyze	No	MSTs, ESE, Class/Quiz Tests

CO No.	(UC-BTEC-902E-18: Artificial Neural Networks)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand generic machine learning terminology	√	√	√	√	√								Analyze	No	MSTs, ESE, Class/Quiz Tests
CO2	Understand the mathematical foundations of neural network models	√	√	√	√	√								Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Have a broad knowledge in Fuzzy logic principles and will be able to determine different methods of Defuzzification	√	√	√	√	√								Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4																

CO No.	(UC-BTEC-611-18: Optical Fibres and Communication Laboratory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO

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CO No.	(UC-BTEC-612-18: Microwave and Antenna Engineering Laboratory)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Simulation of an optical communication system & calculation of its BER and Q factor using simulator.	√	√		√	√							√	Implementatio	no	Practical notebooks,Internal viva,End sem external viva
CO2	Study various types of optical sources and light detectors	√	√		√	√							√	Understanding	no	Practical notebooks,Internal viva,End sem external viva
CO3	Familiarization with the methods of slicing and connecting techniques of optical fibres	√	√		√	√							√	Implementatio	yes	Practical notebooks,Internal viva,End sem external viva
CO4	Study different types of losses in optical fibres.	√	√		√	√							√	Understanding	no	Practical notebooks,Internal viva,End sem external viva
CO5	Design various applications of optical fiber communication sysytem		√		√	√								Implementatio	yes	Practical notebooks,Internal viva,End sem external viva
CO1	Learn about general Microwave components and Microwave bench	√	√		√	√								Understanding	no	Practical notebooks,Internal viva,End sem external viva
CO2	Measure common parameters related to Microwave Oscillator(s).		√			√							√	Understanding	no	Practical notebooks,Internal viva,End sem external viva

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CO No.	(UC-BTEC-631-18: Project-I)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO	
CO3	Determine frequency and wavelength of waveguides.	√			√	√							√	Implementation	yes	Practical notebooks,Internal viva,End sem external viva	
CO4	Measure and plot radiation patterns of various types of Antennas		√		√								√	Implementation	yes	Practical notebooks,Internal viva,End sem external viva	
CO1	Understand the Survey and study of published literature on the assigned topic	√	√		√	√				√			√	Understanding	Yes	Practical notebooks,Internal viva,End sem external viva	
CO2	Working out a preliminary Approach to the Problem relating to the assigned topic	√	√		√	√				√			√	Understanding	Yes	Practical notebooks,Internal viva,End sem external viva	
CO3	preliminary Analysis/Modelling/Simulation/Experiment/Design/Feasibility	√	√		√	√				√			√	Implementation	Yes	Practical notebooks,Internal viva,End sem external viva	
CO4	Preparing a Written Report on the Study conducted for presentation to the Department	√	√		√	√				√			√	Implementation	yes	Practical notebooks,Internal viva,End sem external viva	

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CO No.	(BTEC-907A-18: Internet of Things (IOT) & Cloud Computing)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understanding concept of cloud computing and analyze trade-off between deploying application on cloud and using local infrastructure	√	√		√	√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Identify issues and design challenges in IoT applications.	√	√		√	√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Select appropriate hardware and software components for IoT applications	√	√		√	√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Conceptual knowledge will help students to build IOT applications	√	√		√	√							√	Apply	yes	MSTs, ESE, Class/Quiz Tests

CO No.	(BTEC-907C-18: Robotics and Embedded systems)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Ability to understand basic concept of robotics.	√	√		√	√								Understand	No	MSTs, ESE, Class/Quiz Tests

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO2	To analyze Instrumentation systems and their applications to various	√	√		√	√								Analyze	No	MSTs, ESE, Class/Quiz Tests
CO3	To know about the differential motion, add statics in robotics	√	√		√	√								Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	To know about the dynamics and control in robotics industries	√	√		√	√						√		Apply	Yes	MSTs, ESE, Class/Quiz Tests

CO No.	(BTEC-908C-18: VLSI Design)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the concepts and various processes related to VLSI	√	√		√	√						√		Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Understand the VLSI Circuit Design processes and Gate level design	√	√		√	√								Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Learn about VHDL Synthesis and the tools involved	√	√		√	√								Learn	No	MSTs, ESE, Class/Quiz Tests
CO4	Describe about CMOS Testing techniques		√		√	√						√		Describe	No	MSTs, ESE, Class/Quiz Tests

CO No.	(BTEC-909C-18: Embedded Systems Design)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO

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CO No.	(BTMC-101-18: Indian Constitution)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Learn about the basic architecture of 32-bit microcontrollers	√	√		√	√							√	Learning	No	MSTs, ESE, Class/Quiz Tests
CO2	Understand hardware interfacing concepts to connect digital as well as analog sensors while ensuring low power considerations.	√			√	√								Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Reviews and implement the protocols used by microcontroller to communicate with external sensors and actuators in real world	√			√							√		Revieweing	No	MSTs, ESE, Class/Quiz Tests
CO4	Understand Embedded Networking concepts based upon connected MCUs		√			√								Understand	No	MSTs, ESE, Class/Quiz Tests

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CO No.	CO Statements (BTMC-102-18: Essence of Indian Traditional Knowledge)	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-l	Learning Level	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the Philosophy of Indian constitution, like Sovereignty, Secular, Republic, Socialist and Democracy.							√					√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Understand the Rights and Duties of Citizens, Fundmantal Rights and Human Rights.							√					√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Examine the Forms of government, Parliamentary form of Govt. & Presidential Form of Govt, powers and position of President and Prime Minister .							√					√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	The Course will also helpful in prepration of Competitive exams National wide and state level, like IAS, IPS and others.							√					√	Understand		MST,s ESE, Class/Quiz Tests

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the Philosophy of Indian Knowledge system and and its Basic Structure.								√				√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Understand the Ancient India Culture, Society and Religion.								√				√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Examine the areas of Indian Linguistic Tradition.								√				√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO4	Know the contrubtion of scientists of different eras.								√				√	Understand		MST,s ESE, Class/Quiz Tests
CO No.	(BTEC-909E-18: Bio Medical Signal Processing)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the fundamentals of signal processing for various bio-signal analysis	√	√		√	√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Learn the Infinite impulse response (IIR) filter and study its applications	√			√	√							√	Learning	No	MSTs, ESE, Class/Quiz Tests
CO3	Attain in-depth knowledge about the basic concepts of finite impulse response (FIR) filter and study its applications	√			√								√	Understand	No	MSTs, ESE, Class/Quiz Tests

CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO4	Apply different methods of signal processing techniques in analyzing the various bio-signals such as Electro cardiogram (ECG), Electro myogram (EMG) and Phonocardiogram (PCG)	√			√								√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO No.	**(BTEC-907B-18: Antenna Radiating Systems)**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	**Skill**	**Focus on Employability / Entrepreneurship**	**Assessment Tools to Measure Attainment of CO**
CO1	To understand the basic concepts of radiation	√	√		√	√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	To analyse the radiation pattern of antenna arrays.	√	√											Analyze	No	MSTs, ESE, Class/Quiz Tests
CO3	To understand the concept of various wave propagation techniques													Understand	No	MSTs, ESE, Class/Quiz Tests
CO4	To understand the concept of radiating systems on environment	√	√		√	√							√	Understand	No	MSTs, ESE, Class/Quiz Tests

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CO No.	(BTEC-908B-18: Mobile Communication Networks)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO		
CO1	Understand the working principles of the mobile communication systems	√	√		√	√								Understand	No	MSTs, ESE, Class/Quiz Tests		
CO2	Understand the relation between the user features and underlying technology	√				√								Understand	No	MSTs, ESE, Class/Quiz Tests		
CO3	Analyze mobile communication systems for improved performance	√	√		√	√								Analyze	No	MSTs, ESE, Class/Quiz Tests		

CO No.	(BTEC-908A-18: Artificial Intelligence)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO		
CO1	Learn about the basic understanding of Artificial Intelligent system	√	√		√	√								Learning	No	MSTs, ESE, Class/Quiz Tests		
CO2	Explain about various types of Artificial Neural Networks & their models	√	√		√	√								Explain	No	MSTs, ESE, Class/Quiz Tests		
CO3	Describe Artificial Neural networks methods, operation and parameters	√	√		√	√								Describe	No	MSTs, ESE, Class/Quiz Tests		

CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO4	explore Neural Network MATLAB Toolbox	√	√		√	√								Explore	No	MSTs, ESE, Class/Quiz Tests
CO No.	(BTEC-909D-18: Artificial Intelligence and Machine Learning)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the concept of information and entropy	√	√		√	√								Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Understand Shannon's theorem for coding				√	√								Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Calculation of channel capacity													Calculate	No	MSTs, ESE, Class/Quiz Tests
CO4	Apply coding techniques	√	√			√								Apply	No	MSTs, ESE, Class/Quiz Tests
CO No.	(BTEC-909B-18: Information Theory and Coding)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	To learn the difference between optimal reasoning Vs human like reasoning	√	√		√	√							√	Learning	No	MSTs, ESE, Class/Quiz Tests

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CO No.	(BTEC-907D-18: Python Programming)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO2	To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities	√	√		√	√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	To learn different knowledge representation techniques		√		√	√							√	Learning	No	MSTs, ESE, Class/Quiz Tests
CO4	To understand the applications of AI namely, Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing	√			√	√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO No.	(BTEC-907D-18: Python Programming)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Read and write simple Python programs.	√	√		√	√							√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO2	Develop Python programs with conditionals and loops.	√	√		√	√							√	Develop	No	MSTs, ESE, Class/Quiz Tests

CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO3	Define Python functions and to use Python data structures—lists, tuples, dictionaries.	√	√		√	√							√	Learning	No	MSTs, ESE, Class/Quiz Tests
CO4	Perform input/output operations with files in Python.	√	√		√	√							√	Perform	No	MSTs, ESE, Class/Quiz Tests
CO5	Execute Searching, sorting and merging in Python.	√		√		√							√	Excecute	Yes	MSTs, ESE, Class/Quiz Tests
CO No.	(BTEC-907E-18: Adaptive Signal Processing)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the non-linear control and the need and significance of changing the control parameters with respect to real-time situation	√	√		√	√								Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Mathematically represent the 'adaptability requirement'.	√	√	√	√	√							√	Apply	No	MSTs, ESE, Class/Quiz Tests
CO3	Understand the mathematical treatment for the modeling and design of the signal processing systems.	√	√	√	√	√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests

CO No.	(BTEC-908D-18: Soft Computing)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the concepts of Soft Computing and Algorithms involved there-in	√	√		√	√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Understand Genetic Algorithms with its operators and applications		√			√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Learn about the Neural Network models and its applications	√	√		√	√							√	Applying	Yes	MSTs, ESE, Class/Quiz Tests
CO4	Describe the Fuzzy systems and Swarm Intelligence	√			√								√	Describe	No	MSTs, ESE, Class/Quiz Tests

CO No.	(BTEC-909A-18: Big Data Fundamentals)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Understand the Evolution and basics of Big Data.	√	√		√								√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO2	Understand the Architecture of Hadoop with its file system and its Programming.	√			√	√							√	Understand	No	MSTs, ESE, Class/Quiz Tests
CO3	Explain the Advanced analytical theory and methods.		√		√	√							√	Explain	No	MSTs, ESE, Class/Quiz Tests

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CO No.		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO4	Describe the challenges in handling streaming data from the real world.	√	√			√							√	Describe	No	MSTs, ESE, Class/Quiz Tests
CO No.	(BTEC-908E-18: Digital Image and Video Processing)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Mathematically represent various types of images and analyze them.	√	√		√	√							√	Analyze	No	MSTs, ESE, Class/Quiz Tests
CO2	2. Process these images for the enhancement of certain properties or for optimized use of the resources.	√	√		√	√							√	Apply	Yes	MSTs, ESE, Class/Quiz Tests
CO3	3. Develop algorithms for image compression and coding.	√	√		√	√							√	Design	Yes	MSTs, ESE, Class/Quiz Tests
CO No.	(BTEC-731-18: Project-II)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measure Attainment of CO
CO1	Review and finalization of the Approach to the Problem relating to the assigned topic	√	√		√	√							√	Review	Yes	Report Submission, Internal Viva, Project Submission, Semester-End Viva

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CO	Description																		
CO2	Detailed Analysis/Modeling/Simulation/Design/Problem Solving/Experiment as needed	√	√			√	√								√	Apply	Yes	Report Submission, Internal Viva, Project Submission, Semester-End Viva		
CO3	Final development of product/process, testing, results, conclusions and future directions:	√	√	√	√	√									√	Design	Yes	Report Submission, Internal Viva, Project Submission, Semester-End Viva		
CO4	Prototyping or Product development/Patent and Video demonstration;	√	√	√	√	√									√	Design	Yes	Report Submission, Internal Viva, Project Submission, Semester-End Viva		
CO5	Preparing a paper for Conference presentation/Publication in Journals;	√	√			√									√	Prepare	No	Report Submission, Internal Viva, Project Submission, Semester-End Viva		
CO6	Preparing a Dissertation in the standard format for being evaluated by the Department	√	√			√	√								√	Prepare	Yes	Report Submission, Internal Viva, Project Submission, Semester-End Viva		

Signature of HoD

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Department of Electronics and Communication Engineering

Sub: COs for M-Tech Course

MTWC-101-18- Wireless Communication

Course Outcome

CO1: Implement physical models of wireless channels

CO2: Gain knowledge of key concepts of wireless communication

CO3: Measure capacity of AWGN channel, LTI Gaussian channels and various fading channels

CO4: Study uplink and downlink model of AWGN channel, fading channels and multiuser diversity

MTWC-102-18- Information Theory & Coding

Course Outcome

CO1: Understand the fundamentals of information theory.

