SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (AUTONOMOUS)
(Affiliated to JNTUK, Kakinada), (Recognised by AICTE, New Delhi) Accredited by NAAC with 'A' GradeRecognised as Scientific and Industrial Research Organisation
CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204

SCHEME OF INSTRUCTION & EXAMINATION

(Regulation R17)

III/IV B.TECH

(With effect from 2017-2018 Admitted Batch onwards)

Under Choice Based Credit System

ELECTRONICS AND COMMUNICATION ENGINEERING

I-SEMESTER

Code No.	Name of the Subject	Credits	Lecture Hrs	Tutorial Hrs	Lab Hrs	Contact Hrs/ Week	Internal Marks	External Marks	Total Marks
B17 EC 3101	Pulse and Digital Circuits	3	3	1	--	4	30	70	100
B17 EC 3102	Linear ICs and Applications	3	3	1	--	4	30	70	100
B17 EC 3103	Electronic Measurements And Instrumentation	3	3	1	--	4	30	70	100
B17 EC 3104	Digital Communication	3	3	1	--	4	30	70	100
B17 EC 3105	Antennas and Propagation	3	3	1	--	4	30	70	100
B17 EC 3106	Computer Network Engineering	3	3	1	--	4	30	70	100
B17 EC 3107	Linear Integrated Circuits and Pulse Circuits Lab with Simulation	2	--	--	3	3	50	50	100
B17 EC 3108	Digital ICs Laboratory with simulation	2	--	--	3	3	50	50	100
B17 BS 3101	Problem Solving & Linguistic Competence	1	--	3	--	3	30	70	100
B17 BS 3102	Basic Coding	1	--	--	3	3	50	50	100
Total		**24**	**18**	**9**	**9**	**36**	**360**	**640**	**1000**

Code: B17 EC 3101

PULSE AND DIGITAL CIRCUITS

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives: The main objectives of this course are:

1. To provide insight of the applications of Integrator, differentiator circuits.
2. To introduce the design of various clippers circuits and to provide insight of the applications of clamper circuits.
3. To introduce the analysis of various Bistable, Monostable, Astable Multivibrators and Schmitt trigger for various applications.
4. To introduce various Time Base Generators.
5. To provide insight of the synchronization techniques for sweep circuits and to provide insight of different logic families; realize logic gates using diodes and transistors.

Course Outcomes: By the end of the course the learners (students) will be able to:

1. Understand the applications of Integrator, differentiator circuits.
2. Design of different clipping circuits and understand the applications clamper circuits.
3. Analyze different Bi-stable, Monostable, AstableMultivibrators and Schmitt trigger for various applications.
4. Understand Different Time Base Generators.
5. Analyze synchronization techniques for sweep circuits and to understand different logic families; realize logic gates using diodes and transistors.

SYLLABUS

UNIT-I: Linear Wave Shaping:

High pass, low pass RC circuits-response to sinusoidal, step, pulse, square and ramp inputs, The High pass RC circuit as a differentiator and the Low pass RC circuit as an integrator, Attenuators.

UNIT-II: Non-linear wave shaping:

Diode clippers, Clippers at two independent levels, Transfer characteristics of clippers, Transistor clipper, Emitter coupled clipper, Clamping operation, diode clamping circuits with source resistance and diode resistance -transient and steady state response for a square wave input, clamping circuit theorem.

UNIT-III: Bi-stable multi vibrators:

Transistor as a Switch, Transistor switching timings, A basic binary circuit-explanation.
Fixed-bias transistor binary, self-biased transistor binary, binary with commutating capacitors-analysis, Non-saturated binary–symmetrical triggering, and Schmit ttrigger circuit-emitter coupled binary circuit.

Mono-stable multi vibrator: Basic circuit-collector coupled monostable multivibrator-explanation.
Astable multi vibrator: The collector coupled Astable multivibrator-explanation.

UNIT-IV: Time –Base Generators:

Voltage sweep -- Simple Exponential sweep Generator. Errors that define Deviation from linearity, UJT Relaxation Oscillator – Methods of linearising a Voltage Sweep – Bootstrap and Miller Circuits – Current Sweep – Linearising a current Sweep by adjusting the driving Waveform.

UNIT-V: Synchronization and frequency division:

Pulse synchronization of relaxation devices, frequency division in the sweep circuit, Synchronization of Astable multivibrator, Monostable multivibrator, synchronization frequency division with a sweep circuit.

Digital logic Families: Introduction, RTL,DTL, TTL, ECL, NMOS logic, PMOS logic, CMOS logic-analysis

Text Books:

1. Pulse, Digital and switching wave forms by Milliman and Taub, McGraw Hill.
2. Pulse and Digital Circuits by A. Anand Kumar, PHI.

Reference Books:

1. Pulse and Digital Circuits by MS PrakashRao, Tata McGraw Hill.
2. Pulse and Digital Circuits by Venkatrao K., Ramasudha K., Manmadharao. G, Pearson Education, 2010.

Code: B17 EC 3102

LINEAR ICS AND APPLICATIONS

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives:

1. To understand the internal diagram and characteristics of operational amplifier.
2. To learn about the linear and non-linear applications of operational amplifier.
3. To know the concepts of Active filters and waveform generator
4. To understand the industrial applications using 555 timer, PLL.
5. To understand the concepts of Analog to Digital Converters and Digital to Analog Converters

Course Outcomes: Upon completion of the course, students will be able to

1. Understand the external behavior and characteristics of operational amplifier.
2. Design and analyze linear and non-linear circuits using operational amplifier.
3. Design and analyze oscillators and active filters using operational amplifier.
4. Design and analyze various applications using IC 565 and IC 555.
5. Understand the operation of Analog to Digital and Digital to Analog Converters.

SYLLABUS

UNIT-I: Applications of Operational Amplifiers:
Basics of Op-Amp, Block Diagram, open loop and closed loop op-amp configurations,Frequency compensation Techniques, Logarithmic Amplifier, Instrumentation Amplifiers, Voltage to Current and Current to Voltage Converters. Op-amp As a Comparators, Schmitt trigger, Wave form Generators, Sample and Hold Circuits, Rectifiers, Peak Detection

UNIT-II: Active Filters:
Butterworth type LPF, HPF, BPF, BEF, All-pass Filters, Higher Order Filters and their Comparison, Switched Capacitance Filters.

UNIT-III: Oscillators:
Op-Amp Phase Shift, Wien-bridge and Quadrature Oscillator, VoltageControlled Oscillators, Analog Multiplexers.

UNIT-IV: Special ICs:
555 Timers, 556 Function Generator ICs and their Applications, Three Terminal IC Regulators, IC 565 PLL and its Applications, Voltage to Frequency and Frequency to Voltage Converters.

UNIT-V: Digital to Analog and Analog to Digital Converters:
DAC techniques, Weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Different types of ADCs-parallel Comparator type ADC, Counter type ADC, Successive approximation ADC and ADC specifications.

Text Books:

1. Microelectronics- Jacob Millman.
2. Op-Amps and Linear ICs- RamakanthGayakwad, PHI, 1987.
3. Linear Integrated Circuits- D.RoyChowdhury, New Age International(p) Ltd, 2nd Edition,2003.

Reference Books:

1. Integrated Circuits- Botkar, Khanna Publications.
2. Applications of Linear ICs- Clayton.

Code: B17 EC 3103

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives: The student will

1. Select the instrument to be used based on the requirements.
2. Understand and analyze different signal generators and analyzers
3. Understand the design of oscilloscopes for different applications.
4. Understand the principle of operation and working of various types of bridges for
5. measurement of parameters

Course Outcomes: The student will be able to

1. Evaluate basics of measurement systems, principle of basic meter
2. Evaluate how a signal can be generated using different types of meters.
3. Investigate a signal / waveform with different oscillators.
4. Use bridges of many types and measure appropriate parameters.
5. Design different transducers for measurement of different parameters.

SYLLABUS

UNIT-I:
Performance characteristics of instruments, Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity.Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error. DC Voltmeters-Multirange, Range extension voltmeters, AC voltmeters, True RMS responding voltmeter, Electronic Multimeter.

UNIT-II:
Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors. Introduction to smart sensors.

UNIT-III:
Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line. Dual beam CRO, .Dual trace oscilloscope, sampling oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO.

UNIT – IV:
AC Bridges Measurement of inductance- Maxwell's bridge, Anderson bridge. Measurement of capacitance –Schearing Bridge. Wheatstone bridge.Wien Bridge, Errors and precautions in using bridges.

UNIT – V:

Signal Generator- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers.

Text Books:

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. HelfrickandD.W. Cooper, PHI, 5th Edition, 2002.

Reference Books:

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2nd Edition, 2003.
2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, PearsonEducation, 2nd Ed., 2004.

Code: B17 EC 3104

DIGITAL COMMUNICATION

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives:

1. To introduce the elementary concepts of digital communication systems.
2. To get introduced with emphasis on different modulation techniques.
3. Understand the effect of noise on signal transmission.
4. To learn about optimum detection and probability of error.
5. To compare the performance of two digital modulation techniques and introduce the elementary concept of spread spectrum modulation system.

Course Outcomes: By the end of the course the learners (students) will be able to

1. Understand the basic concepts of sampling and digital communication systems.
2. Understand the concept of binary and M-ary modulation techniques.
3. Understand the problems of noise and can design any digital communication system for the real time environment.
4. Designing of optimal receiver and understanding the concept of probability of error.
5. Analyze the error performance of two digital modulation techniques and understand the concept of spread spectrum communication system

SYLLABUS

UNIT-I: Pulse Modulation and Digital Representation of Analog Signal:
Sampling, Pulse Amplitude Modulation and Concept of Time Division Multiplexing, Pulse Width Modulation, Pulse Position Modulation, Digital representation of analog signal: Quantization of signals, Quantization error, Pulse Code Modulation, Companding, T1 Digital system, Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation, Continuously Variable Slope Delta Modulation.

UNIT-II: Digital Modulation and Transmission:
Binary Phase-Shift Keying, Differential Phase-Shift Keying, Differentially-Encoded PSK (DEPSK), Quadrature Phase-Shift Keying (QPSK), M-ary PSK, Binary Frequency Shift-Keying, Comparison of BFSK and BPSK, M-ary FSK, Minimum Shift Keying (MSK), Duo-binary Encoding.

