	Communication, Modulation.	
4.	**AMPLITUDE MODULATION:** Base band and carrier communication, Amplitude modulation: Double side Band (DSB), Single Side Band (SSB), Vestigial Sideband (VSB), AM Receiver.	7
5.	**ANGLE MODULATION:** Concept of Instantaneous Frequency, Bandwidth of Angle Modulation, Generation of FM wave, Demodulation of FM, Interference of Angle Modulated Systems, FM Receivers.	7
6.	**PULSE MODULATION SYSTEMS:** Sampling theorem, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Pulse Code Modulation, Differential PCM, Delta Modulation, Adaptive Delta Modulation.	4
7.	**ANTENNAS AND WAVE PROPOGATION :** The Potential Functions, Elemental Dipole Antennas (The Electric (Hertzian) Dipole, Magnetic Dipole (Loop), Antenna Characteristics, The Long Dipole and Monopole Antennas, Antenna Arrays, Antenna Directivity and Gain, Antenna Coupling, The Friis Transmission Equation, Effect of Ground Reflections on Signal Transmission, Introduction to wave propogation.	8

Course Outcomes: By the end of this course, the students will be able to	
1.	Calculate the basic transmission line parameters, mathematically and using the Smith chart and design impedance matching devices.
2.	Analyse and design rectangular and circular waveguides.
3.	Explain the block diagram of analog communication system and various modulation techniques.
4.	Compute antenna parameters and draw radiation patterns.

Suggested Books:

Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1.	Electronic Communication Systems by G. Kennedy And B. Davis, Mc Graw Hill, 4th Edition	2006
2.	Elements of Electromagnetics by Mathew N.O. Sadiku, Oxford, Sixth Edition	2014
3.	Modern Digital & Analog Communication Systems by B.P. Lathi, Oxford University Press,4th Edition	2009
4.	Electronic Communications,4th Edition, Roddy &Coolen, Prentice Hall	1995
5.	Electromagnetic Waves by RK Shevgaonkar, Tata McGraw-Hill Education	2005
6.	Electromagnetic Waves & Radiating Systems, 2nd Edition by Jordan& Balmain	1968

Course Name	**:**	**SIGNALS AND SYSTEMS**
Course Code	**:**	**ECN 202**
Credits	**:**	**4**
L T P	**:**	**3-1-0**

Course Objectives:

At the end of this course, students should be able to

Analyze continuous and discrete time signals and systems.

Analyze communication systems in time and frequency domain.

Comprehend signals based on Fourier transform and study the impulse response of RC &RL networks, pulse response of RL, RC networks.

Total No. of Lectures – 42

Lecture wise breakup	**Number of Lectures**

1	**CONTINUOUS TIME SIGNALS :** Signals and their classification, size of the signal, continuous and discrete time signal properties-periodicity, absolute integral, convolution, Hilbert transform, signal operations on elementary CT/DT signals, Shifting, flipping, multiplication.	10
2	**DISCRETE TIME SIGNALS:** Sampling, Aperiodic signal representation by Fourier integral, concept of continuous and discrete spectrum, essential and absolute bandwidth, correlation, auto-correlation and cross-correlation and their properties, energy spectral density, power spectral density, calculation of the energy and power signal respectively, properties of Fourier transform and applications, Discrete time Fourier transform(DTFT), Inverse DTFT.	10
3	**SYSTEMS** Systems and their classification, Linear Time invariant systems and its properties, stability and causality, linear constant coefficients, difference equation, Z-Transform and its properties, inverse z transform, Examples. Continuous and discrete time systems and their applications, band pass signals, band pass systems.	8
4	**TIME AND FREQUENCY DOMAIN ANALYSIS** Representation of basic circuits in terms of generalized frequency and their response, step response of RL, RC, RLC circuits, impulse response of RC & RL networks, pulse response of RL, RC networks.	6
5	**INFORMATION THEORY:** Concept of information, Entropy, Rate of Information Transmission, Redundancy, Efficiency and Channel capacity-Coding theory-Minimum Redundancy Coding-continuous channel, Transmission Rate and Capacity of Continuous Channels	8

Course Outcomes: By the end of this course student will be able to:	
1	Explain in detail continuous and discrete signals and systems and solve problems based on them
2	Solve different types of problems based on z transform and discrete time fourier transform
3	Solve problems relevant to communication channel, capacity and coding