CO 2: Encode text, audio, speech, image and video signals through

various coding and compression techniques.

CO 3: Detect and correct errors in the received signals through error

detecting and correcting codes

MTWC-PE1-18- Wireless Sensor Networks

Course Outcome

CO1: Gain insights of Wireless Sensor Network(WSN) background, its

challenges, constraints along with its advantages and applications.

CO 2: Know the architecture of WSN and its sub-systems.

CO 3: Explain node structure along with the technologies used in

CO 4: Study various Wireless Propagation Models and discuss the

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various MAC protocols, communication protocols and routing protocols

MTWC-PE1B-18- RF MEMS FOR WIRELESS COMMUNICATION SYSTEM

Course Outcome

CO 1: Understand the key concepts in RF based MEMS wireless communication system.

CO 2: Design RF based circuits through modelling.

CO 3: Understand the usage of RF based circuit elements to reconfigure the circuit design.

CO 4: Study various oscillators and filters.

MTWC-PE1C-18- ADVANCED DIGITAL SIGNAL PROCESSING

Course Outcome

CO1: Apply digital transform techniques on signals.

CO 2: Design digital FIR and IIR filters.

CO 3: Predict and estimate errors in digital signal processing systems.

CO 4: Handle multirate DSP and use adaptive filters.

MTWC-PE1D-18- AUDIO AND VIDEO SIGNAL PROCESSING

Course Outcome

CO1: Learn the audio and video signal processing systems.

CO 2: Code and decode the image, audio and video signals.

CO 3: Modulate and demodulate digital signal processing systems.

MTWC-PE2A-18-ADVANCED COMMUNICATION SYSTEM

Course Outcome

CO1: Differentiate between analog and digital communication

CO 2: Transmit data through various digital modulation techniques

CO 3: Understand optical and satellite communication systems.

CO 4: Recognize mobile communication systems, access techniques

and transmission protocols.

MTWC-PE2B-18-DETECTION AND ESTIMATION THEORY

Course Outcome

CO1: Know the background of the signals, variables and processes.

CO 2: Test the data through statistical tools.

CO 3: Learn the ways to detect non-parametric, random and deterministic signals.

CO 4: Familiarize with the estimation of signal parameters

MTWC-PE2C-18- MOBILE ADHOC NETWORKS

Course Outcome

CO1: Know the features, applications, models and characteristics of adhoc networks.

CO 2:Learn the protocols followed in MAC layer, Network layer, Transport layer, Security layer and Cross layer design.

CO 3: Learn how to integrate adhoc networks with mobile-IP

MTWC-PE2D-18- OPTICAL NETWORK AND PHOTONIC SWITCHING

Course Outcome

CO1: Know the optical transmission and reception

CO 2: Apply the compensation techniques to the lost data/signals.

CO 3:Learn the architecture and protocols of passive optical networks.

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CO 4: Learn the process of wire line techniques.

MTRM-101-18 RESEARCH METHODOLOGY & IPR

Course Outcome

CO1: 1. Understand research, research process, define and redefine research problem through literature survey.

CO 2: Know the primary and secondary sources of data collection and select sample size based on the requirement.

CO 3: Utilize the resources efficiently.

CO 4: Critically analyse the data through various statistical measures, perform experiment, gather data and reach to a conclusion based on some hypothesis.

CO5: Know the intellectual property rights

CO6: Write up the report and research article.

MTAC-AO1-18-English for research paper writing

Course Outcome

CO1: Understand that how to improve your writing skills and level of readability

CO 2: Learn about what to write in each section

CO 3:Understand the skills needed when writing a Title

CO 4: Ensure the good quality of paper at very first-time submission.

MTAC-A02-18-Disaster Management

Course Outcome

CO1: Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.

CO 2: Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.

CO 3:Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

CO 4: Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.

MTWC-103-18 Advanced Wireless Communication

Course Outcome

CO1: Review the fundamentals of wireless communication

CO 2: Compare the performance of different digital modulation techniques over wireless channels.

CO 3: Design OFDM system and data transmission through multicarrier modulation.

CO 4: Describe OFDMA system, its operation and applications.

MTWC-104-18- Soft Computing Techniques

Course Outcome

CO1: Study basic concept of soft computing and differentiate between supervised, unsupervised and reinforced learning methods.

CO 2: Learn various artificial neural network techniques, fuzzy sets, fuzzification and defuzzification.

CO 3: Optimize solutions using Genetic Algorithm

CO 4: Use hybrid soft computing techniques.

MTWC-105-18- SIMULATION OF WIRELESS COMM. SYSTEMS

Course Outcome

CO1: Study the role of simulation in communication system and random processes.

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CO 2: Review stochastic processes and parameter estimation

CO 3: Model wireless communication systems through numerical methods.

CO 4: Study communication channel models and perform Monte Carlo Simulation.

MTWC-PE3A-18- Smart Antennas

Course Outcome

CO1: Understand the significance of smart antennas and its historical development.

CO 2: Know the architecture of Smart antennas, types, applications

CO 3: Learn antenna array fundamentals criteria and beam forming basics

CO 4: Explain the Spatial Processing techniques for CDMA Smart Antennas

MTWC-PE3B-18 Wireless Network Planning, Optimization and Management

CO 1: Understand the Radio Network planning and optimization

CO 2: Know the technologies of WCDMA and GSM

CO 3: . Learn the fundamentals of Radio Resource Management

MTWC-PE3C-18 Microwave and RF Design

CO1: Understand the significance of Microwave and RF designs

CO 2: Know the fundamentals behind Microwave Amplifiers/Oscillators designs.

CO 3: Technical know-how of Microwave and RF antennas concepts.

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MTWC-PE3D-18- Multimedia Comunication and Technologies

Course Outcome

CO1: Understand the significance of Microwave and RF designs

CO 2: Know the fundamentals behind Microwave Amplifiers/Oscillators designs.

CO 3: Technical know-how of Microwave and RF antennas concepts.

MTWC-PE3D-18- Multimedia Comunication and Technologies

Course Outcome

CO1: Learn multimedia system design techniques.

CO 2: Implement compression and decompression techniques on

CO 3: Understand the concepts of storage and retrieval technologies.

CO 4: Learn multimedia design application.

MTWC-PE4A-18- Cryptography and Wireless

Course Outcome

CO1: Understand the significance of Cryptography.

CO 2: Know its Integrity, Authentication and Management.

CO 3: Learn the concepts of Security and threats to wireless systems.

MTWC-PE4B-18-Software Defined Radio & Cognitive Radio

Course Outcome

CO1: Understand the fundamental concepts of software defined radio and cognitive radio networks.