UNIT-III: Mathematical Representation of Noise:
Some Sources of Noise, Frequency-domain representation of Noise, Spectral Components of Noise, Response of a Narrowband Filter to Noise, Effect of a Filter on the Power Spectral Density of Noise, Superposition of Noises, Linear Filtering, Noise Bandwidth, Quadrature Components of Noise, Power Spectral Density of Quadrature Components of Noise.

UNIT-IV: Optimal Reception of Digital Signal:
A Base-band Signal Receiver, Probability of Error, Optimum Receiver for both Baseband and Passband - Calculation of optimum filter Transfer function, Optimum filter realization using Matched filter, Probability of Error of the Matched Filter, Optimum filter realization using Correlator, Optimal of Coherent Reception: PSK, FSK, QPSK, Comparison of Modulation Systems.

UNIT-V: Noise in Pulse Code Modulation and Delta Modulation Systems:
PCM Transmission, Calculation of Signal-to-Noise Ratio in PCM, Delta Modulation(DM) Transmission, Calculation of Signal-to-Noise Ratio in DM, Comparison of PCM and DM.
Introduction to Spread Spectrum Modulation: Direct Sequence (DS) Spread Spectrum, Use of Spread Spectrum with Code Division Multiple Access (CDMA), Ranging using DS Spread Spectrum, Frequency Hopping (FH) Spread Spectrum, Generation and Characteristics of PN Sequences.

Text Books:

1. Principles of Communication Systems by Herbert Taub, Donald L Schilling and GoutamSaha,3rd edition, Tata McGraw-Hill Publications, 2008 New Delhi.
2. Digital Communications by Simon Haykins John Wiley, 2005

Reference Books:

1. Principles of Digital Communications- J.Das, SK.Mullick, P.K.Chatterjee.
2. Modern Analog and Digital Communications by B.P.Lathi, Oxford reprint, 3rd Edition, 2004.

Code: B17 EC 3105

ANTENNAS & PROPAGATION

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives:

1. Understand the radiation mechanism of antennas and to learn about basic parameters like impedance, gain, directivity, bandwidth, effective length, beam width and radiation pattern etc.
2. Derive fields and power radiated by elemental antenna, half wave dipole, quarter wave monopole and values of their radiation resistance.
3. Understand the necessity of antenna arrays and to learn about theory of uniform linear arrays, broad side and end fire arrays, non-uniform linear arrays like binomial arrays and pattern multiplication.
4. Have knowledge about practical LF, HF, VHF, UHF and Microwave antennas and be able to design practical antennas.
5. Have knowledge about various antenna measurements and be able to conduct different types of antenna measurements.
6. Have knowledge about various types of radio wave propagation like Ground wave, Ionospheric, space wave and Duct propagation and be able to design different types of communication links.

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

1. Understand Radiation mechanism and functions of antennas, identify antenna parameters derive expressions for antenna parameters .
2. Analyze and design wire and aperture antennas for different applications.
3. Analyze and design Antenna arrays.
4. Capable of performing various antenna measurements and come up with conclusions about antenna parameters and performance.
5. Identify characteristics of radio wave propagation and be able to design different types of communication links for different frequency bands

SYLLABUS

UNIT-I: Fundamentals of Antennas & Radiation from Antennas:
Definition of antennas, functions of Antennas, properties of antennas, antenna parameters, polarization, basic antenna elements, radiation mechanism, radiating fields of alternating current element, radiated power and radiation resistance of current element, different types of current distribution on linear antennas, radiated fields, radiated power and radiation resistance of half-wave dipole and quarter – wave monopole, directional characteristics of dipole antennas.

UNIT-II: Linear Arrays:
Uniform linear arrays, field strength of a uniform linear arrays, locations of principal maximum, null and secondary maxima, first side lobe level, analysis of broad side and end fire , Pattern multiplication, binomial arrays, effect of earth on vertical patterns, methods of excitation of antennas, impedance matching techniques, transmission loss between transmitting and receiving antennas – Friis formula, antenna noise temperature and signal-to-noise ratio, Introduction to array synthesis Methods.

UNIT-III:Practical Antennas – LF,MF,HF,VHF& UHF antennas

Classification of antennas according to type of radiation and type of current distribution of antennas – Isotropic, Omni directional & directional antennas, standing wave and travelling wave antennas, Classification according to frequency of operation – LF, MF, HF, VHF & UHF, brief introduction to LF & MF antennas, earth mat, counterpoise earth, top capacitance hat.

HF, VHF & UHF Antennas - V Antennas, Inverted V Antennas, Rhombic antennas, folded dipole, Yagi-Uda antenna, Log periodic antenna, Loop and Helical Antennas.

UNIT – IV: Microwave antennas:

Introduction, types of reflector antennas, corner reflector, parabolic reflector, feed systems for parabolic reflector, horn antennas, slot antennas and impedance of slot antennas, Babinet's principle and microstrip antennas.

Antenna measurements**:** Introduction, measurement ranges, antenna impedance measurements, antenna gain and directivity measurement, measurement of radiation pattern, beamwidth and SLL.

UNIT-V: Wave Propagation

Types of radio wave propagation, ground wave propagation and Somerfield's analysis of ground wave propagation, wave tilt of ground wave, structure of ionosphere, refractive index of ionosphere, mechanism of wave bending by ionosphere, critical frequency, MUF, Skip distance, fading and remedial measures, effect of earth's magnetic field on ionosphere propagation, faraday rotation, tropospheric (space wave) propagation, range of space wave propagation, effective earth radius, field strength of space wave, atmospheric effects on space wave propagation, duct propagation and scatter propagation.

Textbooks:

1. EM waves and Radiating systems – by E. C. JORDAN and K. G. Balmain – PHI , New Delhi.
2. Antenna theory- by C. A. Balanis, john wiley.

Reference Books:

1. Antennas – By J.D. Kraus, McGrawhill.
2. Antenna and wave propagation – by G.S.N Raju, Pearson eduction.

Code: B17 EC 3106

COMPUTER NETWORK ENGINEERING

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives:

1. To familiarize with the fundamental concepts of computer networking and network engineering reference models.
2. To introduce basic concepts of analog and digital transmission techniques, switching techniques.
3. To understand error control and flow control mechanisms.
4. To familiarize with different multiple access protocols such as ALOHA, CSMA.
5. To familiarize with different networking devices and congestion control algorithms.
6. To familiarize with TCP and UDP header formats.

Course Outcomes:

Upon completion of the course, students will be able to

1. Explain basic computer network principles and layers of the OSI model and TCP/IP.
2. Explain the concepts of transmission media, switching and multiplexing techniques.
3. Explain and analyze the error control and flow control methods.
4. Explain different multiple access control protocols and IEEE standards for LANs and MANs.
5. Identify the different types of connecting devices andexplain the basic concepts of congestion control algorithms and internetworking.
6. Explain TCP and UDP header formats.

SYLLABUS

UNIT-I

Uses of Computer Networks, Line Configuration, Topology, Transmission mode, Categories of Networks-LAN, MAN, WAN; Network Software- Protocol Hierarchies, Design issues of layers, Connection Oriented and Connectionless services; Reference Models- The OSI Reference Model, The TCP/IP Reference Model, The B-ISDN ATM Reference Model.

UNIT-II

Theoretical basis for Data communication, Transmission media- Guided and Unguided Transmission media; The Telephone System-Structure of Telephone system, Trunks and Multiplexing, Frequency Division Multiplexing, Time Division Multiplexing, Switching-Circuit Switching, The Switch Hierarchy, Crossbar switches, Space Division Switches, Time Division Switches; Narrow band ISDN, Broadband ISDN and ATM- Virtual Circuits versus Circuit Switching.

UNIT-III

DATA LINK LAYER

Design issues, Error Detection and Correction, Elementary Data link protocols, Sliding window protocols, HDLC, **Medium access sub layer**-The Channel allocation problem, Multiple Access Protocols-ALOHA, Carrier Sense Multiple Access protocols; IEEE standard for 802 LANs, Satellite Networks

UNIT-IV

NETWORK LAYER

Design considerations, Difference between Gateways, Ethernet switch, Router, Hub, Repeater, Congestion Control algorithms- General principles of Congestion Control, Congestion prevention policies. The Leaky bucket algorithm and Token bucket algorithm, The Network Layer in the Internet- The IP Protocol, IP Addresses.

UNIT-V

TRANSPORT LAYER

The Transport layer Service, Elements of Transport protocols, The Internet Transport Protocols- UDP, TCP.

APPLICATION LAYER

The Domain Name System, Electronic mail, The World Wide Web.

Text Books:

1. Data Communications and Networking by BehrouzA.Forouzan, 2nd edition, Tata McGraw Hill.
2. Computer Networks — Andrew S Tanenbaum, 3rd Edition, Pearson Education/PHI.

Reference Books:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition,Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

Code: B17 EC 3107

LINEAR INTEGRATED CIRCUITS & PULSE CIRCUTS LAB WITH SIMULATION

Lab	**: 3 Periods**	**Int.Marks**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Objectives:

This laboratory course enables students to get practical experience in design, assembly and evaluation of Linear integrated circuits & Pulse Circuits. They will use Multisim to test their electronic designs.

Course Outcomes: Students will be able to:

1. Design and conduct experiments on RC low pass and high pass circuits.
2. Observe operation of UJT Sweep Generator.
3. Design and test different types of Multi vibrators
4. Acquire a basic knowledge on simple applications of operational amplifier.
5. Design, construct Schmitt trigger using operational amplifier.
6. Use Multisim to test their electronic designs.

LIST OF EXPERIMENTS

1. Linear Wave Shaping
   a) Passive RC Differentiator
   b) Passive RC Integrator
2. Non Linear Wave shaping
   a) Clipping Circuits
   b) Clamping Circuits
3. Self biasbistableMultivibrator
4. Schmitt Trigger Using μA 741
5. UJT Sweep Generator
6. AstableMultivibrator using 555 timer
7. Multiplexer
8. Shift Registers

LIST OF EXPERIMENTS
(Simulation)

1. Linear Wave Shaping
   a) Passive RC Differentiator
   b) Passive RC Integrator
2. Non Linear Wave shaping
   a) Clipping Circuits
   b) Clamping Circuits

3. Self biasbistableMultivibrator
4. Schmitt Trigger Using μA 741
5. UJT Sweep Generator
6. AstableMultivibrator using 555 timer.
7. Multiplexer
8. Shift Registers

Reference: Lab Manuals

Code: B17 EC 3108

DIGITAL IC'S LABORATORY WITH SIMULATION

Lab	**: 3 Periods**	**Int.Marks**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Objectives:

1. Learn and understand the basics of digital electronics, Boolean algebra, and able to design the simple logic circuits and test/verify the functionality of the logic circuits.
2. Design combinational and sequential logic circuits using digital ICs.
3. This laboratory course enables student to get practical experience in design, assembly and evaluation of digital integrated circuits and HDL lab. Students use digital trainer kit and Xilinx ISE simulator to test their electronic designs.