Suggested Books:

Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Modern Digital & Analog Communication Systems by B.P. Lathi, pub. Oxford Univ. Press, 3rd Edition	2009
2	Signal And System by M.J. Robert, TMH, Third Edition.	Latest Edition
3	Signals and systems by A.V. Oppenheim & A.S. willisky, 2nd edition, Pearson education.	Latest Edition
4	Introduction to Communication Theory by P.D. Sharma	Latest Edition
5	Circuits and Networks (Analysis and synthesis):- Sudhakar, Shyammohan	Latest Edition

Course Name	**:**	**MICROPROCESSOR AND APPLICATIONS**
Course Code	**:**	**ECN-203**
Credits	**:**	**4**
L T P	**:**	**3 0 2**

Course Objectives:

At the end of the course, the students should be able to explain the architecture of 8086 microprocessors, analyse the programming techniques. The students should also be able to demonstrate various interfacing techniques and design a microprocessor based application.

Total No. of Lectures – 42

Lecture wise breakup		**Number of Lectures**
1	**MICROPROCESSOR 8086:** Introduction to Microprocessors and Microcomputers, 8086 Microprocessor architecture, Pin configuration, Register organisation of 8086, physical memory organisation, General bus operation, Special processor activities, Minimum Mode 8086 System and Timings, Maximum Mode 8086 System and Timings.	6
2	**INSTRUCTION SET AND ASSEMBLER DIRECTIVES:** Machine Language Instruction Formats, Addressing Modes of 8086, Instruction Set of 8086, Assembler Directives and Operators.	7
3	**ASSEMBLY LANGUAGE PROGRAMMING WITH 8086:** Machine Level Programs, Machine Coding the Programs, Programming with an Assembler, Assembly Language Example Programs.	6
4	SPECIAL ARCHITECTURAL FEATURES AND RELATED PROGRAMMING: Introduction to stack, stack Structure of 8086, Interrupts and Interrupt Service Routines, Interrupt Cycle of 8086, Non Maskable Interrupt, Maskable Interrupt, Interrupt Programming, MACROS, Timings and Delays.	6
5	**BASIC PERIPHERALS AND THEIR INTRFACING WITH 8086** Semiconductor Memory Interfacing, Dynamic RAM Interfacing, Interfacing I/O Ports, PIO 8255 (Programmable Input-Output Port), Modes of Operation of 8255, Interfacing Analog to Digital Data Converters, Interfacing Digital to Analog Data Converters.	7
6	**SPECIAL PURPOSE PROGRAMMABLE PERIPHERAL DEVICES AND THEIR INTERFACING:** Programmable Interval Timer 8253, Introduction to Serial Communication, Programmable Communication Interface 8251.	5
7	**NUMERIC DATA PROCESSOR (8087)** Pin configuration, NDP data types, Processor architecture, interfacing with 8086, Exceptions, Instruction set.	5

List of Experiments:		**Number of Turns**
1	8086 based experiments for data transfer operations.	2
2	8086 based experiments for arithmetic operations.	2
3	8086 based experiments for logical operations.	2
4	8086 based experiments for sorting.	2
5	8086 based experiments for data conversions.	3
6	8086 based experiments for interfacing various addon cards	3

Course Outcomes: By the end of this course student will be able to:	
1	Explain the functioning of microprocessor.
2	Do projects based on interfacing.
3	Evaluate the programming skills.
4	Identify the importance of Assembler Directives and Operators

Suggested Books:		
Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Advanced Microprocessors & peripherals by A K Ray & K M Bhurchandi, TMH Publication.	2013
2	Microprocessors and Peripherals by- B.Brey, CBS.	1989

Course Name	**:**	**ANALOG ELECTRONIC CIRCUITS –II**
Course Code	**:**	**ECN 204**
Credits	**:**	**4**
L T P	**:**	**3-0-2**

Course Objectives:
By the end of this course, the students should be able to design and analyze feedback amplifier and oscillator circuits, explain basic building blocks of operational amplifier, their functioning and demonstrate its various applications in analog systems. The students should also be able to classify various filters and their design and describe the working of multivibrators and operating principle of Phase locked loop.

