ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
UNIVRSITY COLLEGE OF ENGINEERING
ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE STRUCTURE

B.Tech, Four Year Degree Course

(From the admitted batch of 2017-2018 under CBCS Scheme)

UNIVERSITY COLLEGE OF ENGINEERING
ADIKAVI NANNAYA UNIVERSITY
RAJAMAHENDRAVARAM – **533 296**

IVTH B TECH (ECE) *STRUCTURE &SYALLBUS*

IV B.Tech I Semester ECE w.e.f 2017-18

Sub Code	Subject	Hrs/Week		Max Marks		Total Marks	Credits
		Theory	Lab	Internal	External		
BTECE701	RADAR ENGINEERING	4	--	25	75	100	4
BTECE702	DIGITAL IMAGE PROCESSING	4	--	25	75	100	4
BTECE703	OPTICAL COMMUNICATIONS	4	--	25	75	100	4
BTECE704	ELECTIVE-2	4	--	25	75	100	4
	A) INFORMATION THEORY AND CODING B) ARTIFICIAL NEURAL NETWORKS &FUZZY LOGIC C) SOFTWARE DEFINED RADIO D) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION						
BTECE705	VLSI DESIGN LAB	--	3	50	50	100	2
BTECE706	MICROWAVE AND ANTENNAS LAB	--	3	50	50	100	2
BTECE707	INDUSTRIAL INTERNSHIP / TECHNICAL COURSE (ASSEMENT)	--	--	100	--	100	--
Total		**16**	**06**	**300**	**400**	**700**	**20**

BTECE701: RADAR ENGINEERING

Theory: 4 Hrs/week **Credits : 4**

Int Marks: 25 **Ext Marks : 75**

UNIT-I

BASICS OF RADAR: Introduction to radars, History, Maximum Unambiguous Range, Simple Radar range Equation, Radar Block Diagram and Operation, Radar frequency and Applications, Prediction of range Performance, Minimum Detectable signal, modified radar Range Equation, SNR, Integration Radar Pulses, Radar cross section of targets.

UNIT- II

CW AND FREQUENCY MODULATED RADAR: Doppler effect, CW- radar – Block Diagram, Isolation between transmitter and receiver, Receiver Bandwidth requirements, application CW radar, FMCW radar, Range and Doppler Measurement, Block diagram and characteristics of FMCW altimeter, FMCW radar, Pulse Radar.

UNIT –III

MTI AND PULSE DOPPLER RADAR: Introduction, Principle, Doppler Frequency, Doppler Processing in CW MTI radar with Power Amplifiers Transmitter and power oscillator transmitter, Delay line Cancellers, Filter characteristics, Blind Speed, Double Cancellation, MTI radar parameters, Limitations of MTI performance, MTI versus Pulse Doppler Radar, Moving target Detectors.

UNIT-IV

TRACKING RADARS: Tracking with radar, Monopulse tracking radar, Various scanning and tracking, tracking techniques – Range tracking, Angle tracking, Tracking Accuracy. Detection of Signals to Noise,

RADAR RECEIVERS: Displays – Types, Duplexers – Branch type and Balanced type, Circulators as Duplexers, Introduction & detection Criteria, Automatic Detection, CFAR, Receivers

TEXT BOOKS:

1. Introduction to Radar Systems – Merril. I. Skolnik, TMH Special Indian Edition, 2nd Ed., 2007
2. Radar Engineering – GSN Raju, IK International.
3. Microwave and Radar Engineering, Gottapu Sasibhushana Rao, Pearson Education, New Delhi, 2014

REFERENCE BOOKS:

1. Introduction to Radar Systems, Skolnik McGraw Hill 3nd Edition., 2001
2. Radar: Principles, Technology, Applications – Byron Edde, Pearson Education, 2004
3. Radar Principles – Peebles. Zj., P.Z., Wiley, New York, 1998

BTECE702:DIGITAL IMAGE PROCESSING

Theory: 4 Hrs/week **Credits : 4**

Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

Image Transforms: Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Importance of Phase, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform, SVD and KL Transform.

UNIT-II

Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters , sharpening spatial filters, Combining spatial enhancement methods.

Filtering In The Frequency Domain: Preliminary concepts, Sampling and the Fourier transform of sampled functions. The Basic of filtering in the frequency domain, image smoothing using frequency domain filters, Selective filtering, Implementation.