Course Outcomes: Upon completion of the course, students will be able to

1. Synthesize, simulate and implement a digital design in a configurable digital circuit with computer supported aid tools and digital trainer kit.
2. Acquire Knowledge of analysis and synthesis of combinational and sequential circuits with simulators and digital trainer kits.
3. Build high level programming (HDL programming) skills for digital circuits.
4. Adapt digital circuits to electronics and telecommunication field.

LIST OF EXPERIMENTS

A. **HARDWARE**

1. Verify the operation of following digital components using Digital Trainer Kit
   a. Full adder using gates
   b. Full subtract or using gates
2. Design and verify the logic functions of multiplexer and de-multiplexers using digital trainer kit
3. Design code convertors using digital trainer kit
   a. BCD TO SEVEN segment display
   b. Priority encoder
4. Verify the operation of following flip-flops using Digital Trainer Kit
   a. JK flip flop
   b. D flip flop
   c. T flip flop
5. Design a following synchronous counters using Digital Trainer Kit
   a. Mod 16 counter
   b. Mod 8 counter
   c. Decade counter
6. Verify the functioning of shift register using Digital Trainer Kit

B. SOFTWARE

7. Verify the operation of following digital components using ISE Simulator
   a. Full adder
   b. Full subtractor
8. Verify the operation of multiplexer and priority encoder using ISE Simulator
9. Design ALU and verify the operation using ISE Simulator
10. Design RAM for read/write operations using ISE Simulator

Equipment Required:

1. Personal Computer with necessary peripherals and Xilinx Vivado ISE software
2. Digital trainer kits.

Reference: Lab Manuals

Code: B17BS3101

PROBLEM SOLVING & LINGUISTIC COMPETENCE

(Common to all Branches)

Tutorial	**: 3 Periods (VA-2+QA-1)**	**Int.Marks**	**: 30**
Exam	**: 3 Hrs.**	**Ext.Marks**	**: 70**
		Credits	**: 1**

Part-A: Verbal and Soft Skills-I

Course Objectives:

1. To introduce concepts required in framing grammatically correct sentences and identifying errors while using Standard English.
2. To familiarize the learner with high frequency words as they would be used in their professional career.
3. To inculcate logical thinking in order to frame and use data as per the requirement.
4. To acquaint the learner of making a coherent and cohesive sentences and paragraphs for composing a written discourse.
5. To familiarize students with soft skills and how it influences their professional growth.

Course Outcomes:

The student will be able to

1. Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.
2. Answer questions on synonyms, antonyms and other vocabulary based exercises while attempting CAT, GRE, GATE and other related tests.
3. Use their logical thinking ability and solve questions related to analogy, syllogisms and other reasoning based exercises.
4. Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.
5. Apply soft skills in the work place and build better personal and professional relationships making informed decisions.

SYLLABUS

Grammar: (VA**)**

Parts of speech(with emphasis on appropriate prepositions, co-relative conjunctions, pronouns-number and person, relative pronouns), articles(nuances while using definite and indefinite articles), tenses(with emphasis on appropriate usage according to the situation), subject – verb agreement (to differentiate between number and person) , clauses(use of the appropriate clause , conditional and relative clauses), phrases(use of the phrases, phrasal verbs) to-infinitives, gerunds, question tags, voice, direct & indirect speech, degrees of comparison, modifiers, determiners, identifying errors in a given sentence, correcting errors in sentences.

Vocabulary: (VA)

Synonyms and synonym variants(with emphasis on high frequency words), antonyms and antonym variants(with emphasis on high frequency words), contextual meanings with regard to inflections of a word, frequently confused words, words often mis-used, multiple meanings of the same word (differentiating between meanings with the help of the given context), foreign phrases, homonyms, idioms, pictorial representation of words, word roots, collocations.

Reasoning: (VA)
Critical reasoning (understanding the terminology used in CR- premise, assumption, inference, conclusion), Analogies (building relationships between a pair of words and then identifying similar relationships), Sequencing of sentences (to form a coherent paragraph, to construct a meaningful and grammatically correct sentence using the jumbled text), odd man (to use logical reasoning and eliminate the unrelated word from a group), YES-NO statements (sticking to a particular line of reasoning Syllogisms.

Usage: (VA)
Sentence completion (with emphasis on signpost words and structure of a sentence), supplying a suitable beginning/ending/middle sentence to make the paragraph coherent, idiomatic language (with emphasis on business communication), punctuation depending on the meaning of the sentence.

Soft Skills:
Introduction to Soft Skills – Significance of Inter & Intra-Personal Communication – SWOT Analysis –Creativity & Problem Solving – Leadership & Team Work - Presentation Skills Attitude – Significance – Building a positive attitude – Goal Setting – Guidelines for Goal Setting – Social Consciousness and Social Entrepreneurship – Emotional Intelligence - Stress Management, CV Making and CV Review.

Text Books:

1. Oxford Learners's Grammar – Finder by John Eastwood, Oxford Publication.
2. R S Agarwal's books on objective English and verbal reasoning
3. English Vocabulary in Use- Advanced , Cambridge University Press.
4. Collocations In Use, Cmbridge University Press.
5. Soft Skills & Employability Skills by SaminaPillai and Agna Fernandez, Cambridge University Press India Pvt. Ltd.
6. Soft Skills, by Dr. K. Alex, S. Chand & Company Ltd., New Delhi

Reference Books:

1. English Grammar in Use by Raymond Murphy, CUP
2. Websites: Indiabix, 800score, official CAT, GRE and GMAT sites
3. Material from _IMS, Career Launcher and Time' institutes for competitive exams.
4. The Art of Public Speaking by Dale Carnegie
5. The Leader in You by Dale Carnegie
6. Emotional Intelligence by Daniel Golman
7. Stay Hungry Stay Foolish by RashmiBansal
8. I have a Dream by RashmiBansal

Part-B: Quantitative Aptitude -I

Course objectives:

The objective of introducing quantitative aptitude-1 is:

1. To familiarize students with basic problems on numbers and ratio‘s problems.
2. To enrich the skills of solving problems on time, work, speed, distance and also measurement of units.
3. To enable the students to work efficiently on percentage values related to shares, profit and loss problems.
4. To inculcate logical thinking by exposing the students to reasoning related questions.
5. To expose them to the practice of syllogisms and help them make right conclusions.

Course Outcomes:

1. The students will be able to perform well in calculating on number problems and various units of ratio concepts.
2. Accurate solving problems on time and distance and units related solutions.
3. The students will become adept in solving problems related to profit and loss, in specific, quantitative ability.
4. The students will present themselves well in the recruitment process using analytical and logical skills which he or she developed during the course as they are very important for any person to be placed in the industry.
5. The students will learn to apply Logical thinking to the problems of syllogisms and be able to effectively attempt competitive examinations like CAT, GRE, GATE for further studies.

SYLLABUS

Numbers, LCM and HCF, Chain Rule, Ratio and Proportion Importance of different types of numbers and uses of them: Divisibility tests, Finding remainders in various cases, Problems related to numbers, Methods to find LCM, Methods to find HCF, applications of LCM, HCF. Importance of chain rule, Problems on chain rule, Introducing the concept of ratio in three different methods, Problems related to Ratio and Proportion.

Time and work, Time and Distance Problems on man power and time related to work, Problems on alternate days, Problems on hours of working related to clock, Problems on pipes and cistern, Problems on combination of the some or all the above, Introduction of time and distance, Problems on average speed, Problems on Relative speed, Problems on trains, Problems on boats and streams, Problems on circular tracks, Problems on polygonal tracks, Problems on races.

Percentages, Profit Loss and Discount, Simple interest, Compound Interest, Partnerships, shares and dividends

Problems on percentages-Understanding of cost price, selling price, marked price, discount, percentage of profit, percentage of loss, percentage of discount, Problems on cost price, selling price, marked price, discount. Introduction of simple interest, Introduction of compound interest, Relation between simple interest and compound interest, Introduction of partnership, Sleeping partner concept and problems, Problems on shares and dividends, and stocks.

Introduction, number series, number analogy, classification, Letter series, ranking, directions Problems of how to find the next number in the series, Finding the missing number and related sums, Analogy, Sums related to number analogy, Ranking of alphabet, Sums related to Classification, Sums related to letter series, Relation between number series

and letter series, Usage of directions north, south, east, west, Problems related to directions north, south, east, west.

Data sufficiency, Syllogisms Easy sums to understand data sufficiency, Frequent mistakes while doing data sufficiency**,** Syllogisms Problems.

Text Books:

1. Quantitative aptitude by RS Agarwal
2. Verbal and non verbal reasoning by RS Agarwal.
3. Puzzles to puzzle you by shakunataladevi

References:

1. Barron‘s by Sharon Welner Green and Ira K Wolf (Galgotia Publications pvt.Ltd.)
2. Websites: m4maths, Indiabix, 800score, official CAT, GRE and GMAT sites
3. Material from _IMS, Career Launcher and Time‘ institutes for competitive exams.
4. Books for cat by arunsharma
5. Elementary and Higher algebra by HS Hall and SR knight.

Websites:

1.www.m4maths.com
2. www.Indiabix.com
3. www.800score.com
4. Official GRE site
5. Official GMAT site

Code: B17 BS 3102

BASIC CODING
(Common to ECE & EEE)

Lab	**: 3 Periods**	**Int.Marks**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 1**

Course Objectives:

1. To develop programming skills among the students.
2. To familiarize the student with Control Structures, Loop Structures.
3. To familiarize the student with Basic searching and sorting Methods.
4. To familiarize the student with Functions, Recursions and Storage Classes.
5. To familiarize the student with Structures and Unions.
6. To familiarize the student with Operating System concepts.
7. To familiarize the student with Networking concepts.

Course Outcomes:

At the end of the course students will be able to

1. Know about Control Structures, Loop Structures and branching in programming.
2. Know about various searching and sorting methods.
3. Know about Functions, Recursions and Storage Classes.
4. Know about Structures and Unions.
5. Know different Operating System concepts.
6. Differentiate OSI Model Vs. TCP/IP suite.