Total No. of Lectures – 42

Lecture wise breakup		**Number of Lectures**
1.	**FEEDBACK AMPLIFIERS AND OSCILLATORS:** Concept of feedback, Positive and negative feedback, Voltage and current feedback, Series and shunt feedback, Effect of feedback on performance characteristics of an amplifier. Basic principles of sinusoidal oscillators, tuned collector, tuned base, Hartley oscillator, Colpitt's Oscillator, Phase Shift Oscillator, Wein Bridge Oscillator, Crystal Oscillator, Frequency stability of Oscillator.	10
2.	**OPERATIONAL AMPLIFIERS:** Differential amplifier, cascaded differential amplifier, block diagram of a typical Opamp, Ideal Opamp, Open loop Opamp configurations, Opamp Characteristics, closed loop Opamp configurations, voltage series feedback or Non inverting amplifier, Voltage shunt feedback or inverting amplifier.	6
3.	**APPLICATIONS OF OP-AMP:** Summing scaling and averaging amplifiers, Subtractor, voltage to current converter, current to voltage converter, Integrator, Differentiator, Comparator, Instrumentation Amplifier.	5
4.	**NON LINEAR CIRCUITS:** Comparator, Zero crossing detector, Schmitt trigger, Logarithmic and antilogarithmic amplifiers, Precision rectifiers, Sample and Hold circuit, Clippers and clampers using Opamp, Peak detector.	4
5.	**ACTIVE FILTERS:** Filter specifications, design of low pass, high pass, band pass and band reject filters using operational amplifiers; Design of Butterworth and Chebyshev filters, higher order filters; State variable filters.	7
6.	**MULTIVIBRATORS:** Switching action of a transistor, Transistor switching times, MOSFET as a switch, Multivibrators-Monostable, Bistable, Astable, Unsymmetrical/symmetrical triggering, Schmitt trigger, 555 timer-block diagram and working, 555 timer as monostable, astable and bistable multivibrator.	7
7.	**PHASE-LOCKED LOOP:** Operating Principle, PLL Operation and PLL applications	3

List of Experiments: ANALOG ELECTRONIC CIRCUITS – II (LAB)		**Number of Turns**
1	Opamp as summing and difference amplifier.	1
2	Opamp as integrator & differentiator.	1
3	Opamp as high pass, low pass and Bandpass filter	3
4	Clipper, clamper and comparator using Opamp	2
5	Astable, monostable and bistable multivibrator using 555 timer	3
6	MOSFET as switch	1
7	Simulation of feedback amplifiers and oscillator circuits.	3

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

1	Describe the fundamentals of feedback amplifiers and oscillators.
2	Draw outputs of the wave shaping circuits and explain operational amplifier along with its applications.
3	Identify the multivibrator circuits and explain the basic principle of phase locked loop.
4	Demonstrate the working behavior of devices and circuits and their applications.

Suggested Books:		
Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Op-amps and linear integrated circuits by Ramakant A Gayakward Prentice hall 4th edition	2000
2	Electronics Devices & Circuit Theory, RL Boylestead & L Nashelsky, PHI	2008
3	Microelectronic Circuits, AS Sedra & KC Smith, OXFORD	2003
4	Electronics Circuit Analysis and Design, Donald A. Neamen, Tata McGraw Hill	2009

Course Name	**:**	**ENGINEERING ANALYSIS AND DESIGN**
Course Code	**:**	**ECN 206**
Credits	**:**	**4**
L T P	**:**	**3-0-2**

Course Objectives:
At the end of this course, the students should be able to familiarize with the new concepts towards simulation and automation. The students should also be able to demonstrate to control any device by interfacing a computer.