CO 2: Develop the cognitive radio, as well as techniques for spectrum holes detection that cognitive radio takes advantages in order to exploit it.

CO 3: Understand fundamental issues regarding dynamic spectrum access, the radio-resource management and trading, as well as a number of optimisation techniques for better spectrum exploitation.

CO 4: Apply SDR principles to smart antennas.

MTWC-PE4C-18- Wireless and Optical Communication Networks

Course Outcome

CO1: Learn Wireless Communication Network layers/technology.

CO 2: Understand basic network components of Wireless and Optical Networks.

CO 3: Explain their applications

MTWC-PE4D-18- MIMO Systems

Course Outcome

CO1: Understand Basic MIMO communication systems.

CO 2: Explore Space-time block codes & Space-time trellis codes.

CO 3: MIMO systems for frequency-selective (FS) fading channels.

MTWC-PE5A-18- Millimeter Wave Communication Technology

Course Outcome

CO1: Familiarization with the concept of Millimeter wave communication.

CO 2: Calculate the performance parameters in millimeter wave antennas.

CO 3: Model the millimeter wave link budget.

CO 4: Analyze the millimeter wave with multiple antennas.

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MTWC-PE5B-18- Space Time Wireless Communication

Course Outcome

CO1:Understand Space Time Channel Characterization.

CO 2: Explain Capacity of Multiple Antenna Channels.

CO 3: Learn ST OFDM, Spread Spectrum.

MTWC-PE5C-18- Advanced Techniques for Wireless Reception

Course Outcome

CO1: Understand Wireless Signaling Environment.

CO 2: Explain the usage of Multiuser detection.

CO 3: Learn CDMA, OFDM, MIMO systems

MTWC-PE5D-18- Emerging Technologies of Wireless Communication

Course Outcome

CO1: Understand the concept of cellular/wireless communication

CO 2: Explain the Mobile Radio Propagation and Multiuser systems.

CO 3: Learn technologies of GPRS, UMTS, WiFi, WiMAX, Ultra Wideband communications, 4G and beyond 4G.

MTWC-PE5E-18- Microstrip Antennas

Course Outcome

CO1: Understand the basic concept of micro-strip antennas, methods of analysis and configurations.

CO 2: Explain micro-strip antennas arrays.

CO 3: Understand the physical significance of discontinuities

CO 4: Learn coupled micro-strip line with multiband and broadband behavior

MTOE-301A-18- Cost Management of Engineering Projects

Course Outcome

CO1: Understand the cost calculation for decision-making about an engineering research project

CO 2: Able to define Role of each member in the project team

CO 3:Manage the project by applying Quantitative techniques for cost management

MTWC-111-18-Wireless Communication Lab

Course Outcome

CO1:To design Path-Loss models

CO2:To investigate Fading environments in wireless channels CO3:To develop MATLAB codes for Block codes, Cyclic codes

MTWC-112-18-Information Theory and Coding Lab

Course Outcome

CO1:To understand the programming of Entropies and Mutual In CO2:To learn and practice programming for generation and evaluation CO3:To develop MATLAB codes for Block codes, Cyclic codes

MTWC-105-18- SIMULATION OF WIRELESS COMM. SYSTEMS Laboratory

To understand the programming of OFDM based Transmitter & To learn and practice MATLAB programming for implementing To find the vacant spaces for secondary users in Cognitive Radio

MTWC-MP1-18-Mini Project

CO1: Acquire practical knowledge of the chosen field.

CO2 Identify, analyze, formulate & handle programming projects with systematic approach.

CO3: Contribute as a team leader in the development of technical projects.

CO4: Develop communication skills for the presentation of project related activities.

MTWC-DS1-18 DISSERTATION PHASE I

Course Outcome

CO1: Critically analyse and evaluate existing knowledge about the chosen problem

CO 2: Find the gaps and motivation through literature survey.

CO 3:Design the framework to optimize the solution for the problem

CO 4: Construct the research proposal.

MTWC-DS2-18- DISSERTATION PHASE II

Course Outcome

CO1: Implement the proposed framework practically or through simulation

CO 2: Gather the results and publish in the research articles.

CO 3: Write-up the proposed work, results with conclusion and future work in the form of thesis

CO4: Present the research work before a committee.

BoS(Co-ordinator)

HOD(ECE)

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Sub:COs for B-Tech Course

CO No.(BTEC-301-18: Electronic Devices)

CO1 Understand physics of semiconductors and behavior of charge carriers within semiconductors
CO2 Understand the working of semiconductor diodes supported with mathematical explanation.
CO3 Understand the working of BJT and MOSFET with their equivalent small signal models.
CO4 Understand the chemical processes used in fabrication of integrated circuits.

CO No . (BTEC-302-18: Digital System Design)

CO1 Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
CO2 To understand and examine the structure of various number systems and its application in digital design.
CO3 The ability to understand, analyze and design various combinational and sequential circuits.
CO4 Ability to identify basic requirements for a design application and propose a cost effective solution.
CO5 The ability to identify and prevent various hazards and timing problems in a digital design.

CO No.(BTEC-303-18: Electromagnetic Waves)

CO1 Understand characteristics & wave propagation through transmission lines
CO2 Understand Maxwell's equations for electromagnetic waves
CO3 Characterize uniform plane wave
CO4 Calculate reflection and transmission of waves at media interface

CO No. (UC-BTAM-303-18: Engineering Mathematics-III)

CO1 The mathematical tools needed in evaluating multiple integrals and their usage
CO2 The effective mathematical tools for the solutions of differential equations that model physical processes.
CO3 The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.
CO4 To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering.
CO5 To provide an overview of probability and statistics to engineers

CO No.(BTEC-304-18: Network Theory)

CO1 Analyze linear networks using network theorems
CO2 Use Laplace transform to analyze transient & steady state response of linear networks
CO3 Comprehend network parameters to analyze two port networks.
CO4 Realize one port networks using Foster's and Cauer's methods.

CO No.(BTEC-311-18: Electronic Devices Laboratory)

CO1 Realization using resistors and diodes in circuits with proper understanding to their working
CO2 Understand characteristics & working of transistor in different configurations.
CO3 Understand characteristics & working of MOSFET in circuits
CO4 Think and design working circuits based on resistors, diodes, transistors and MOSFETs

CO No. (BTEC-312-18: Digital System Design Laboratory)

CO1 Realize combinational circuits using logic gates
CO2 Realize sequential circuits using logic gates
CO3 Write & simulate VHDL programs for combinational & sequential circuits.
CO4 Think and design working projects using digital 74XX Ics

CO No. (HSMC101-18: Devlopment of Societies)

CO1 Understand the Origin of Family, Clan and Society.
CO2 Understand the Forms of Government, like Democracy, Monocracy, Dictatorship and others
CO3 Understand the Basic concepts of Economic, Barter system and Jajmani system : Socialism, Capitalism, and Marxism..
CO4 Know about the Development process before, during and after British Rule in India.