SYLLABUS

UNIT-I Review of Programming constructs
Programming Environment, Expressions formation, Expression evaluation, Input and Output patterns, Control Structures, Sequential branching, Unconditional branching, Loop Structures, Coding for Pattern Display.

UNIT-II Introduction to Linear Data, strings and pointers
Structure of linear data, Operation logics, Matrix forms and representations, Pattern coding, Working on character data, Compiler defined methods, Substitution coding for defined methods, Row Major representation, Column Major representation, Basic searching and sorting Methods.

UNIT-III Functions, Recursions and Storage Classes
Functions – Introduction to modular programming – Function Communication - Pass by value, Pass by reference – Function pointers – Recursions – Type casting – Storage classes

Practice: programs on passing an array and catching by a pointer, function returning data, comparison between recursive and Iterative solutions.
Data referencing mechanisms: Pointing to diff. data types, Referencing to Linear data, Runtime-memory allocation, Named locations vs pointed locations, Referencing a 2D-Matrix

UNIT-IV User-defined datatypes, Pre-processor Directives and standard storage
Need for user-defined data type – structure definition – Structure declaration – Array within a Structure – Array of Structures – Nested Structures - Unions – Declaration of Union data type, StructVs Union - Enum – Pre-processor directives , Standard storage methods, Operations on file, File handling methods, Orientation to Object oriented programming

Practice: Structure padding, user-defined data storage and retrieval programs

UNIT-V Operating system principles and Database concepts
Introduction to Operating system principles, Process scheduling algorithms, Deadlock detection and avoidance, Memory management, Networking: Introduction to Networking, OSI Model Vs. TCP/IP suite, Datalink layer, Internet layer, DVR Vs. LSR, Transport Layer, Application Layer

References:

1. Computer Science, A structured programming approach using C, B.A.Forouzan and R.F.Gilberg, 3rd Edition, Thomson, 2007.
2. The C –Programming Language, B.W. Kernighan, Dennis M. Ritchie, Prentice Hall India Pvt.Ltd
3. Scientific Programming: C-Language, Algorithms and Models in Science, Luciano M. Barone (Author), EnzoMarinari (Author), Giovanni Organtini, World Scientific .
4. ObjectOrientedProgrammingin C++: N. Barkakati, PHI.
5. ObjectOrientedProgrammingthrough C++ byRobatLaphore.
6. https://www.geeksforgeeks.org/.
7. https://www.tutorialspoint.com/

SCHEME OF INSTRUCTION & EXAMINATION

(Regulation R17)

III/IV B.TECH

(With effect from 2017-2018 Admitted Batch onwards)

Under Choice Based Credit System

ELECTRONICS AND COMMUNICATION ENGINEERING

II-SEMESTER

Code No.	Name of the Subject	Credits	Lecture Hrs	Tutorial Hrs	Lab Hrs	Contact Hrs/ Week	Internal Marks	External Marks	Total Marks
B17 EC 3201	Microprocessors and its Applications	3	3	1	--	4	30	70	100
B17 EC 3202	Microwave Engineering	3	3	1	--	4	30	70	100
B17 EC 3203	VLSI Design	3	3	1	--	4	30	70	100
B17 EC 3204	Digital Signal Processing	3	3	1	--	4	30	70	100
B17 EC 3205	Radar Engineering	3	3	1	--	4	30	70	100
#OE	OPEN ELECTIVE	3	3	1	--	4	30	70	100
B17 EC 3208	Microprocessors and Microcontrollers Lab	2	--	--	3	3	50	50	100
B17 EC 3209	VLSI Lab	2	--	--	3	3	50	50	100
B17 BS 3201	Employability Skills	1	--	3	--	3	30	70	100
B17 BS 3203	Advanced Coding	1	--	--	3	3	50	50	100
B17 BS 3206	IPR & PATENTS	--	--	2	--	2	--	--	--
Total		**24**	**18**	**11**	**9**	**38**	**360**	**640**	**1000**

OPEN ELECTIVE	B17EC3206	Microcontrollers
	B17CS3214	Oops through Java
	B17CS3215	Data Mining
	B17ME3210	Industrial Robotics
	B17EE3209	Power Electronics
	B17EC3207	Bio Medical Engineering
	B17CS3216	Artificial Neural Networks

Code: B17 EC 3201

MICROPROCESSORS AND ITS APPLICATIONS

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives:

1. To understand the architecture of 8085 Microprocessor
2. To be familiar with 8085 assemble language programming
3. To understand the concept of interfacing peripheral devices and memory to 8085 Microprocessor
4. To understand the architecture of 8086/8088 Microprocessor
5. To be familiar with 8086 assemble language programming

Course Outcomes: By the end of the course the learners (students) will

1. Understand and analyze architecture of the 8085 microprocessor
2. Be familiar with the 8085 Assembly Language Programming
3. Be familiar with Hardware and software requirements in interfacing and designing 8085 microprocessor based products for practical applications
4. Understand and analyze architecture of the 8086 microprocessor
5. Be familiar with the 8086 Assembly Language Programming

SYLLABUS

UNIT-I: 8085 Architecture:

Bus structure of 8085,internal architecture and functional description of INTEL 8085 Microprocessor pin out & signals, flag register, Fetch cycle ,memory Read /Write and I/O Read /Write Cycles with Timing Diagrams , Stack memory organization, Interrupt structure of 8085,Vectored, non-vectored, maskable and non maskable interrupts, pending interrupts, execution of SIM and RIM instructions.

UNIT-II: 8085 Programming:

Introduction to 8085 Assembly Language Programming, Programming model of 8085 and function of each register, Addressing modes of 8085 with examples, I/O addressing, Stack memory operation using PUSH and POP instructions, Classification of 8085 instructions with examples, Instruction set, Sample Programs, Subroutines, CALL and RET instructions, and Interrupt Service Routines.

UNIT-III: 8085 Interfacing:

Interfacing of semiconductor Memory and I/O devices to 8085, Classification of Read /Write and Read only memories, Interfacing of SRAMs, DRAMs and EPROMs using 74LS138.Functional description of PPI(8255),PIT(8253/8254) and USART(8251A).Interfacing of parallel I/O (8255), Timer/Counter (8253/8254), Serial I/O (8251A) with 8085 Microprocessor.

UNIT-IV: 8086/8088 Architecture:
Internal Architecture and Functional description of INTEL 8086/8088 microprocessor, and their comparisons. Memory segmentation and physical memory address generation, pipeline architecture and instruction queue .Register organisation, Status flags and machine control flags of 8086, pin out and signals in detail, Memory read /write and I/O read/Write Bus cycles with timing diagrams, 8086 memory Banks,8086 minimum and maximum modes of operation.

UNIT-V: 8086 Programming:
Introduction to 8086 Assembly language programming, programmable register array of 8086 and function of each register, Data addressing modes of 8086 with examples, fixed and variable I/O addressing. Stack memory operation, classification of 8086 instructions, sample 8086 assembly language programs using data transfer, Arithmetic and logic instructions, Introduction to ARM.

Text Books:

1. Architecture Programming and Applications. Ramesh S.Goankar.New Age International Pvt.Ltd.,(3rd Edition)'
2. Microprocessors and interfacing ,DouglasV.Hall, Tata McGraw-Hill Revised 2nd Edition.

Reference Book:

1. Microprocessors: The 8086/8088, 80186/80286, 80386/80486 and the Pentium Family.NileshB.Bahadure, Phi Learning Pvt.Ltd.,2010.

Code: B17 EC 3202

MICROWAVE ENGINEERING

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives:

1. The purpose of this course is to provide the operational characteristics and conceptual understanding of active and passive components at microwave frequencies.
2. This course also emphasizes formulation and application of scattering matrix for the analysis of different microwave passive components.
3. Further, this course also provides the understanding of measurement techniques of different parameters.

Course Outcomes: By the end of the course the learners (students) will be able to

1. Explain the working principle of different passive waveguide components used atmicrowave frequencies.
2. Apply the properties of scattering matrix for solving the scattering matrix of different passive microwave components for both ideal and practical considerations and analyse their operation.
3. Understand the conceptual and operational characteristics of different microwave Tube circuits.
4. Explain the operational characteristics of different microwave solid state devices.
5. Understand and implement different experimental procedures involving measurement of microwave parameters

SYLLABUS

UNIT-I: Microwave Components and its applications:
Introduction, Microwave Spectrum and Bands, Applications of Microwaves, Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide irises, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types, E-plane and H-plane Tees, Magic Tee, Hybrid Ring; Directional Couplers – 2Hole, Bethe Hole types, Ferrite Components– Faraday Rotation, Gyrator, Isolator, Circulator, Related Problems.

UNIT-II: Scattering Matrix:
Scattering Matrix – Significance, Formulation and Properties, Scattering Matrix of Isolator, circulator, directional coupler, E Plane Tee, H plane Tee and Magic Tee.

UNIT-III:Qualitative treatment on Microwave Tubes:
Limitations and Losses of conventional tubes at microwave frequencies.Re-entrant Cavities,Microwave tubes – O type and M type classifications. O-type tubes :2 Cavity Klystrons – Structure, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory, Applications, Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Electronic Admittance; Electronic and Mechanical Tuning, Applications, Related Problems.

HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT (Qualitative treatment).
M-type Tubes Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron – Hull Cut-off Condition, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

UNIT-IV: Microwave Solid state Devices:
Negative resistance phenomenon, Gunn Diode, domain formation, Tunnel Diode- principle of operation, IMPATT- principle of operation, TRAPATT, PIN Diodes and its applications (Qualitative analysis only).Detector diode or point contact diode and its characteristics.

UNIT-V:Microwave Measurements:
Microwave Test bench, Measurement of Power, VSWR, Frequency, Guide Wavelength, Unknown load impedance, S parameters of reciprocal and non reciprocal devices

Text Books:

1. Foundations for Microwave Engineering, R. R. Collin, McGraw Hill.
2. Microwave Devices and Circuits, Third Edition, Samuel Y. Liao, Pearson Education.

Reference Books:

1. Microwave Engineering, Annapurna Das, Sisir K. Das, Tata McGraw-Hill Education
2. Microwave Engineering, 4th Edition, David M. Pozar, November 2011.
3. Microwave and Radar Engineering, GottapuSasibhushanaRao, Pearson Education, New Delhi, 2014.
4. Microwave and Radar Engineering-M.Kulkarni, Umesh Publications, 3rd Edition.

