TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Affiliated to JNTUH, Autonomous)

B.TECH ELECTRONICS AND COMMUNICATION ENGINEERING

R20 –OPEN ELECTIVES

S.No	Course Code	Course Title	L	T	P	Credits
1	**C450E1**	Artificial Neural Networks	3	0	0	3
2	**C45OE2**	Principles Of Electronic Communications	3	0	0	3
3	**C46OE1**	Embedded Systems Design	3	0	0	3
4	**C46OE2**	Tele Communication Switching Systems And Networks	3	0	0	3
5	**C47OE1**	Data Communications	3	0	0	3
6	**C47OE2**	Information Theory And Coding	3	0	0	3

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
ARTIFICIAL NEURAL NETWORKS

B.Tech. V Semester **L/T/P/C**
Course Code: C45OE1 **3/0/0/3**

Course Objectives:

To understand the biological neural network model ,equivalent neuron models and to understand the architecture, learning algorithm and issues of various feed forward and feedback neural networks.

Course Outcomes: Upon completion of this course the student will be able to:

1. Create different neural networks of various architectures both feed forward and feed backward.
2. Perform the training of neural networks using various learning rules.
3. Perform the testing of neural networks and do the perform analysis of these networks for various pattern recognition applications.

UNIT – I

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process.

UNIT – II

Single Layer Perceptron: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

UNIT – III

Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues, and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT – IV Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification

UNIT – V

Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm Hopfield Models – Hopfield Models, Computer Experiment

TEXT BOOKS:

1. Neural Networks a Comprehensive Foundations, Simon Haykin, PHI edition.

REFERENCE BOOKS:

1. Artificial Neural Networks – B. Yegnanarayana Prentice Hall of India P Ltd 2005
2. Neural Networks in Computer Intelligence, Li Min Fu TMH 2003
3. Neural Networks -James A Freeman David M S Kapura Pearson Education 2004.
4. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
PRINCIPLES OF ELECTRONIC COMMUNICATIONS

B.Tech. V Semester **L/T/P/C**
Course Code: C45OE1 **3/0/0/3**

Course Objectives:

Introduce the students to modulation and various analog and digital modulation schemes and they can have a broad understanding of satellite, optical, cellular, mobile, wireless and telecommunication concepts.

Course Outcomes: Upon completion of this course the student will be able to:

1. Work on various types of modulations.
2. Should be able to use these communication modules in implementation.
3. Will have a basic understanding of various wireless and cellular, mobile and Telephone communication systems.

UNIT - I
Introduction: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels.

UNIT - II
Simple description on Modulation: Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes.

UNIT - III
Telecommunication Systems: Telephones Telephone system, Paging systems, Internet Telephony.
Networking and Local Area Networks: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

UNIT - IV
Satellite Communication: Satellite Orbits, satellite communication systems, satellite Subsystems, Ground Stations Satellite Applications, Global Positioning systems.
Optical Communication: Optical Principles, Optical Communication Systems, Fiber –Optic Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing.

UNIT - V
Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA, and WCDMA.
Wireless Technologies: Wireless LAN, PANs and Bluetooth, Zig Bee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

Text Books:

1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGraw Hill publications, 2008.
2. Electronic Communications systems, Kennedy, Davis 4e, MC GRAW HILL EDUCATION, 1999

Reference Books:

1. Theodore Rapp port, Wireless Communications - Principles and practice, Prentice Hall, 2002.
2. Roger L. Freeman, Fundamentals of Telecommunications, 2e, Wiley publications.
3. Introduction to data communications and networking, Wayne Tomasi, Pearson Education, 2005.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
EMBEDDED SYSTEMS DESIGN

B.Tech.VI Semester **L/T/P/C**
Course Code: C46OE2 **3/ 0 /0/ 3**

COURSE OBJECTIVES:
To provide an overview of Design Principles of Embedded System and to provide clear understand about the role of firmware, operating systems in correlation with hardware systems.

COURSE OUTCOMES: Upon completion of this course the student will be able to:
1. Understands the basic concepts of Embedded Systems
2. Formulates typical Embedded System
3. Illustrates the trends in Embedded Industry
4. Outlines the concepts of RTOS based Embedded System Design
5. Analyze Task Communication in RTOS

UNIT – I:
Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT – II:
Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS). Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT – III:
Trends in Embedded Industry: Processor Trends in Embedded Systems, Embedded OS Trends, Development Language Trends, Open Standards, Frameworks & Alliances, Bottlenecks, Development Platform Trends, Cloud, Internet Of Things (IoT) & Embedded Systems. Communication Interface: Onboard and External Communication Interfaces.