CO No. (BTEC-321-18: 4-Weeks Institutional Training)

CO1 Exposure to Practical Aspects of the Discipline
CO2 Realization of common and simple circuits with proper understanding to their working
CO3 Think and design working circuits based on common Electronic components

CO No.(BTEC-331-18: Mentoring and Professional Development)

CO1 Development of Overall Personality and Aptitutde
CO2 General Awareness both Current affairs & GK
CO3 Development of Communication Skills
CO4 Development of Presentation Skills

CO No.(BTEC-401-18: Analog Circuits)

CO1 Understand the biasing of transistors and analyze BJT/FET amplifiers
CO2 Analyze various rectifier and amplifier circuits
CO3 Analyze sinusoidal and non-sinusoidal oscillators
CO4 Understand various types of Power Amplifiers

CO No. (BTEC-402-18: Microprocessors and Microcontrollers)

CO1 Understand architecture &functionalities of different building block of 8085 microprocessor.
CO2 Understand working of different building blocks of 8051 microcontroller.
CO3 Comprehend and apply programming aspects of 8051 microcontroller.
CO4 Interface & interact with different peripherals and devices.

CO No.(BTEC-403-18: Signals and Systems)

CO1   Mathematically characterize different types of signals and systems.
CO2   Analyze the behavior of linear-shift invariant systems.
CO3   Apply concepts of Fourier and Laplace Transforms to analyze continuous-time signals and systems.
CO4   Investigate discrete-time signals and systems using Discrete-Time Fourier and Z-Transforms and simple Probability concepts.

CO No.(HSMC-122-18: Universal Human Values-2)

CO1   Understand the core of Universal Human Values.
CO2   Understand the Harmony and Self Exploration.
CO3   Understand the Basic Human Aspiration.
CO4   Know about the Professional Ethics.

CO No.(EVS-101-18:Environmental Sciences)

CO1   Students will enable to understand environmental problems at local and national level through literature and general awareness
CO2   The students will gain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various environmental Issues
CO3   The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to mitigate these problems
CO4   Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world

CO No.(BTEC-411-18: Analog Circuits Lab)

CO1   Study and verify the characteristics of BJTs in circuits with proper understanding to their working.
CO2   Understand frequency response & working of various types of Oscillators
CO3   Understand characteristics & working of different types of Power amplifiers
CO4   Design working circuits of oscillators,emitter follower circuit and power amplifier

CO No.(BTEC-412-18: Microprocessors and Microcontrollers Lab)

CO1   Understanding the architecture &functionalities of different building blocks of 8085 microprocessor.
CO2   Programming for controlling stepper and DC motors using 8085 Microprocessor(s).
CO3   Programs to generate waveforms and interface ADC and DAC using 8051 Microcontroller.

CO No.(UC-BTEC-501-18: Analog and Digital Communication)

CO1   Analyze and compare different analog modulation schemes for their efficiency and bandwidth
CO2   Analyze the behavior of a communication system in presence of noise.
CO3   Investigate pulsed modulation system and analyze their system performance.
CO4   Analyze different digital modulation schemes and can compute the bit error performance.

CO No.(UC-BTEC-502-18: Digital Signal Processing)

CO1 Represent signals mathematically in continuous and discrete time and frequency domain
CO2 Get the response of an LSI system to different signals
CO3 Design of different types of digital filters for various applications

CO No.(UC-BTEC-503-18: Linear Integrated Circuits)

CO1 Represent signals mathematically in continuous and discrete time and frequency domain
CO2 Get the response of an LSI system to different signals
CO3 Design of different types of digital filters for various applications

CO No.(UC-BTEC-504-18: Control Systems)

CO1 Characterize a system and find its steady state behaviour
CO2 Investigate stability of a system using different tests
CO3 Design various controllers
CO4 Solve linear, non-linear and optimal control problems

CO No.(UC-BTEC-901A-18: AC & DC Motors)

CO1 Understand the principle of energy conversion
CO2 Explain the working principle, construction and applications of DC motors
CO3 Explain the working principle, construction and applications of AC motors
CO4 Gain knowledge about the fundamentals of Special motors

CO No.(UC-BTEC-901C-18: Satellite Communication)

CO1 Interpret & define basics of Satellite communication, understand the complete link design along with and the interference effects on it
CO2 Understand various fixed and demand assignment multiple access techniques
CO3 Understand the special purpose communication satellites.
CO4 Have knowledge of laser satellite communication and CATV system.

CO No.(UC-BTEC-901F-18: JAVA Programming)

CO1 Apply the concepts and basics of JAVA
CO2 Demonstrate the knowledge of operators and control statements
CO3 Ability to learn about Inheritance, Interface, Applets
CO4 Learn about JAVA database connectivity

CO No.(UC-BTEC-511-18: Analog and Digital Communication Laboratory)

CO1 Study the characteristics and output waveforms of AM, FM, PCM

CO2 Study and compare noise in AM and FM systems
CO3 Investigate the output responses of PAM, PCM, PSK, FSK, MSK and QAM.
CO4 Digital link simulation & error estimation in a digital link using MATLAB (SIMULINK)/ communication simulation packages.

CO No.(UC-BTEC-512-18: Digital Signal Processing Laboratory)

CO1 Develop a MATLAB program to generate standard sequences and various signals
CO2 Configuring Audio Codec of C6xxx Boards
CO3 Develop programs to verify convolution and design FIR & IIR filters.
CO4 Implementation of Audio Delay Line, Echo and Audio Reverberation

CO No.(UC-BTEC-513-18: Linear Integrated Circuits Laboratory)

CO1 Study the configurations of Differential amplifiers
CO2 Determine the performance parameters of an OP-Amp
CO3 Design various applications using Op-Amps
CO4 Examine the operation of a Phase lock loop

CO No.(UC-BTEC-601-18: Wireless Communication)

CO1 Understand the basic elements of Cellular Radio Systems and its design
CO2 Learn about the concepts Digital communication through fading multipath channels
CO3 Understand various Multiple Access techniques for Wireless communication
CO4 Know about the Wireless standards and systems

CO No.(BTCS-504-18: Computer Networks)

CO1 Explain the functions of the different layer of the OSI Protoco
CO2 Describe the function of each block of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs)
CO3 Develop the network programming for a given problem related TCP/IP protocol
CO4 Learn about DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

CO No.(UC-BTEC-602-18: Opticsl Fibres and Communication)

CO1 Recognize and classify the structures of Optical fiber and types.
CO2 Discuss the channel impairments like losses and dispersion and analyze various coupling losses.
CO3 Classify the Optical sources and detectors and to discuss their principle.
CO4 Familiar with Design considerations of fiber optic systems and sources and detectors

CO No.(UC-BTEC-603-18: Microwave and Antenna Engineering)

CO1 Understand the working and operation of various Microwave Tubes and Microwave Solid-state

devices.
CO2   Learn about various important Microwave Components and the Microwave measurements that can be carried out
CO3   Explain the basic concepts and types of Antennas and its regions.
CO4   Describe the important concepts of Antenna Arrays and Antenna Aperture

CO No.(UC-BTEC-902B-18: Power Electronics)

CO1   Attain the ability and to handle the concept of construction and characteristics of Power semiconductor devices and fundamental of thyristors and family
CO2   Demonstrate and build a various single phase AC-DC power converter circuits and understand their applications
CO3   Illustrate the operating principle and construct a various types of DC-DC converters
CO4   Simulate power electronic converters and their control scheme.