Code: B17 EC 3203

VLSI DESIGN
(Common to ECE & EEE (Open Elective))

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives: Student will be introduced to

1. Use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnections. Learn the various fabrication steps of NMOS and CMOS.
2. Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect and to verify the functionality, timing, power and parasitic effects.
3. Learn some basic electrical properties of MOSFET and scaling models and limitations of scaling of MOS circuits.
4. The concepts and techniques of modern integrated circuit design and testing (CMOS VLSI). Learn basic concepts of FPGA.
5. Introduction to Low power CMOS Logic circuits and also someoptimisation techniques.

Course Outcomes: By the end of the course the learners (students) will be able to

1. Apply the Concept of design rules during the layout of a circuit.
2. Model and simulate digital VLSI systems using hardware design language.
3. Synthesize digital VLSI systems from register-transfer or higher level descriptions
4. Understand current trends in semiconductor technology, and how it impacts scaling and performance.
5. Understand the basic concepts of FPGA and low power VLSI design

SYLLABUS

UNIT-I: Introduction :

Introduction to IC Technology,Fabrication process: NMOS, PMOS and CMOS.I_{ds} versus V_{ds}Relationships,Aspects of MOS transistor Threshold Voltage,MOS transistor Transconductance,OutputConductance and Figure of Merit.NMOSInverter,Pull-up to Pull-down Ratio for NMOS inverter driven by another NMOS Inverter,and through one or more pass transistors,Alternative forms of pull-up,The CMOS Invertor,Latch-up in CMOS circuits,Comparison between CMOS and Bi-CMOS technology.

UNIT-II: MOS and Bi-CMOS Circuit Design Processes:

MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2µm Double Metal, Double Poly, CMOS/BiCMOS rules, 1.2µm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask Form.

UNIT-III: Basic Circuit Concepts:

Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, The Delay Unit, Inverter Delays, Driving large capacitive loads,Propagation Delays, Wiring Capacitances, Choice of layers

Scaling of MOS Circuits: Scaling models, Scaling factors for device parameters, Limits due to sub threshold currents, current density limits on logic levels and supply voltage due to noise and current density.Switchlogic,Gate logic.

UNIT-IV: Test and Testability:
Design for Testability, Practical design for Test (OFT) Guidelines, Scan Design Techniques and Built-In-Self Test.
FPGA Based Systems: Introduction, Basic concepts, FPGA architecture.

UNIT-V: Introduction to Low Power VLSI Design:
Introduction to Deep submicron digital IC design,Low power CMOS Logic circuits:Over view of power consumption,Low –Power design through voltage scaling,Estimation and optimisation of switching activity,Reduction of switching capacitance, interconnectDesign,Power Grid and Clock Design.

Text Books:

1. Essentials of VLSI Circuits and Systems By Kamran Eshraghian, Douglas and A. Pucknell and SholehEshraghian, Prentice-Hall of India Private Limited,2005 Edition.
2. CMOS Digital Integrated Circuits Analysis and Design, Sung-Mo Kang, Yusuf Leblebici, Tata McGraw Hill Education,2003.

Reference Books:

1. "FPGA Based System Design"- Wayne Wolf, Pearson Education, 2004, Technology and Engineering.

Code: B17 EC 3204

DIGITAL SIGNAL PROCESSING

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives:

This course introduces students to the fundamental principles of Digital Signal Processing and develops essential analysis and design tools required for signal processing systems & implementations. Also this subject is an introduction to the graduate-level courses in a broad range of disciplines spanning communications, speech processing & image processing.

The topics include SS basics, sampling theorem, Z-transform, analysis of Discrete-time Linear Time-Invariant Systems, Realization structures, Frequency domain representation of signals and systems, DTFT, DFS, Discrete Fourier Transform (DFT), linear/circular convolutions, Fast Fourier Transform (FFT) algorithms, FIR & IIR digital filter design, Multi-rate DSP and a few DSP applications.

Course Outcomes: At the end of this course, the students will be able to;

1. Describe the DSP fundamental theory and components, Develop an understanding of DSP advantages, limitations and fundamental tradeoffs. Carry-out LTI system analysis using convolution & Z-transform
2. Carryout data analysis &spectrum analysis using FFT
3. Design of IIR digital filters to meet specifications
4. Design of FIR digital filters to meet specifications
5. Knows multi-rate signal processing aspects & DSP applications

SYLLABUS

UNIT-I: Discrete-Time Signals and Systems: (Oppenheim &Proakis**)**
Introduction to Digital Signal Processing, Basic elements of a DSP system, Advantages of Digital SP over Analogy SP, Discrete-time signals and systems, DT-LTI systems described by Linear constant–coefficient difference equations, Properties & Analysis of DT-LTI systems, Discrete linear convolution, Frequency domain representation of DT Signals and Systems, DTFT, Review of the Z-transform, Properties, Inverse Z-transform, Analysis of DT-LTI systems in Z-Domain, System function, One-sided Z-transform, Solution of difference equations, Structures and Realization of Digital Filters, Direct-I, II, series and parallel forms.

UNIT-II: Discrete Fourier Transform (DFT) and Fast Fourier Transform Algorithms (FFT): (Oppenheim &Proakis)
Frequency analysis of discrete time signals, DFS, Properties of DFS, Sampling of DTFT, DFT, Properties of DFT, Circular and linear convolution of sequences using DFT, Efficient computation of DFT, Radix–2 Decimation–in–Time(DIT) & Decimation–in–Frequency(DIF) FFT Algorithms, Inverse FFT.

UNIT-III: Design of IIR Digital Filters: (Oppenheim &Proakis**)**
General considerations in Filter design, Analog filter approximations– Butterworth and Chebyshev, Frequency response specifications; Design of IIR digital filters from analog filters, Bilinear Transformation Method, Impulse Invariance Technique, and Low-pass filter Design examples.

UNIT-IV:**Design of FIR Digital Filters:** (Oppenheim &Proakis**)**
Characteristics of FIR Digital Filters, Design of Linear Phase FIR digital Filters using Windows, Effect of Window selection & filter length on filter frequency response, Design examples, Comparison of IIR and FIR Filters.

UNIT-V: DSP Applications and Fundamentals of Multirate Digital Signal Processing: (SK Mitra**)**
Overview of DSP applications, Spectral analysis of sinusoidal signals using FFT, Subband coding of speech signals, Signal compression, Finite precision arithmetic effects.

Introduction to Multirate DSP, Basic sampling rate alteration devices: upsampler, downsampler, Time and Frequency domain characterization of up/down samplers, Interpolator and decimator. Interactive programing based examples.

Text Books:

1. Alan V. Oppenheim, Ronald W. Schafer, "Digital Signal Processing" – PHI Ed., 2006
2. John G. Proakis, D.G. Manolakis, "Digital Signal Processing: Principles, Algorithms and Applications", 3rd Ed., PHI, 1996.

Reference Books:

1. Sanjit K. Mitra, "Digital Signal Processing: A Computer Based Approach", Tata McGraw Hill.
2. Lawrence R.Rabiner, Bernard Gold, "Theory and application of digital signal processing", Prentice Hall.

Code: B17 EC 3205

RADAR ENGINEERING

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives

1. To provide insight of basic working principle of Radar
2. To apply different methods to measurement the Range, angle information etc. of the target from the radar,
3. To introduce different types of Radar systems and other types of tracking Radars,
4. To provide insight of advantages, limitations and applications of various Radar.
5. To provide insight of basics of various navigational aids and their working principles, applications, limitations and different methods to overcome their limitations

Course Outcomes:

By the end of the course the learners (students) will be able to

1. Able to understand the basic working principles of various Radars .
2. Apply various mathematical equations to measure the Range and angle information of the targets from the radar.
3. Analyze and design of radar signals, MTI, Pulse Doppler radar and various tracking Radars.
4. Analyze various Radar systems, advantages, limitations and their applications.
5. Analyze various Navigational Aids like LORAN, DECCA and VOR.

SYLLABUS

UNIT-I:AN INTRODUCTION TO RADAR:

Origin of Radar, Basic Principle of Radar, Range to a target, Pulse Repetition Frequency and Range Ambiguities, Radar Block Diagram and Operation,Radar Equation, Integration of Radar Pulses ,Probability of Detection and Probability of False Alarm, CW Radar and applications, Radar Antenna Parameters, System Losses and Propagation Effects, Applications of Radar.

UNIT-II: MTI AND PULSE DOPPLER RADAR:

Pulse Doppler Radar, Butterfly effect, Coherent and Non Coherent Moving Target Indication Radar, Delay line Cancellers, Limitation to MTI performance, Moving target Detector, MTI from moving platform

UNIT-III:TRACKING RADAR:

Types of Tracking Radars, Sequential Lobing, Conical Scan, Monopulse tracking Radar, Low angle tracking, Synthetic Aperture Radar (SAR), Active and Passive Aperture Phased array Radars,. MST Radar, ECM, ECCM

UNIT-IV:RADAR TRANSMITTERS&RECEIVERS:
Noise Figure and Noise Temperature, Types of Duplexers, Types of Mixers, Radar Displays, Receiver Protectors, Match Filter & Antennas

UNIT-V: **FUNDAMENTALS OF NAVIGATIONAL AIDS:**
Principles of Direction Finders, Sense Finders, VOR, Aircraft Homing and ILS, Radio Altimeter, LORAN and NDB.

Text Books:

1. Introduction to Radar Systems – Merrill I. Skolnik, THIRD EDITION, Tata McGraw-Hill, 2001.
2. Radar Systems and Radio Aids to Navigation-Prof A.K.Sen and Dr.A.B.Bhattacharya

Reference Books:

1. Introduction to Radar Systems – Merrill I. Skolnik, SECOND EDITION, McGraw-Hill, 1981.
2. Radar Engineering and Fundamentals of Navigational Aids, G S N Raju, IK International Publishers, 2008.
3. Fundamentals of RADAR, SONAR and Navigation Engineering – K.K.Sharma

Code: B17EC3206

MICROCONTROLLERS
(Open Elective)

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives:

1. To understand the basic architectures of various processors.
2. Study the architecture and addressing modes of 8051
3. Impart knowledge about assembly language programs of 8051
4. Analyze the concept of inter facing of peripheral devices and Memory.
5. Introductory programs on embedded C

Course Outcomes: After successfully completing the course students will be able to:

1. Understand instruction execution sequence with clock.
2. Gain comprehensive knowledge about architecture and addressing modes of 8051
3. Learn the art of programming in assembly language for various embedded system applications.
4. Develop independent learning skills to interface memory and PPI with 8051
5. Create the IO interfacing techniques with 8051

SYLLABUS

UNIT-I: Introduction to 8051

Microprocessors and Microcontrollers, RISC & CISC CPU Architectures, Harvard & Von-Neumann CPU architecture. 8051Microcontroller: Introduction, Architecture of 8051, Pin diagram of 8051, Memory organization, External Memory interfacing, stacks.