Total No. of Lectures – 42

Lecture wise breakup		**Number of Lectures**
1.	**INTRODUCTION TO SYSTEM MODELLING** Basic simulation modeling review of probability and statistics, random number generation.	**8**
2.	**PROGRAMMING & SIMULATION WITH LAB VIEW** Components, tools, controls & indicators, Local and Global variables, shift registers, formula node, arrays & clusters, data acquisition, instrument interfacing, interfacing of sensors, design of combinational and sequential circuits. applications based on lab view.	**15**
3.	**PROGRAMMING AND SIMULATION WITH MATLAB** Introduction to MATLAB, data types, 2D-3D plotting, histogram, polar plots, matrix manipulation, 2D-3D matrix visualization, spectral analysis of various signals, solving linear / non linear equations, system design & simulation with SIMULINK, use of Communication & Signal Processing tool boxes.	**15**
4.	**CASE STUDIES** Based on Analog / Digital Circuits	**4**

List of Experiments:		**Number of Turns**
1.	Write a program to count Modulus 32 and display the values in decimal, Hexadecimal, octal and binary.	**1**
2.	Set up a temperature simulator. Set up over and under temperature LEDs to light up whenever the deviation is>5ºC. The loop should operate once every second.	**1**
3.	Build a Four-Function Calculator.	**1**
4.	Build a VI to compute and display the linear equation.	**1**
5.	Write a simple program to generate a Voltage at Analog Output 0 using a knob to select the voltage. Verify using a multimeter.	**1**
6.	Design an astable multivibrator circuit and verify the frequency of its output signal by using ELVIS instrument.	**1**

Course Outcomes: By the end of this course student will be able to:	
1	Define LTI systems transform ,DTFT ,FFT
2	Explain various design techniques of IIR and FIR digital filters
3	Explain the realization of IIR and FIR filters
4	Outline the concept of DSP processor

Suggested Books:		
Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Digital Signal Processing by Proakis & Manolakis, Pearson Education	Latest Edition
2	Digital Signal Processing by A.V Oppenheim and R.W.Schafer, Pearson Education	Latest Edition
3	Digital Signal Processing by E C Ifeachor and B W Jervis.	Latest Edition
4	Digital Signal Processing by S Salivahanan, A Vallavraj, C Gyanapriya, TMH	2011
5	Digital Signal Processing By S. K. Mitra, TMH	2010

Course Name	**:**	**COMMUNICATION THEORY**
Course Code	**:**	**ECN 210**
Credits	**:**	**4**
L T P	**:**	**3-1-0**

Course Objectives:
At the end of this course, the students should be able to evaluate the signals at input and output of a communication system and analyse the performance of basic communication system in terms of on signal transmission through linear networks and noise.

Total No. of Lectures – 42

Lecture wise breakup		**Number of Lectures**
1	**RANDOM SIGNALS:** Definition of a random process, stationarity, ensemble averages, Power spectral density, cross spectral density, Gaussian process.	6
2	**RANDOM SIGNAL THEORY:** Probability, random variables, probability density, statistical moments, different density functions, sum of random variables, transformations of density functions, correlation functions, random processes, correlation functions of random processes, spectral density, white noise	9
3	**SIGNAL TRANSMISSION THROUGH LINEAR NETWORKS:** Convolution theorem, frequency domain analysis, bandpass networks, ideal transfer functions-amplitude distortion , phase distortion, optimum filters, matched filters, minimum mean square error criteria, calculation ,	9
4	**INPUT-OUTPUT RELATIONS WITH RANDOM INPUTS:** Probability density input-output relationships, equivalent noise bandwidth, envelope of sine wave plus gausian noise.	9
5	**NOISE AND INTERFERENCE:** Classification of noise, sources of noise, atmospheric noise, shot noise, thermal and white noise, noise spectral density, noise calculations, Noise Figure of Devices, Circuits and Cascaded Networks, Experimental Determination of NF, Noise Calculations for different Communication Systems.	9

Course Outcomes: By the end of this course, the students will be able to:	
1	Calculate a various parameters relevant to a communication system.
2	Comprehend the concept of filters in signal transmission through linear networks.
3	Formulate mathematical model of a communication system given a random signal.

Suggested Books:		
Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Introduction to communication theory by P.D.Sharma, Publisher Nem Chand & Bros.	1971
2	Probability, Random variables and acoustic processes by Papoulis, S.Pillai, Tata McGraw Hill.	2014

Course Name	**:**	**COMPUTER ARCHITECTURE**
Course Code	**:**	**ECN301**
Credits	**:**	**4**
L T P	**:**	**3-1-0**

Course Objectives:
By the end of this course, the students should be able to identify and define the architecture and organization of the basic computer. The students should also be able to explain the role of different modules like control unit, central processing unit, input-output organization, memory unit in the organization of basic computer, solve computer arithmetic and define the concept of parallel processing.