CO No.(UC-BTEC-902C-18: Mobile ADHOC NETWORKS)

CO1   Understand the principles of mobile ad hoc networks, and their models.
CO2   Understand and develop information dissemination protocols for mobile adhoc networks
CO3   Analyze the challenges in designing, routing and security in mobile adhoc networks.

CO No.(UC-BTEC-902E-18: Artificial Neural Networks)

CO1   Understand generic machine learning terminology
CO2   Understand the mathematical foundations of neural network models
CO3   Have a broad knowledge in Fuzzy logic principles and will be able to determine different methods of Defuzzification

CO No.(UC-BTEC-611-18: Optical Fibres and Communication Laboratory)

CO1   Simulation of an optical communication system & calculation of its BER and Q factor using simulator.
CO2   Study various types of optical sources and light detectors
CO3   Familiarization with the methods of slicing and connecting techniques of optical fibres
CO4   Study different types of losses in optical fibres.
CO5   Design various applications of optical fiber communication sysytem

CO No.(UC-BTEC-612-18: Microwave and Antenna Engineering Laboratory)

CO1   Learn about general Microwave components and Microwave bench
CO2   Measure common parameters related to Microwave Oscillator(s).
CO3   Determine frequency and wavelength of waveguides.
CO4   Measure and plot radiation patterns of various types of Antennas

CO No.(UC-BTEC-631-18: Project-I)

CO1	Understand the Survey and study of published literature on the assigned topic
CO2	Working out a preliminary Approach to the Problem relating to the assigned topic
CO3	preliminary Analysis/Modelling/Simulation/Experiment/Design/Feasibility
CO4	Preparing a Written Report on the Study conducted for presentation to the Department

CO No.(BTEC-907A-18: Internet of Things (IOT) & Cloud Computing)

CO1	Understanding concept of cloud computing and analyze trade-off between deploying application on cloud and using local infrastructure
CO2	Identify issues and design challenges in IoT applications.
CO3	Select appropriate hardware and software components for IoT applications
CO4	Conceptual knowledge will help students to build IOT applications

CO No.(BTEC-907C-18: Robotics and Embedded systems)

CO1	Ability to understand basic concept of robotics.
CO2	To analyze Instrumentation systems and their applications to various
CO3	To know about the differential motion, add statics in robotics
CO4	To know about the dynamics and control in robotics industries

CO No.(BTEC-908C-18: VLSI Design)

CO1	Understand the concepts and various processes related to VLSI
CO2	Understand the VLSI Circuit Design processes and Gate level design
CO3	Learn about VHDL Synthesis and the tools involved
CO4	Describe about CMOS Testing techniques

CO No.(BTEC-909C-18: Embedded Systems Design)

CO1	Learn about the basic architecture of 32-bit microcontrollers
CO2	Understand hardware interfacing concepts to connect digital as well as analog sensors while ensuring low power considerations.
CO3	Reviews and implement the protocols used by microcontroller to communicate with external sensors and actuators in real world
CO4	Understand Embedded Networking concepts based upon connected MCUs

CO No.(BTMC-101-18: Indian Constitution)

CO1	Understand the Philosophy of Indian constitution, like Sovereignty, Secular, Republic, Socialist and Democracy.
CO2	Understand the Rights and Duties of Citizens, Fundamental Rights and Human Rights.
CO3	Examine the Forms of government, Parliamentary form of Govt. & Presidential Form of Govt, powers and position of President and Prime Minister .
CO4	The Course will also helpful in preparation of Competitive exams National wide and state level, like IAS, IPS and others.

CO No.CO Statements (BTMC-102-18: Essence of Indian Traditional Knowledge)

CO1	Understand the Philosophy of Indian Knowledge system and and its Basic Structure.
CO2	Understand the Ancient India Culture, Society and Religion.
CO3	Examine the areas of Indian Linguistic Tradition.

CO4   Know the contribution of scientists of different eras.

CO No.(BTEC-909E-18: Bio Medical Signal Processing)

CO1   Understand the fundamentals of signal processing for various bio-signal analysis
CO2   Learn the Infinite impulse response (IIR) filter and study its applications
CO3   Attain in-depth knowledge about the basic concepts of finite impulse response (FIR) filter and study its applications
CO4   Apply different methods of signal processing techniques in analyzing the various bio-signals such as Electro cardiogram (ECG), Electro myogram (EMG) and Phonocardiogram (PCG

CO No.(BTEC-907B-18: Antenna Radiating Systems)

CO1   To understand the basic concepts of radiation
CO2   To analyse the radiation pattern of antenna arrays.
CO3   To understand the concept of various wave propagation techniques
CO4   To understand the concept of radiating systems on environment

CO No.(BTEC-908B-18: Mobile Communication Networks)

CO1   Understand the working principles of the mobile communication systems
CO2   Understand the relation between the user features and underlying technology
CO3   Analyze mobile communication systems for improved performance

CO No.(BTEC-908A-18: Artificial Intelligence)

CO1   Learn about the basic understanding of Artificial Intelligent system
CO2   Explain about various types of Artificial Neural Networks & their models
CO3   Describe Artificial Neural networks methods, operation and parameters
CO4   Explore Neural Network MATLAB Toolbox

CO No.(BTEC-909D-18: Artificial Intelligence and Machine Learning)

CO1   Understand the concept of information and entropy
CO2   Understand Shannon's theorem for coding
CO3   Calculation of channel capacity
CO4   Apply coding techniques

CO No.(BTEC-909B-18: Information Theory and Coding)

CO1   To learn the difference between optimal reasoning Vs human like reasoning
CO2   To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities
CO3   To learn different knowledge representation techniques
CO4   To understand the applications of AI namely, Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing

CO No.(BTEC-907D-18: Python Programmimg)

CO1   Read and write simple Python programs.
CO2   Develop Python programs with conditionals and loops.
CO3   Define Python functions and to use Python data structures--lists, tuples, dictionaries.
CO4   Perform input/output operations with files in Python.
CO5   Execute Searching, sorting and merging in Python.