UNIT-II: Addressing modes and Instruction set:

Introduction, Instruction syntax, Data types, Subroutines, Addressing modes,Assembler directives, Instruction set, Instruction timings, example programs in assembly language.

UNIT-III: 8051 Interrupts and Timers/counters:

Basics of interrupts, 8051 interrupt structure, Timers and Counters, 8051 timers/counters, special function registers, programming 8051 timers in assembly language.

UNIT-IV: 8051 Interfacing and Applications:

Basics of I/O concepts, I/O Port Operation, Interfacing 8051 to LCD, Keyboard, parallel and serial ADC, DAC, Stepper motor interfacing and DC motor interfacing and programming.

UNIT-V: 8051 Serial Communication:

Data communication, Basics of Serial Data Communication, 8051 Serial Communication, connections to RS-232, 8255A Programmable Peripheral Interface: Architecture of 8255A, I/O devices interfacing with 8051 using 8255A, Introduction to embedded C.

Text Books:

1. "The 8051 Microcontroller and Embedded Systems – using assembly and C "-, Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; PHI, 2013 / Pearson, 2013
2. "8051 Microcontrollers"-MCS51 Family and its variants, Satish Shah, Oxford university press, 2010

Reference Books:

1. "The 8051 Microcontroller Architecture, Programming & Applications", 2e Kenneth J. Ayala Penram International, 1996 / Thomson Learning 2005.
2. "The 8051 Microcontroller", V.Udayashankar and MalikarjunaSwamy, TMH, 2009
3. Microcontrollers: Architecture, Programming, Interfacing and System Design",Raj Kamal, "Pearson Education, 2005

Code: B17CS3214

OOPS THROUGH JAVA
(Common to ECE & EEE)
(Open Elective)

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period.**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives:

1. Understanding the OOP's concepts, classes and objects, threads, files, applets, swings and act.
2. This course introduces computer programming using the JAVA programming language with object- oriented programming principles.
3. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using Java for network level programming and middleware development

Course Outcomes:

1. Understand Java programming concepts and utilize Java Graphical User Interface in Programwriting.
2. Write, compile, execute and troubleshoot Java programming for networkingconcepts.
3. Build Java Application for distributedenvironment.
4. Design and Develop multi-tier applications.
5. Identify and Analyze Enterpriseapplications

SYLLABUS

UNIT-I:

Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure.

Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

UNIT-II:

Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

UNIT-III:

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package. Exception handling, importance of try, catch, throw, throws and finally block, user-defined exceptions, Assertions.

UNIT-IV:

Multithreading: introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file,

UNIT-V:

Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

Text Books:

1. The complete Reference Java, 8th edition, Herbert Schildt,TMH.
2. Programming in JAVA, SachinMalhotra, SaurabhChoudary,Oxford.
3. Introduction to java programming, 7th edition by Y Daniel Liang,Pearson.

Reference Books:

1. Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managersin
2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, DialogBox.

Code: B17CS3215

DATA MINING
(Open Elective)

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives:

1. Students will be enabled to understand and implement classical models and algorithms in data warehousing and datamining.
2. They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms toapply.
3. They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze theirbehavior.

Course Outcomes:

1. Understand stages in building a Data Warehouse
2. Understand the need and importance of preprocessingtechniques
3. Understand the need and importance of Similarity and dissimilaritytechniques
4. Analyze and evaluate performance of algorithms for AssociationRules.
5. Analyze Classification and Clusteringalgorithms

SYLLABUS

UNIT –I

Introduction: Why Data Mining? What Is Data Mining?1.3 What Kinds of Data Can Be Mined?1.4 What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity

UNIT –II

Data Pre-processing: Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT –III

Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision treeinduction.

UNIT –IV

Classification: Alterative Techniques, Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

Association Analysis: Basic Concepts and Algorithms: Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. **(Tan &Vipin)**

UNIT –V

Cluster Analysis: Basic Concepts and Algorithms: Overview: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. **(Tan &Vipin)**

Text Books:

1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, VipinKumar,Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber,Elsevier.

Reference Books:

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, CengageLearning.
2. Data Mining :VikramPudi and P. RadhaKrishna,Oxford.
3. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith,TMH.

Code: B17ME3210

INDUSTRIAL ROBOTICS
(Common to ECE & EEE)
(Open Elective)

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course objectives:

1. To give students practice in applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics.
2. The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectory planning.
3. Mathematical approach to explain how the robotic arm motion can be described.
4. The students will understand the functioning of sensors and actuators.

Course Outcomes:

Upon successful completion of this course you should be able to:

1. Identify various robot configuration and components,
2. Select appropriate actuators and sensors for a robot based on specific application
3. Carry out kinematic and dynamic analysis for simple serial kinematic chains.
4. Perform trajectory planning for a manipulator by avoiding obstacles

SYLLABUS

UNIT-I

Introduction: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

UNIT – II

Components Of The Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT – III

Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems.

Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

Differential transformation and manipulators, Jacobians– problems Dynamics: Lagrange – Euler and Newton – Euler formulations – Problems.

UNIT IV

General considerations in path description and generation.Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language..

UNIT V

Robot Actuators and Feed Back Components:

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.

Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

Robot Applications in Manufacturing:

Material Transfer - Material handling, loading and unloading- Processing - spot andcontinuous arc welding & spray painting - Assembly and Inspection.

Text Books:

1. Industrial Robotics / GrooverM P /PearsonEdu.
2. Robotics and Control / Mittal R K &NagrathI J /TMH.

Reference Books:

1. Robotics / Fu K S/ McGrawHill.
2. Robotic Engineering / Richard D. Klafter, PrenticeHall
3. Robot Analysis and Control / H. Asada and J.J.E. Slotine/ BSP BooksPvt.Ltd.
4. Introduction to Robotics / John J Craig / PearsonEdu.

Code: B17EE3209

POWER ELECTRONICS
(Open Elective)

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives: Students will

1. Understand the concepts of Power Semiconductor devices and their applications.
2. Understand the need of Energy conversion and effective implementation methods.

Course outcomes:

Students are able to

1. Explain the principle of operation of thyristor, modern power semiconductor devices and necessity of series and parallel connection of thyristors.
2. Explain the operation of Firing and Commutation techniques.
3. Evaluate the phase controlled rectifiers with different loads.
4. Analyse different Choppers, Cyclo-converter and AC voltage Controller configurations.
5. Investigate harmonic reduction techniques for inverters based on PWM techniques.

SYLLABUS

UNIT I: MODERN POWER SEMI CONDUCTOR DEVICES

Thyristors – Silicon Controlled Rectifiers (SCRs) – BJT – Power MOSFET – Power IGBT and their characteristics. Basic theory of operation of SCR – Static characteristics and Dynamic characteristics of SCR - Turn on and Turn off times – Turn on and turn off methods. Two transistor analogy of SCR -Series and parallel connections of SCRs Snubber circuit details – Numerical problems.

UNIT II: THYRISTORFIRING AND COMMUTATIONCIRCUITS

SCR trigger circuits-R, RC and UJT triggering circuits. The various commutation methods of SCRs-Load commutation- Resonant Pulse Commutation- Complementary Commutation- Impulse Commutation- External Pulse Commutation Techniques. Protection of SCRs

UNIT III: PHASE CONTROLLED RECTIFIERS

Principles of phase controlled rectification -Study of Single phase and three-phase half controlled and full controlled bridge rectifiers with R, RL, RLE loads. Effect of source inductance. Dual converters- circulating current mode and circulating current free mode-control strategies. Numerical problems.

UNIT IV:CHOPPERS, CYCLONVERTER AND AC VOLTAGE CONTROLLER

Classification of Choppers A, B, C, D and E, Switching mode regulators-Study of Buck, Boost and Buck-Boost regulators, Cukregulators . Principle of operation of Single phase bridge type Cycloconverter and their applications. Single phase AC Voltage Controllers with R and RL loads.

UNIT-V INVERTERS

Principle of operation of Single phase Inverters -Three phase bridge Inverters (180^0 and 120^0 modes)-voltage control of inverters-Single pulse width modulation- multiple pulse width modulation, sinusoidal pulse width modulation. Harmonic reduction techniues- Comparison of Voltage Source Inverters and Current source Inverters.

Text Books:

1. Power electronics - P.S. Bimbhra- Khanna Publishers, 4th Edition
2. Power electronics – M.D. Singh & K.B. Kanchandhani, Tata McGraw – Hill Publishing Company, 2nd edition.

Reference Books:

1. Power Electronics: Circuits Devices and Applications – M.H. Rashid, Prentice Hall of India, 3rd edition.
2. Power Electronics – VedamSubramanyam, New Age International (p) Limited, Publishers.
3. Power Electronics – P.C. Sen, Tata McGraw-Hill Publishing.
4. Thyristorised power Controllers – G.K. Dubey, S.R Doradra, A. Joshi and R.M.K. Sinha, New Age international Pvt Ltd. Publishers latest edition

Code: B17EC3207

BIO MEDICAL ENGINEERING
(Open Elective)

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives: The objectives of this course are to:

1. Describe the origin, properties and suitable models of important biological signals such as ECG and EEG.
2. Introduce students to basic signal processing techniques in analyzing biological signals.
3. Develop the mathematical and computational skills relevant to the field of biomedical signal processing.
4. Develop a thorough understanding on basics of ECG signal compression algorithms.
5. Increasethestudent'sawarenessofthecomplexityofvariousbiologicalphenomena and cultivate an understanding of the promises, challenges of the biomedical engineering.

Course outcomes: At the end of the course, students will be able to:

1. Possess the basic mathematical skills necessary to analyze ECG and EEG signals.
2. Possess the basic scientific skills necessary to analyze ECG and EEG signals.
3. Possess the basic computational skills necessary to analyze ECG and EEG signals.
4. Apply classical and modern filtering and compression techniques for ECG and EEG signals.
5. Develop a thorough understanding on basics of ECG and EEG feature extraction.