UNIT –IV:
RTOS Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT –V:

Task Communication: Shared Memory, Message Passing, Remote Procedure, Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS

TEXT BOOKS

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

REFERENCE BOOKS

1. Embedded Systems - Raj Kamal, Mc Graw Hill Education.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems - Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
TELE COMMUNICATION SWITCHING SYSTEMS AND NETWORKS

B.Tech. VI Semester **L/T/P/C**
3/0/0/3

Course Code: C46OE2

COURSE OBJECTIVES:
To provide students with a balanced blend of theoretical and practical aspects regarding Telecommunication Switching System.

COURSE OUTCOMES: Upon completion of this course the student will be able to:
1. Demonstrate knowledge about Telecommunication Switching Systems.
2. Analyze different switching methodologies.
3. Differentiate between signaling methods used in Telecommunication Networks
4. Exhibit a good knowledge on data communication networks and ISDN and be able to differentiate LAN, MAN, WAN.
5. Demonstrate an ability to work on various Telecommunication Network concepts.
6. Demonstrate knowledge on modern telecommunication concepts like DSL & SONET.

UNIT -I
Telecommunication Switching Systems: Introduction, Elements of Switching Systems, Switching Network Configuration, Rotary Switches, Uniselector, Two Motion Selector, Trunking Principle, Principles of Cross Bar Switching, Crossbar Switch Configuration, Cross Point Technology, Crossbar Exchange Organization.

UNIT – II
Electronic Space Division Switching: Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced services, Two-Stage Networks, ThreeStage Networks, n-Stage Networks. Time Division Switching: Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching, Three Stage Combination Switching, n - Stage Combinational Switching.

UNIT – III
Telecommunications Traffic: Introduction; The Unit of Traffic, Congestion, Traffic Measurement, A Mathematical Model, Lost-Call Systems-Theory, Traffic Performance, Loss Systems in Tandem, Use of Traffic Tables, Queuing Systems-The Second Erlang Distribution, Probability of Delay, Finite Queue Capacity, Some Other Useful Results, Systems with a Single Server, Queues in Tandem, Delay Tables, Applications of Delay Formulae.

UNIT – IV

Telephone Networks: Subscriber loop systems, switching hierarchy and routing, transmission plan, transmission systems, numbering plan, charging plan, Signaling techniques: In channel signaling, common channel signaling, Cellular mobile telephony. Data Networks: Data transmission in PSTNs, Switching techniques for data transmission, data communication architecture, link to link layers, end to end layers, satellite based data networks, LAN, MAN, Internetworking.

UNIT – V

Integrated Services Digital Network (ISDN): Introduction, motivation, new services, Network and protocol architecture, Transmission channels, User-Network interfaces, functional grouping, reference points, signaling, numbering, addressing, BISDN.

DSL Technology: ADSL, Cable Modem, Traditional Cable Networks, HFC Networks, Sharing, CM & CMTS and DOCSIS. SONET: Devices, Frame, Frame Transmission, Synchronous Transport Signals, STS I, Virtual Tributaries, and Higher rate of service.

TEXT BOOKS

1. Tele communication switching system and networks - Tyagarajan Viswanathan, PHI, 2000.

2. J. E Flood, “Telecommunications Switching and Traffic Networks,” Pearson Education, 2006

3. Data Communication & Networking - B.A. Forouzan, TMH, 4th Edition, 2004.

REFERENCE BOOKS

1. Digital telephony - J. Bellamy, John Wiley, 2nd edition, 2001.

2. Data Communications & Networks - Achyut. S. Godbole, TMH, 2004.

3. Principles of Communication Systems - H. Taub& D. Schilling, TMH, 2ndEdition, 2003.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
DATA COMMUNICATIONS

B.Tech. VII Semester **L/T/P/C**
Course Code: C47OE3 **3/ 0 /0/ 3**

Course Objectives:
To provide a solid conceptual understanding of the fundamentals of data communications, protocols and signal transmission.