CO No.(BTEC-907E-18: Adaptive Signal Processing)

CO1   Understand the non-linear control and the need and significance of changing the control parameters with respect to real-time situation
CO2   Mathematically represent the 'adaptability requirement'.
CO3   Understand the mathematical treatment for the modeling and design of the signal processing systems.

CO No.(BTEC-908D-18: Soft Computing)

CO1   Understand the concepts of Soft Computing and Algorithms involved there-in
CO2   Understand Genetic Algorithms with its operators and applications
CO3   Learn about the Neural Network models and its applications
CO4   Describe the Fuzzy systems and Swarm Intelligence

CO No.(BTEC-909A-18: Big Data Fundamentals)
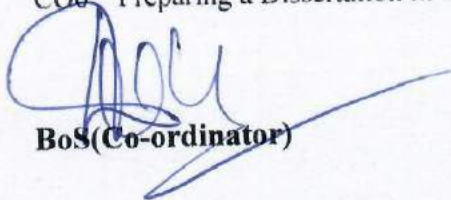
CO1   Understand the Evolution and basics of Big Data.
CO2   Understand the Architecture of Hadoop with its file system and its Programming.
CO3   Explain the Advanced analytical theory and methods.
CO4   Describe the challenges in handling streaming data from the real world.

CO No.(BTEC-908E-18: Digital Image and Video Processing)

CO1   Mathematically represent various types of images and analyze them.
CO2   2. Process these images for the enhancement of certain properties or for optimized use of the resources.
CO3   3. Develop algorithms for image compression and coding.

CO No.(BTEC-731-18: Project-II)

CO1   Review and finalization of the Approach to the Problem relating to the assigned topic
CO2   Detailed Analysis/Modeling/Simulation/Design/Problem Solving/Experiment as needed
CO3   Final development of product/process, testing, results, conclusions and future directions;
CO4   Prototyping or Product development/Patent and Video demonstration;
CO5   Preparing a paper for Conference presentation/Publication in Journals;
CO6   Preparing a Dissertation in the standard format for being evaluated by the Department

BoS(Co-ordinator)

HOD(ECE)

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Department of Electronics and Communication Engineering

Sub: COs for M-Tech Course

MTWC-101-18- Wireless Communication

Course Outcomes

CO1: Implement physical models of wireless channels

CO2: Gain knowledge of key concepts of wireless communication

CO3: Measure capacity of AWGN channel, LTI Gaussian channels and various fading channels

CO4: Study uplink and downlink model of AWGN channel, fading channels and multiuser diversity

MTWC-102-18- Information Theory & Coding

Course Outcomes

CO1: Understand the fundamentals of information theory.

CO 2: Encode text, audio, speech, image and video signals through

various coding and compression techniques.

CO 3: Detect and correct errors in the received signals through error

detecting and correcting codes

MTWC-PE1-18- Wireless Sensor Networks

Course Outcomes

CO1: Gain insights of Wireless Sensor Network(WSN) background, its

challenges, constraints along with its advantages and applications.

CO 2: Know the architecture of WSN and its sub-systems.

CO 3: Explain node structure along with the technologies used in

CO 4: Study various Wireless Propagation Models and discuss the

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various MAC protocols, communication protocols and routing protocols

MTWC-PE1B-18- RF MEMS FOR WIRELESS COMMUNICATION SYSTEM

Course Outcomes

CO 1: Understand the key concepts in RF based MEMS wireless communication system.

CO 2: Design RF based circuits through modelling.

CO 3: Understand the usage of RF based circuit elements to reconfigure the circuit design.

CO 4: Study various oscillators and filters.

MTWC-PE1C-18- ADVANCED DIGITAL SIGNAL PROCESSING

Course Outcomes

CO1: Apply digital transform techniques on signals.

CO 2: Design digital FIR and IIR filters.

CO 3: Predict and estimate errors in digital signal processing systems.

CO 4: Handle multirate DSP and use adaptive filters.

MTWC-PE1D-18- AUDIO AND VIDEO SIGNAL PROCESSING

Course Outcomes

CO1: Learn the audio and video signal processing systems.

CO 2: Code and decode the image, audio and video signals.

CO 3: Modulate and demodulate digital signal processing systems.

MTWC-PE2A-18-ADVANCED COMMUNICATION SYSTEM

Course Outcome

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CO1: Differentiate between analog and digital communication

CO 2: Transmit data through various digital modulation techniques

CO 3: Understand optical and satellite communication systems.

CO 4: Recognize mobile communication systems, access techniques and transmission protocols.

MTWC-PE2B-18-DETECTION AND ESTIMATION THEORY

Course Outcome

CO1: Know the background of the signals, variables and processes.

CO 2: Test the data through statistical tools.

CO 3: Learn the ways to detect non-parametric, random and deterministic signals.

CO 4: Familiarize with the estimation of signal parameters

MTWC-PE2C-18- MOBILE ADHOC NETWORKS

Course Outcome

CO1: Know the features, applications, models and characteristics of adhoc networks.

CO 2:Learn the protocols followed in MAC layer, Network layer, Transport layer, Security layer and Cross layer design.

CO 3: Learn how to integrate adhoc networks with mobile-IP

MTWC-PE2D-18- OPTICAL NETWORK AND PHOTONIC SWITCHING

Course Outcomes

CO1: Know the optical transmission and reception

CO 2: Apply the compensation techniques to the lost data/signals.

CO 3:Learn the architecture and protocols of passive optical networks.

CO 4: Learn the process of wire line techniques.

MTRM-101-18 RESEARCH METHODOLOGY & IPR

Course Outcomes

CO1: 1. Understand research, research process, define and redefine research problem through literature survey.

CO 2: Know the primary and secondary sources of data collection and select sample size based on the requirement.

CO 3: Utilize the resources efficiently.

CO 4: Critically analyse the data through various statistical measures, perform experiment, gather data and reach to a conclusion based on some hypothesis.

CO5: Know the intellectual property rights

CO6: Write up the report and research article.

MTAC-AO1-18-English for research paper writing

Course Outcomes

CO1: Understand that how to improve your writing skills and level of readability

CO 2: Learn about what to write in each section

CO 3:Understand the skills needed when writing a Title

CO 4: Ensure the good quality of paper at very first-time submission.

MTAC-A02-18-Disaster Management

Course Outcomes

CO1: Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.

CO 2: Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.

CO 3:Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

CO 4: Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.

MTWC-103-18 Advanced Wireless Communication

Course Outcomes

CO1: Review the fundamentals of wireless communication

CO 2: Compare the performance of different digital modulation techniques over wireless channels.

CO 3: Design OFDM system and data transmission through multicarrier modulation.

CO 4: Describe OFDMA system, its operation and applications.