SYLLABUS

UNIT-I:

Introduction to Biomedical Signals: The nature of Biomedical Signals, Examples of Biomedical Signals, Objectives and difficulties in biomedical analysis, Basic electrocardiography, ECG lead systems, ECG signal characteristics, Simple signal conversion systems, Conversion requirements for biomedical signals, Signal conversion circuits.

UNIT-II:

Signal Averaging: Basics of signal averaging, signal averaging as a digital filter, a typical averager, software for signal averaging, limitations of signal averaging, Adaptive Principal noise canceller model, 60-Hz adaptive cancelling using a sine wave model, other applications of adaptive filtering.

UNIT-III:

Data Compression Techniques: Turning point algorithm, AZTEC algorithm, Fan algorithm, Huffman coding, data reduction algorithms The Fourier transform, Correlation, Convolution, Power spectrum estimation, Frequency domain analysis of the ECG.

UNIT-IV:

Cardiological signal processing: Basic Electrocardiography, ECG data acquisition, ECG lead system, ECG signal characteristics (parameters and their estimation), Analog filters, ECG amplifier, and QRS detector, Power spectrum of the ECG, Bandpass filtering techniques, Differentiation techniques, Template matching techniques, A QRS detection algorithm, Real-time ECG processing algorithm, ECG interpretation, ST segment analyzer, Portable arrhythmia monitor.

UNIT-V:

Neurological signal processing: The brain and its potentials, The electrophysiological origin of brain waves, The EEG signal and its characteristics (EEG rhythms, waves, and transients), Correlation, Detection of EEG rhythms, Template matching for EEG, spike and wave detection

Text Books:

1. Biomedical Digital Signal Processing- Willis J. Tompkins, PHI 2001.
2. Biomedical Signal Processing Principles and Techniques- D C Reddy, McGrawHill publications 2005

Reference Books:

1. Biomedical Signal Analysis-Rangaraj M. Rangayyan, John Wiley & Sons 2002

Code: B17CS3216

ARTIFICIAL NEURAL NETWORKS
(Open Elective)

Lecture	**: 3 Periods**	**Int. Marks**	**: 30**
Tutorial	**: 1 Period.**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 3**

Course Objectives:

1. To Introduce the concept of Artificial Neural Networks , Characteristics, Models of Neuron, Learning Rules, Learning Methods, Stability and Convergence
2. To study the basics of Pattern Recognition and Feed forward Neural Networks
3. To study the basics of Feedback neural networks and Boltzmann machine
4. To introduce the Analysis of Feedback layer for different output functions, Pattern Clustering and Mapping networks
5. To study the Stability, Plasticity, Neo cognitron and Different applications of Neural Networks

Course Outcomes

1. This Course introduces Artificial Neural Networks and Learning Rules and Learning methods
2. Feed forward and Feedback Neural Networks are introduced
3. Applications of Neural Networks in different areas are introduced.

SYLLABUS

UNIT-I : Basics of Artificial Neural Networks
Introduction: Biological Neural Networks, Characteristics of Neural Networks, 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

UNIT-V:
Applications of Neural Networks: Pattern classification, Associative memories, Optimization, Applications in Image Processing, Applications in decisionmaking

Text Book:

1. B.Yagnanarayana"Artificial Neural Networks", PHI

Reference Books:

1. LaureneFausett ,"Fundamentals of Neural Networks", PearsonEducation
2. Simon Haykin , "Neural Networks", SecondEdition

Code: B17 EC 3208

MICROPROCESSORS AND MICROCONTROLLERS LAB

Lab	**: 3 Periods**	**Int.Marks**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Objectives:

1. To understand the basics of Microprocessors 8085
2. To understand the basics of Microprocessors 8086 and Microcontroller 8051.
3. To understand the internal organization of INTEL 8085,
4. To understand the internal organization of INTEL 8085,8086 Microprocessors and Microcontroller 8051.
5. Developing Assembly Language Programs using the instruction sets of microprocessors and microcontroller and to study the interfacing of the processor with various peripheral devices.

Course Outcomes: The objective of this course is

1. To become familiar with the instruction set of Intel microprocessors and microcontroller.
2. To familiarize with Assembly language programming.
3. The accompanying lab is designed to provide practical hands-on experience with microprocessor software applications and interfacing techniques.

SYLLABUS

Experiments Based On ALP (8085):

1. a. Assume that byte of data is stored at memory location 'X'. Write an ALP which tests bit 5 of thisdata. Write 'FF' in the location 'X+1' if the bit 5 is '1' and '00'if bit 5 is '0'.
   b. Check the zero condition of this number and write '00' at location'Y' if it is '0'and 'FF' at 'Y' if non zero.
   c. For data value in the location 'X' compute the number of logic 1's and store the result in the location 'Y+1'.
2. a. Write an ALP to swap the contents of location 'X' and 'X+1' using BC & HL Register pairs.
   b. By using above logic, write an ALP to transfer a block of data into another block.
3. a. Write an ALP to add and subtract two eight bit Number stored in the location 'X' and 'X+1' by assuming that content of 'X' is greater than content of 'X+1'
   b. Modify this program to add two 16 bit numbers without using DAD instruction.
4. Two 8 bit numbers 34H and 43H are stored in locations 'X' and 'X+1' compute the product of these two numbers using
   a. Repetitive addition method b. Shift and add method
5. The number of the bytes of a block of data is in location 'X' and data starts from location 'X+1' onwards defining a stack pointers. Write an ALP to arrange this sequence of data in reverse order. Keep the reverse sequence from 'Y' onwards.
6. The number of bytes of a block of data is location 'X' and data starts from location 'X+1'onwards. Arrange this block of data in ascending order by using bubble sorting technique
7. Using 8279 write an ALP to generate the message of 4 characters. Activate the LED's individually and make the display ON &OFF for every 0.5 seconds

Experiments Based On ALP (8086):

1. Write an 8086 ALP to addition of two-32 bit numbers stored in the memory location 6000H and 6004H.Store the result at location 6008H.

2. Write an 8086 ALP to Subtraction of two-32 bit numbers stored in the memory location 6000H and 6004H.Store the result at location 6008H.

3. Write an 8086 ALP to Multiply two 16 bit numbers stored in the memory location 9000H and 9002H. Store the result at location 9005H.

4. Write an 8086 ALP to divide 32bit dividend with 16 bit devisor stored in the memory location 5000H and 5004H respectively. Store the quotient at 5006H and the remainder in location 5008H.

5. Write an 8086 program to add four digit BCD numbers present in memory locations 15000 H and 15002 H.Store the result at memory location 15004 H.

6. Write an 8086 program to sort the given block of data using bubble sorting technique. Assume number bytes of block of data stored in the memory location 3000H and Actual block of data starts from 3001H onwards.

Experiments based on Interfacing and Microcontroller (8051):

Programs on Data transfer instructions using 8051 Microcontroller
Programs on Arithmetic and Logical instructions using 8051 Microcontroller

References:

1. Lab Manual

Code: B17EC3209

VLSI LAB

Lab	**: 3 Periods**	**Int. Marks**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Objectives:

1. Learn and understand the basics of NMOS and CMOS logic and able to design the schematic diagrams of basic combinational and sequential circuits using CMOS logic with necessary EDA tools (Mentor Graphics/Cadence Tools)
2. Draw the layout diagrams of combinational and sequential to perform the following experiments using CMOS 130nm Technology with necessary EDA tools (Mentor Graphics/Cadence Tools)
3. This laboratory course enables student to get practical experience in design and evaluation of performance metrics.

Course Outcomes: Upon completion of the course, students will be able to

5. Learn the work flow of mentor graphic tools/Cadence tools forlogic gates, Combinational and Sequential circuits.
6. Simulate combinational and sequential circuits with EDA tools
7. Acquire Knowledge of analysis of combinational and sequential circuits using CMOS 130nm Technology.
8. Acquire practical experience in drawing layouts using Cadence/Mentor Graphics CAD tools.

List of Experiments:

1. Design and implementation of an inverter
2. Design and implementation of universal gates (NAND, NOR)
3. Design and implementation of AND, OR gates
4. Design and implementation of EXOR gate using minimum no. of transistors
5. Design and implementation of 2 to 1 Multiplexer
6. Design and implementation of full adder
7. Design and implementation of full subtractor
8. Design and implementation of D-latch
9. Design and implementation 3-bit asynchronous counter
10. Design and Implementation of static 1-bit RAM cell

Equipment Required:

1. Mentor Graphics/Cadence tools software-latest version
2. Personal computer with necessary peripherals.

References:

1. Lab Manual

Code: B17BS3201

EMPLOYABILITY SKILLS
(Common to all Branches)

Theory	**: 3 Periods (VA-2+QA-1)**	**Int.Marks**	**: 30**
Exam	**: 3 Hrs.**	**Ext.Marks**	**: 70**
		Credits	**: 1**

Part-A: Verbal Aptitude and Soft Skills-II

Course objectives:

1. To expose the students to bettering sentence expressions and also forming equivalents.
2. To instill reading and analyzing techniques for better comprehension of written discourses.
3. To create awareness among the students on the various aspects of writing, organizing data, preparing reports, and applying their writing skills in their professional career.
4. To inculcate conversational skills, nuances required when interacting in different situations.
5. To build/refine the professional qualities/skills necessary for a productive career and to instill confidence through attitude building.

Course Outcomes:

The students will be able to

1. Construct coherent, cohesive and unambiguous verbal expressions in both oral and written discourses.
2. Analyze the given data/text and find out the correct responses to the questions asked based on the reading exercises; identify relationships or patterns within groups of words or sentences
3. Write paragraphs on a particular topic, essays (issues and arguments), e mails, summaries of group discussions, reports, make notes, statement of purpose(for admission into foreign universities), letters of recommendation(for professional and educational purposes).
4. Converse with ease during interactive sessions/seminars in their classrooms, compete in literary activities like elocution, debates etc., raise doubts in class, participate in JAM sessions/versant tests with confidence and convey oral information in a professional manner.
5. Participate in group discussions/group activities, exhibit team spirit, use language effectively according to the situation, respond to their interviewer/employer with a positive mind, tailor make answers to the questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews (stress, technical, HR) that they would face during the course of their recruitment process.