UNIT-III

Image Restoration And Reconstruction: Noise models, Restoration in the presence of Noise, only Spatial Filtering, Periodic Noise reduction by Frequency Domain Filtering, Linear, Position Invariant Degradations, Inverse Filtering, Wiener Filtering, constrained least squares filtering, geometric mean filter ,image reconstruction from projections.

Image compression: Fundamentals, Basic compression methods: Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run-Length coding, Symbol-Based coding, Bit-Plane coding, Block Transform coding, Predictive coding.

UNIT-IV

Morphological Image Processing: preliminaries Erosion and dilation, opening and closing, the Hit-or-miss transformation, some Basic Morphological algorithms, grey –scale morphology.

Image Segmentation: Fundamentals, point, line, edge detection thresholding, region –based segmentation, segmentation using Morphological watersheds, the use of motion in segmentation.

Color Image Processing: color fundamentals, colour models, pseudo color image processing, basic of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

TEXT BOOKS:

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.
2. Jayaraman, S. Esakkirajan, and T. Veerakumar," Digital Image Processing", Tata McGraw-Hill Education,2011.

REFERENCE BOOKS:

1. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition, Indian Reprint,2002.
2. B.Chanda, D.Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2009.

BTECE703:OPTICAL COMMUNICATIONS

Theory : 4 Hrs/week **Credits: 4**

Int Marks: 25 **Ext Marks: 75**

UNIT-I

OVER VIEW OF OPTICAL COMMUNICATIONS: Over view of fiber optics, Advantages of light wave communication system over EM, optical spectral bands, generations of optical fiber, structure of optical fiber, classifications of optical bires, single mode & multimode fibers, snell's law, Internal reflection in optical fiber, acceptance angle & cone of acceptance, numerical aperture.

UNIT-II

FIBER MANUFACTURING AND CABLING: Introduction, types of fibber drawing processes, outside vapor-phase oxidation process (OVPO), vapour phase axial deposition(VAD), modified chemical vapor deposition, plasma activated chemical vapour deposition, structural elements fibber optical cable & types, loose buffered & tight buffered cables, intrinsic & extrinsic losses, types of dispersions.

UNIT-III

FIBER OPTIC COMPONENTS AND MEASURING INSTRUMENTS: Introduction, types of fibber optics components, need for connections in FOC, functions of splice in optical fibbers, types of connectors, types of splices, working principle of optical coupler, working principle of isolator in OFC, types of measuring instruments, optical power meter, optical attenuators, optical time domino in reflectometer.

UNIT-IV

FIBER OPTIC DEVICES: fiber optic devices, types of optical sources, salient features of an optical sources, types of optical detectors, salient features of an optical detector, construction and working of an LED, principle of laser, construction and working of laser source, pin photo diode, avalanche photodiode, regenerator in fiber optic communications, types of repeaters, erbium doped fiber amplifier, block diagram go fiber optic communication system.

TEXT BOOKS:

1. "optical communications and its applications" - S.C. Gupta.
2. "Fiber - optic communications systems, third edition". - Govind P. Agrawal.

REFERENCES BOOKS:

1. Optical fiber communications 4th edition - Gerd Keiser
2. Optical fiber communications - P Chakrabarti
3. Fundamentals of Optical fiber communications - 2nd edition - Michael K. Bamoski.

ELECTIVE-2
BTECE704A: INFORMATION THEORY AND CODING

Theory: 4hrs/Week **Credits: 4**

Int Marks: 25 **Ext. Marks: 75**

UNIT-I

INFORMATION THEORY: Review of probability theory, Mutual information, Discrete messages, concept of amount of information and its properties. Average information, Entropy, Entropy and its properties. Information rate, Mutual information and its properties.

UNIT-II

SOURCE CODING: Introductions, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

UNIT-III

LINEAR BLOCK CODES: Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Optimal Codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes.