Course Outcomes: Upon completion of this course the student will be able to:

1. Understand the standards organization for data communications, basic concepts of network architecture and signals.
2. Understand the concepts of multiplexing and spreading techniques.
3. Analyze various transmission media and switching techniques in data communication.
4. Emphasizes the importance of data communication codes and error control.
5. Understand various data communication equipments.

UNIT – I:

Introduction to Data Communication

Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Circuit Arrangements, Data communications Networks, Alternate Protocol Suites.

Signals, Noise, Modulation, And Demodulation: Signal Analysis, Electrical Noise and Signal-to-Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and M-ary Encoding, Digital Modulation.

UNIT – II:

Multiplexing and Spreading:

Multiplexing: Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Synchronous Time-Division Multiplexing, Statistical Time-Division Multiplexing

Spread spectrum: Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum (DSSS)

UNIT – III:

Transmission media: Guided Media-Twisted-pair cable, Coaxial cable, Fiber-Optic cable
Unguided Media- Radio Waves, Microwaves, Infrared.

Switching: Circuit-switched networks, Datagram networks. Virtual-circuit networks

UNIT – IV:

Data Communications Codes, Error Control, and Data Formats: Data Communications Character Codes, Bar Codes, Error Control, Error Detection, Error Correction, Character Synchronization

UNIT – V

Data Communications Equipment: Digital Service Unit and Channel Service Unit, Voice Band Data Communication Modems, Bell Systems- Compatible Voice- Band Modems, Voice Band Modern Block Diagram, Voice- Band Modem Classifications, Asynchronous Voice-Band Modems, Synchronous Voice-Band Modems, Modem Synchronization, Cable Modems, Probability of Error and Bit Error Rate.

TEXTBOOKS

1. Behrouz A. Forouzan, Data Communications and Networking 5E, 5th Edition, Tata McGraw-Hill, 2013.
2. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

REFERENCE BOOKS

1. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007.
2. Data Communication and Networks Godbole Achyut McGraw Hill, New Delhi, 2006.
3. Data Communication and Computer Networks Gupta Prakash C. Pearson Education. New Delhi, 2006.
4. Computer Communications and Networking Technologies, Gallow, Second Edition, Thomson.
5. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
INFORMATION THEORY AND CODING

B.Tech. VII Semester **L/T/P/C**
Course Code: C47OE4 **3/0/0/3**

Course Objectives:

To provide insight to the concept of information in the context of communication theory and its significance in the design of communication receivers.

Course Outcomes: Upon completion of this course the student will be able to:

1. Understand the concept of information and entropy
2. Understand Shannon's theorem for coding
3. Calculation of channel capacity
4. Apply coding techniques

UNIT I:

Information Theory: Basics of information, entropy, conditional entropy, entropy for discrete ensembles, discrete memory less channel, bounds discrete channels, channel capacity, mutual information.

UNIT II:

Source Coding: Source coding theorem-code efficiency, redundancy, variance; Shannon's noisy coding theorem, Shannon's noise less coding theorem, Shannon's Hartley theorem application to continuous channel, Shannon's Fano coding, Huffman coding.

UNIT III:

Techniques of Coding and Decoding: Linear block codes: principle of block coding, matrix description of linear block codes, hamming codes, error detection and correction capabilities of hamming codes.

UNITIV:

Cyclic Codes: Algebric structure, syndrome calculation, error correction using syndrome vector, syndrome decoder for (n,k) block code, error correction capability, advantages and disadvantages of cyclic codes.

UNIT V:

Convolution Codes: Analysis of convolutional encoders, Markov sources-code tree, trellis, state diagram for convolutional encoder, uniquely detectable codes, Viterbi algorithm, advantages and disadvantages of convolutional codes.

Text Books:

1. N. Abramson, Information and Coding, McGraw Hill, 1963.
2. M. Mansurpur, Introduction to Information Theory, McGraw Hill, 1987.
3. R.B. Ash, Information Theory, Prentice Hall, 1970.
4. Shu Lin and D.J. Costello Jr., Error Control Coding, Prentice Hall, 1983.

Reference Books:

1. Principles of Communication Systems-Herbert Taub, Donald L schilling, GouthamSaha, 3rd Edition, McGraw Hill, 2008.
2. Digital and analog communication systems-Sam Shanmugam, John Wiley, 2005.
3. Digital communication—Simon Haykin, John Wiley, 2005.

Communication Systems-B.P.Lathi, BS Publications 2006