Total No. of Lectures – 42

Lecture wise breakup		**Number of Lectures**
1	**REGISTER TRANSFER AND MICRO OPERATIONS:** Register transfer Language, Register transfer, Bus & memory transfer, micro operations, Instruction codes, Computer instructions, Timing & control, Instruction Cycles, Memory reference instruction, Input /Output & Interrupts, Complete computer description & design of basic computer.	8
2	**CONTROL UNIT:** Hardwired vs. Micro programmed control unit.	4
3	**CENTRAL PROCESSING UNIT:** General register organization, Stack organization, Instruction format, Data transfer & manipulation, Program control, RISC, CISC.	7
4	**COMPUTER ARITHMETIC:** Addition & subtraction, Multiplication Algorithms, Division algorithms.	5
5	**INPUT-OUTPUT ORGANIZATION:** Peripheral devices, I/O interface, Data transfer schemes, Program control, Interrupt, DMA transfer, I/O processor.	7
6	**MEMORY UNIT:** Memory hierarchy, Processor vs. memory speed, Hard disk drive, High-speed memories, Cache memory, Associative memory, Interleave, Virtual memory, Memory management	8
7	**PARALLEL PROCESSING:** Types of parallel processors, performance considerations, pipeline processors, array processors	3

Course Outcomes: By the end of this course, the students will be able to	
1	Define the syntax of Register transfer Language and different micro operations.
2	Design and construct the instruction format & addressing modes for a given operation and algorithms for

1	"Effective Technical Communication", Rizvi M.A., 5th Reprint, Pubs: McGraw Hill Education (India).	2007
2	"Technical Communication: Principles and Practice", Raman M. and Sharma, S., 2nd Edition, Pubs: Oxford University Press.	2012
3	"Business Communication Today", Bovee C.L. and Thill J.V., 9th Edition, Pubs: Pearson Education Asia, New Delhi.	2009
4	"Business Correspondence and Report Writing", Sharma R.C. and Mohan K., Pubs: McGraw Hill	1994
5	"Communication for Professional Engineers", Scott B., 2nd Edition, Pubs: Thomas Teleford Ltd.	1997
6	"Handbook for Technical Writing", McMurrey D.A. and Buckley J., Pubs: Cengage Learning.	2012
7	"Student Activities for taking charge of your Career Direction and Job Search", Lock R., 3rd Edition, Pubs: Cole Publishing	1996
8	"The Definitive Book of Body Language", Pease A. and Pease B., Pubs: Manjul Publishing House Pvt. Ltd.	2005

Course Name	**:**	**ECONOMICS**
Course Code	**:**	**HSS 201**
Credits	**:**	**3**
L T P	**:**	**2-1-0**

Course Objectives:
The main aim of this course is to make students understand how society manages its scarce resources for achieving maximum satisfaction and to make them learn about economic aspects related to a consumer, firm, market and economy.

Total No. of Lectures – 28

Lecture wise breakup		**Number of Lectures**
1	**INTRODUCTION TO ECONOMICS** Nature of Economics, Economic Thoughts, Economic Activities, Relationship of Economics with other Social Sciences and Engineering	**3**
2	**THEORY OF CONSUMER BEHAVIOUR** Demand: Types, Law of Demand, Demand Supply Curve, Determinants of Demand and Change in Demand (Movement of Demand and Shift of Demand) with Case Studies Elasticity of Demand: Nature, Degrees, Types, Factors Affecting Elasticity of Demand and its Application in present scenario Laws of Consumption: Concept and Applicability of Law of Diminishing Marginal Utility and Law of Equi-Marginal Utility	**9**
3	**THEORY OF PRODUCTION AND COST** Cost: Concept and Types Production: Concept, Scale of Production, Law of Variable Proportion Returns to Factor and Returns to Scale: Causes and Implications Economies and Diseconomies of Scale: Concept and Types Relevance of Production and Cost Concept in present context	**5**
4	**THEORY OF MARKET** Market: Concept and Types (Perfect Competition, Monopoly and Monopolistic Competition), Nature and Relevance of different Markets in present scenario – Case Study	**5**
5	**BASIC CONCEPTS OF MACRO ECONOMICS** National Income: Concept and Measurement Methods, Determination of Equilibrium of Income	**6**

	Inflation: Concept, Causes and Effect of Inflation, Measures to Control Inflation, Case Study on Impact of Inflation	

Course Outcomes:	
1	The students are expected to apply engineering knowledge to maximize profit, satisfaction and welfare.
2	The students are able to identify the forces that affect the economy.