UNIT-IV

CONVOLUTION CODES: Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

TEXT BOOKS:
1. Digital communications - Simon Haykin, John Wiley, 2005
2. Principles of Communication Systems – H. Taub and D. Schilling, TMH, 2003

REFERENCE BOOKS:
1. T. M. Cover, J. A, Thomas, "Elements of information theory," Wiely Interscience, 2 nd Edition, 2006/
2. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley, 2005.
3. Digital Communications – John Proakis, TMH, 1983. Communication Systems Analog & Digital – Singh & Sapre, TMH, 200

ELECTIVE-2

BTECE704B: ARTIFICIAL NEURAL NETWORKS &FUZZY LOGIC

Theory : 4hrs/Week **Credits: 4**

Int Marks: 25 **Ext. Marks: 75**

UNIT-I

Basics of Artificial Neural Networks Introduction: Biological Neural Networks, Characteristics of Neural Networks, and Models of Neuron, Topology, Basic Learning Rules Activation and Synaptic Dynamics: Activation Dynamic Models, Synaptic Dynamic Models, Learning Methods, Stability & Convergence, Recall in Neural Networks.

UNIT-II

Functional Units of ANN for Pattern Recognition Tasks: Pattern Recognition problem Basic Fundamental Units, Pattern Recognition Tasks by the Functional Units Feed forward Neural Networks: Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks.

UNIT-III

Feedback Neural Networks: Analysis of linear auto adaptive feed forward networks, Analysis of pattern storage Networks, Stochastic Networks & Stimulated Annealing, Boltzmann machine.

UNIT-IV:

Competitive Learning Neural Networks**:** Components of a Competitive Learning Network, Analysis of Feedback layer for Different Output Functions, Analysis of Pattern Clustering Networks and Analysis of Feature Mapping Network. Architectures for Complex Pattern Recognition Tasks**:** Associative memory, Pattern mapping Stability – Plasticity dilemma: ART, temporal patterns, Pattern visibility: Neocognitron.

TEXT BOOKS:

1. B.Yagnanarayana“Artificial Neural Networks”, PHI

REFERENCE BOOKS:

2. Laurene Fausett ,“Fundamentals of Neural Networks”, Pearson Education

3. Simon Haykin, “Neural Networks”, Second Edition.

ELECTIVE-2

BTECE704C: SOFTWARE DEFINED RADIO

Theory : 4hrs/Week **Credits: 4**

Int Marks: 25 **Ext. Marks: 75**

UNIT-I

Introduction to SDR : What is a Software Radio? The need for Software Radios, Characteristics and benefits of a Software Radio, Design principles of Software Radio

Radio Frequency Implementation Issues : The purpose of the RF Front-End, Dynamic range: The principal challenge of receiver design. RF receiver front-end topologies, Enhanced flexibility of the RF Chain with Software Radios, Importance of the components to overall performance, Transmitter architectures and their Issues, noise and distortion in the RF Chain, ADC and DAC distortion

UNIT-II

Digital Generation of Signals

Comparison of direct digital synthesis with analog signal synthesis, Approaches to direct digital synthesis, Analysis of spurious signals, Spurious components due to periodic jitter, Band pass signal generation, Performance of direct digital synthesis systems, Hybrid DDS-PLL Systems, Applications of direct digital synthesis, Generation of random sequences, ROM compression technique.

UNIT-III

Digital Hardware Choices

Key hardware elements, DSP processors, Field Programmable Gate Arrays, Trade-offs in using DSPs, FPGAs, and ASICs, Power management issues, Combination of DSPs, FPGAs, and ASICs

Analog To Digital And Digital To Analog Conversion

Parameters of ideal data converters, Parameters of practical data converters, Techniques to improve data converter performance, Common ADC and DAC architectures.

UNIT-IV

Smart Antennas Designing Issues

Vector channel modeling, Benefits of smart antennas, Structures for beam forming systems, Smart antenna algorithms, Diversity and space-time adaptive signal processing, Algorithms for transmit STAP, Hardware implementation of smart antennas, Array calibration.