SYLLABUS

UNIT -I (VA)

Sentence Improvement (finding a substitute given under the sentence as alternatives), Sentence equivalence (completing a sentence by choosing two words either of which will fit in the blank), cloze test (reading the written discourse carefully and choosing the correct options from the alternatives and filling in the blanks), summarizing and paraphrasing.

UNIT- II (VA)

Types of passages (to understand the nature of the passage), types of questions (with emphasis on inferential and analytical questions), style and tone (to comprehend the author‘s intention of writing a passage), strategies for quick reading(importance given to skimming, scanning), summarizing ,reading between the lines, reading beyond the lines, techniques for answering questions related to vocabulary (with emphasis on the context), supplying suitable titles to the passage, identifying the theme and central idea of the given passages.

UNIT- III (VA)
Punctuation, discourse markers, general Essay writing, writing Issues and Arguments(with emphasis on creativity and analysis of a topic), paragraph writing, preparing reports, framing a ‗Statement of purpose', ‗Letters of Recommendation', business letter writing, email writing, writing letters of complaints/responses. picture perception and description, book review.

UNIT-IV (VA)
Just a minute sessions, reading news clippings in the class, extempore speech, telephone etiquette, making requests/suggestions/complaints, elocutions, debates, describing incidents and developing positive non verbal communication, story narration, product description.

UNIT-V (SS)
Employability Skills – Significance — Transition from education to workplace - Preparing a road map for employment – Getting ready for the selection process, Awareness about Industry / Companies – Importance of researching your prospective workplace - Knowing about Selection process - Resume Preparation: Common resume blunders – tips, Resume Review, Group Discussion: Essential guidelines – Personal Interview: Reasons for Rejection and Selection.

Reading/ Listening material:

1. Guide to IELTS, Cambridge University Press
2. Barron's GRE guide.
3. Newspapers like ‗The Hindu, ‗Times of India, ‗Economic Times.
4. Magazines like Frontline, Outlook and Business India.
5. News channels NDTV, National News, CNN

Text Books:

1. Objective English and Verbal Reasoning by R S Agarwal.
2. Communication Skills by Sanjay Kumar and PushpaLatha, Second Edition, OUP.
3. Business Correspondence and Report Writing – A Practical Approach to Business and Technical Communication by R C Sharma and Krishna Mohan.
4. Soft Skills & Employability Skills by SaminaPillai and Agna Fernandez, Cambridge University Press India Pvt. Ltd.
5. Soft Skills, by Dr. K. Alex, S. Chand & Company Ltd., New Delhi

Reference Books:

1. Oxford Guide to Effective Writing and Speaking by John Seely.
2. Collins Cobuild English Grammar by Collins
3. The Art of Public Speaking by Dale Carnegie
4. The Leader in You by Dale Carnegie
5. Emotional Intelligence by Daniel Golman
6. Stay Hungry Stay Foolish by RashmiBansal

Part-B: Quantitative Aptitude-II

Course objectives:

The objective of introducing quantitative aptitude-II is:

1. To refine concepts related to quantitative aptitude. – SOLVING PROBLEMS OF DI and accurate values using averages, percentages.
2. To inculcate logical thinking by exposing the students to puzzles and reasoning related questions.
3. To familiarize the students with finding out accurate date and time related problems.
4. To enable the students solve the puzzles using logical thinking.
5. To expose the students to various problems based on geometry and menstruation.

Course Outcomes:

1. The students will be able to perform well in calculating different types of data interpretation problems.
2. The students will perform efficaciously on analytical and logical problems using various methods.
3. Students will find the angle measurements of clock problems with the knowledge of calendars and clock.
4. The students will skillfully solve the puzzle problems like arrangement of different positions.
5. The students will become good at solving the problems of lines, triangulars, volume of cone, cylinder and so on.

SYLLABUS

UNIT I: Averages, mixtures and allegations, Data interpretation Understanding of AM,GM,HM-Problems on averages, Problems on mixtures standard method. Importance of data interpretation: Problems of data interpretation using line graphs, Problems of data interpretation using bar graphs, Problems of data interpretation using pie charts, Problems of data interpretation using others.

UNIT II: Puzzle test, blood Relations, permutations, Combinations and probability Importance of puzzle test, Various Blood relations-Notation to relations and sex making of family Tree diagram, Problems related to blood relations, Concept of permutation and combination, Problems on permutation, Problems on combinations, Problems involving both permutations and combinations, Concept of probability-Problems on coins, Problems on dice, Problems on cards, Problems on years.

UNIT III: Periods,Clocks, Calendars, Cubes and cuboids Deriving the formula to find the angle between hands for the given time, finding the time if the angle is known, Faulty clocks, History of calendar-Define year, leap year, Finding the day for the given date, Formula and method to find the day for the given date in easy way, Cuts to cubes, Colors to cubes, Cuts to cuboids, Colors to cuboids.

UNIT IV: Puzzles Selective puzzles from previous year placement papers, sitting arrangement, problems- circular arrangement, linear arrangement, different puzzles.

UNIT V: Geometry and Menstruation Introduction and use of geometry-Lines, Line segments, Types of angles, Intersecting lines, Parallel lines, Complementary angles, supplementary angles, Types of triangles-Problems on triangles, Types of quadrilaterals-Problems on quadrilaterals, Congruent triangles and properties, Similar triangles and its applications, Understanding about circles-Theorems on circles, Problems on circles, Tangents and circles, Importance of menstruation-Introduction of cylinder, cone, sphere, hemi sphere.

Text Books:

1. Quantitative aptitude by RS Agarwal
2. Verbal and non verbal reasoning by RS Agarwal.
3. Puzzles to puzzle you by shakunataladevi
4. More puzzles by shakunataladevi
5. Puzzles by George summers.

Reference Books:

1. Barron‘s by Sharon Welner Green and Ira K Wolf (Galgotia Publications pvt.Ltd.)
2. Websites: m4maths, Indiabix, 800score, official CAT, GRE and GMAT sites
3. Material from _IMS, Career Launcher and Time‘ institutes for competitive exams.
4. Books for cat by arunsharma
5. Elementary and Higher algebra by HS Hall and SR knight.

Code: B17 BS 3203

ADVANCED CODING
(Common to ECE & EEE)

Lab	**: 3 Periods**	**Int.Marks**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 1**

Course Objectives

1. To understand the basics of modular programming
2. To learn about ADT, Linked Lists and Templates.
3. To investigate different methods to find time complexities.
4. To learn about Java collections and Libraries

Course Outcomes

At the end of the course, a student should be able to:

1. Acquire coding knowledge on essential of modular programming
2. Acquire Programming knowledge on linked lists
3. Acquire coding knowledge on ADT
4. Acquire knowledge on time complexities of different methods
5. Acquire Programming skill on Java libraries and Collections

SYLLABUS

UNIT I Review Coding essentials and modular programming

Introduction to Linear Data, Structure of linear data, Operation logics, Matrix forms and representations, Pattern coding.

Introduction to modular programming: Formation of methods, Methods: Signature and definition, Inter-method communication, Data casting & storage classes, Recursions

UNIT II Linear Linked Data

Introduction to structure pointer, Creating Links Basic problems on Linked lists, Classical problems on linked lists. Circular Linked lists, Operations on CLL, Multiple links, Operations on Doubly linked lists

UNIT III Abstract Data-structures

Stack data-structure, Operations on stack, Infix/Prefix/Post fix expression evaluations, Implementation of stack using array, Implementation of stack using linked lists.

Queue data-structure: Operations on Queues, Formation of a circular queue, Implementation of queue using stack, Implementation of stack using array, Implementation of stack using linked lists

UNIT IV Running time analysis of code and organization of linear list data

Code evaluation w.r.t running time, Loop Complexities, Recursion complexities, Searching techniques: sequential Vs. binary searching.

Organizing the list data, Significance of sorting algorithms, Basic Sorting Techniques: Bubble sort, selection sort, Classical sorting techniques: Insertion sort, Quick sort, Merge sort.

UNIT V Standard Library templates and Java collections

Introduction to C++ language features, Working on STLs, Introduction to Java as Object Oriented language, Essential Java Packages, Coding logics.

Note: This course should focus on Problems

References:

1. Computer Science, A structured programming approach using C, B.A.Forouzan and R.F.Gilberg, 3rd Edition, Thomson, 2007.
2. The C –Programming Language, B.W. Kernighan, Dennis M. Ritchie, Prentice Hall India Pvt.Ltd
3. Scientific Programming: C-Language, Algorithms and Models in Science, Luciano M. Barone (Author), EnzoMarinari (Author), Giovanni Organtini, World Scientific .
4. ObjectOrientedProgrammingin C++: N. Barkakati, PHI.
5. ObjectOrientedProgrammingthrough C++ byRobatLaphore.
6. https://www.geeksforgeeks.org/.
7. https://www.tutorialspoint.com/

Code: B17BS3206

IPR & PATENTS
(Common to CSE, ECE & IT)

Tutorial : 2 Periods **Credits : 0**

Course Objectives:

1. To introduce the idea of tangible and intangible property and its protection.
2. To familiarize with the frameworks for protection of intellectual property.
3. To layout the procedures to claim rights over intellectual property.

Course Outcomes:

After successful completion of the course, the student shall be able to

1. Identify various types of intangible property that an engineering professional could generate in the course of his career.
2. Distinguish between various types of protection granted to Intellectual Property such as Patents, Copy Rights, Trademarks etc.,
3. List the steps involved in getting protection over various types of intellectual property and maintaining them.
4. Take precautions in writing scientific and technical reports without plagiarism.
5. Help micro, small and medium entrepreneurs in protecting their IP and respecting others IP as part of their business processes.

SYLLABUS

UNIT I

Intellectual Property Law: Basics - Types of Intellectual Property - Innovations and Inventions - Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Compliance and Liability Issues

UNIT II

Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership–Copyright Formalities and Registration – Limitations – Infringement of Copyright - Plagiarism and difference between Copyright infringement and Plagiarism

UNIT III

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance– Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law

UNIT IV

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting

UNIT V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.

Text Books:

1. KompalBansal&ParikshitBansal "Fundamentals of Intellectual Property for Engineers", BS Publications
2. PrabhuddhaGanguli: "Intellectual Property Rights" Tata McGraw –Hill, New Delhi
3. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights: Text and Cases",Excel Books, New Delhi.

Reference Books:

1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning , NewDelhi
2. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.