MTWC-104-18- Soft Computing Techniques

Course Outcomes

CO1: Study basic concept of soft computing and differentiate between supervised, unsupervised and reinforced learning methods.

CO 2: Learn various artificial neural network techniques, fuzzy sets, fuzzification and defuzzification.

CO 3: Optimize solutions using Genetic Algorithm

CO 4: Use hybrid soft computing techniques.

MTWC-105-18- SIMULATION OF WIRELESS COMM. SYSTEMS

Course Outcomes

CO1: Study the role of simulation in communication system and random processes.

CO 2: Review stochastic processes and parameter estimation

CO 3: Model wireless communication systems through numerical methods.

CO 4: Study communication channel models and perform Monte Carlo Simulation.

MTWC-PE3A-18- Smart Antennas

Course Outcomes

CO1: Understand the significance of smart antennas and its historical development.

CO 2: Know the architecture of Smart antennas, types, applications

CO 3: Learn antenna array fundamentals criteria and beam forming basics

CO 4: Explain the Spatial Processing techniques for CDMA Smart Antennas

MTWC-PE3B-18 Wireless Network Planning, Optimization and Management

Course Outcomes

CO 1: Understand the Radio Network planning and optimization

CO 2: Know the technologies of WCDMA and GSM

CO 3: . Learn the fundamentals of Radio Resource Management

MTWC-PE3C-18 Microwave and RF Design

CO1: Understand the significance of Microwave and RF designs

CO 2: Know the fundamentals behind Microwave Amplifiers/Oscillators designs.

CO 3: Technical know-how of Microwave and RF antennas concepts.

MTWC-PE3D-18- Multimedia Comunication and Technologies

Course Outcomes

CO1: Understand the significance of Microwave and RF designs

CO 2: Know the fundamentals behind Microwave Amplifiers/Oscillators designs.

CO 3: Technical know-how of Microwave and RF antennas concepts.

MTWC-PE3D-18- Multimedia Comunication and Technologies

Course Outcomes

CO1: Learn multimedia system design techniques.

CO 2: Implement compression and decompression techniques on

CO 3: Understand the concepts of storage and retrieval technologies.

CO 4: Learn multimedia design application.

MTWC-PE4A-18- Cryptography and Wireless

Course Outcomes

CO1: Understand the significance of Cryptography.

CO 2: Know its Integrity, Authentication and Management.

CO 3: Learn the concepts of Security and threats to wireless systems.

MTWC-PE4B-18-Software Defined Radio & Cognitive Radio

Course Outcomes

CO1: Understand the fundamental concepts of software defined radio and cognitive radio networks.

CO 2: Develop the cognitive radio, as well as techniques for spectrum holes detection that

cognitive radio takes advantages in order to exploit it.

CO 3: Understand fundamental issues regarding dynamic spectrum access, the radio-resource management and trading, as well as a number of optimisation techniques for better spectrum exploitation.

CO 4: Apply SDR principles to smart antennas.

MTWC-PE4C-18- Wireless and Optical Communication Networks

Course Outcomes

CO1: Learn Wireless Communication Network layers/technology.

CO 2: Understand basic network components of Wireless and Optical Networks.

CO 3: Explain their applications

MTWC-PE4D-18- MIMO Systems

Course Outcomes

CO1: Understand Basic MIMO communication systems.

CO 2: Explore Space-time block codes & Space-time trellis codes.

CO 3: MIMO systems for frequency-selective (FS) fading channels.

MTWC-PE5A-18- Millimeter Wave Communication Technology

Course Outcomes

CO1: Familiarization with the concept of Millimeter wave communication.

CO 2: Calculate the performance parameters in millimeter wave antennas.

CO 3: Model the millimeter wave link budget.

CO 4: Analyze the millimeter wave with multiple antennas.

MTWC-PE5B-18- Space Time Wireless Communication

Course Outcomes

CO1:Understand Space Time Channel Characterization.

CO 2: Explain Capacity of Multiple Antenna Channels.

CO 3: Learn ST OFDM, Spread Spectrum.

MTWC-PE5C-18- Advanced Techniques for Wireless Reception

Course Outcomes

CO1: Understand Wireless Signaling Environment.

CO 2: Explain the usage of Multiuser detection.

CO 3: Learn CDMA, OFDM, MIMO systems

MTWC-PE5D-18- Emerging Technologies of Wireless Communication

Course Outcomes

CO1: Understand the concept of cellular/wireless communication

CO 2: Explain the Mobile Radio Propagation and Multiuser systems.

CO 3: Learn technologies of GPRS, UMTS, WiFi, WiMAX, Ultra Wideband communications, 4G and beyond 4G.

MTWC-PE5E-18- Microstrip Antennas

Course Outcomes

CO1: Understand the basic concept of micro-strip antennas, methods of analysis and configurations.

CO 2: Explain micro-strip antennas arrays.

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CO 3: Understand the physical significance of discontinuities

CO 4: Learn coupled micro-strip line with multiband and broadband behavior

MTOE-301A-18- Cost Management of Engineering Projects

Course Outcomes

CO1: Understand the cost calculation for decision-making about an engineering research project

CO 2: Able to define Role of each member in the project team

CO 3:Manage the project by applying Quantitative techniques for cost management

MTWC-111-18-Wireless Communication Lab

Course Outcomes

CO1:To design Path-Loss models

CO2:To investigate Fading environments in wireless channels CO3:To develop MATLAB codes for Block codes, Cyclic codes

MTWC-112-18-Information Theory and Coding Lab

Course Outcomes

CO1:To understand the programming of Entropies and Mutual In CO2:To learn and practice programming for generation and evaluation CO3:To develop MATLAB codes for Block codes, Cyclic codes

MTWC-105-18- SIMULATION OF WIRELESS COMM. SYSTEMS Laboratory

To understand the programming of OFDM based Transmitter & To learn and practice MATLAB programming for implementing To find the vacant spaces for secondary users in Cognitive Radio

MTWC-MP1-18-Mini Project

Course Outcomes

CO1: Acquire practical knowledge of the chosen field.

CO2 Identify, analyze, formulate & handle programming projects with systematic approach.

CO3: Contribute as a team leader in the development of technical projects.

CO4: Develop communication skills for the presentation of project related activities.

MTWC-DS1-18 DISSERTATION PHASE I

Course Outcomes

CO1: Critically analyse and evaluate existing knowledge about the chosen problem

CO 2: Find the gaps and motivation through literature survey.

CO 3:Design the framework to optimize the solution for the problem

CO 4: Construct the research proposal.

MTWC-DS2-18- DISSERTATION PHASE II

Course Outcomes

CO1: Implement the proposed framework practically or through simulation

CO 2: Gather the results and publish in the research articles.

CO 3: Write-up the proposed work, results with conclusion and future work in the form of thesis

CO4: Present the research work before a committee.

BOS (Co-ordinator)

Chairman (ECE)