TEXT BOOK:

1. J.H. Reed, Software-Defined Radio, Prentice-Hall, 2002

REFERENCE BOOKS:

1. Software Radio Architecture: Object-Oriented Approaches to Wireless Systems Engineering by Joseph Mitola Wiley-Interscience; 1st edition 2000
2. Antenna Theory: analysis and design, 2nd ed., Balanis, Wiley, 1997

ELECTIVE-2

BTECE704 D: ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Theory: 4hrs/Week **Credits: 4**

Int Marks: 25 **Ext. Marks: 75**

UNIT-I

MEASUREMENT CONCEPTS: Performance Characteristics of Instruments, Static and Dynamic characteristics, Error analysis, DC ammeters, DC Voltmeters, Series and Shunt type Ohmmeter, AC Voltmeters using Rectifiers, RMS responding voltmeter, Electronic Voltmeter AC Bridge Measurements – Wheatstone, Kelvin, Guarded Wheatstone, Maxwell, Hay's Schering, Anderson and Wien Bridge, Errors and Precautions, Q Meter,

UNIT – II

DIGITAL INSTRUMENTS: Comparison of Analog and Digital techniques- Digital Voltmeter, Ramp, Stair case, Ramp Continuous Balance, Successive Approximation, Signal generators- Fixed and Variable, Function generators, Frequency Counters- Measurement of Frequency and Time, Extension of frequency range, Measurement errors, Cathode ray Oscilloscopes, Block Schematic applications, Special Oscilloscopes, Storage and Sampling Oscilloscopes, Analyzers types.

UNIT- III

TRANSDUCERS: Introduction , Classification of Transducers, Active and Passive transducers, Analog transducers, Resistive Transducers, Potentiometers, Strain gauges, Types of Strain Gauges, Thermometers, Thermisters, Thermocouples – Construction, Measurements of thermocouple, Sensistors, Variable Inductance type of Transducers, LVDT, Peizo Electric transducers.

UNIT – IV

ADVANCED INSTRU MENTS: Measurement of Physical parameters, Force, Pressure, Velocity, Humidity, Moisture, Speed, Proximity, Displacement

TEXT BOOKS

1. Albert D. Helfrick and William D. Cooper – Modern Electronic Instrumentation and Measurement techniques, Prentice hall of India, 2003,
2. A.K. Sawhaney, electrical and Electronic Measurement and Instrumentation, Dhanpat Rai, 2000
3. H.S. Kalsi, Electronic Instrumentation , TMH, 1995

REERNCE BOOKS:

1. Electronic Instrumentation & Measurements – David A. Bell, PHI , 2nd Edition, 2003
2. Electronic Measurements & Instrumentation – Lal Kishore, Pearson Education – 2005
3. Ernest O. Doebelin, Measurement Systems – Application and Design – Tata McGraw-Hill – 2004

BTECE705:VLSI DESIGN LAB

Lab: 3 Hrs/week **Credits: 2**

Int Marks: 50 **Ext Marks: 50**

LIST OF EXPERIMENTS:

1. Design and Implementation of an Universal Gates.
2. Design and Implementation of an Inverter.
3. Design and Implementation of Full Adder.
4. Design and Implementation of Full Subtractor.
5. Design and Implementation of Decoder.
6. Design and Implementation of RS-Latch.
7. Design and Implementation of D-Latch.
8. Design and Implementation asynchronous counter.
9. Design and Implementation of static RAM cell.
10. Design and Implementation of 8 bit DAC using R-2R latter network.

BTECE706: MICROWAVE AND OPTICAL COMMUNICATIONS LAB

Lab hours: 3 Hrs/week **Credits: 2**

Int Marks: 50 **Ext Marks: 50**

Minimum Twelve Experiments to be conducted:

Part – A: Experiments Based on Microwave Engineering

(Any 7 Experiments)

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. Impedance and Frequency Measurement.
6. Scattering parameters of Circulator.
7. Scattering parameters of Magic Tee.
8. Radiation Pattern of Horn and Parabolic Antennas.
9. Synthesis of Microstip antennas (Rectangular Structure) Using HFSS.

Part – B: Experiments Based on Optical Communication

(Any 5 Experiments)

10. Characterization of LED.
11. Characterization of Laser Diode.
12. Intensity modulation of Laser output through an optical fiber.
13. Measurement of Data rate for Digital Optical link.
14. Measurement of NA.
15. Measurement of losses for Analog Optical link.

BTECE 707:INDUSTRIAL TRAINING/ TECHNICAL ASSESMENT COURSE

Internal Marks:100

Every student should submit the industrial intrenship or technical course report which for internal evaluation of 100 marks.

Sub Code	Subject	Hrs/week		Max.Marks		Total Marks	Credits
		Theory	Lab	Internal	External		
BTECE 707	INDUSTRIAL INTERNSHIP / TECHNICAL COURSE (ASSEMENT)	--	--	100	--	100	---