Suggested Books:		
Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	"Modern Economics", Ahuja H. L., Pubs: Sultan Chand and Co. Ltd, New Delhi.	2012
2	"Economics For Engineers", Gupta M. L. and Gupta S.P., Pubs: ESS PEE Publications.	
3	"Business Economics", Ahuja H. L., Pubs: Sultan Chand and Co. Ltd, New Delhi.	2010
4	"Macro Economic Theory", Jhingan M.L., Pubs: Konark Publisher Pvt. Ltd., New Delhi.	1986
5	"Principles of Microeconomics", Stiglitz J.E. and Walsh C.E., 4th Edition, Pubs: W.W. Norton & Company.	2006
6	"Principles of Macroeconomics", Stiglitz J.E. and Walsh C.E., 4th Edition, Pubs: W.W. Norton & Company.	2006
7	"Principles of Economics", Mankiw N.G., 7th Edition, Pubs: Cengage Learning	2014
8	"Economics", Samuelson P.A. and Nordhaus W.D., 18th Edition, Pubs: McGraw Hill.	2004

Course Name	**:**	**PSYCHOLOGY**
Course Code	**:**	**HSS 202**
Credits	**:**	**3**
L T P	**:**	**2-1-0**

Course Objectives:
The main aim of the course is to provide knowledge and understanding about important concepts in Psychology which will help the students in learning the applications of principles of psychology in personal and professional life.

Total No. of Lectures – 28

Lecture wise breakup		**Number of Lectures**
1	**INTRODUCTION TO PSYCHOLOGY** Concept, Nature and Scope Methods of Studying Human Behaviour – Introspection Method, Observation Method, Experimental Method, Case History Method, Survey Method, Psychological Test Use Relevance of these Methods in present context	**4**
2	**INTELLIGENCE** Concept and Determinants of Intelligence Theories of Intelligence and its Application: Spearman, Thurston, Guilford.	**4**
3	**PERSONALITY** Personality: Concept, Determinants of Personality, Trait Paradigm (Eysenck), Psychodynamic Paradigm (Freud), Measurement of Personality – Self Report Measures (EPQ), Projective Measures (TAT), Hypothetical Measurement of Personality	**4**
4	**MENTAL HEALTH AND STRESS** Mental Health: Concept and Factors Affecting Mental Health Stress: Nature, Rections to Stress, Outcomes of Stress, Stress Management Case Study	**4**

	Dependent Sources), KVL and KCL	
2	**SEMICONDUCTOR DEVICES:** Concept of active and passive devices, Semiconductor Devices: Structure, principle of operation, characteristics and applications of PN-Junction (Rectifier, Clipper and Clamper), BJT, Current Components in BJT, Input & Output characteristics Common Emitter (CE), Common Base (CB), Common Collector (CC) configurations, BJT as an amplifier, Construction, working principle and characteristics of FET and MOSFET, Concept of feedback amplifier, Barkhuasen criteria, Oscillators, 555 timer as multivibrator, Four layer devices- SCR, DIAC and TRIAC (Construction, operation and characteristics)	15
3	**DIGITAL PRINCIPLES:** Digital waveforms, digital logic, moving and storing digital information, digital operations, digital integrated circuits	3
4	**OPERATIONAL AMPLIFIER AND ITS APPLICATIONS:** Block diagram, characteristics, inverting and non inverting configurations, Opamp as summing amplifier, difference amplifier, integrator, differentiator	5
5	**A/D AND D/A CONVERTERS:** Basic principle and characteristics, Weighted resistor D/A converter, Binary ladder D/A converter, counter ramp type A/D Converter	4
6	**INTRODUCTION TO MICROPROCESSOR:** Pin diagram, Architecture of 8085 Microprocessor, Concept of Microcontroller and its applications	3
7	**COMMUNICATION SYSTEMS**: Introduction to communication system, communication time line, Various frequency bands used for communication, Block diagram of Analog and Digital communication, need of modulation, Analog modulation techniques (Amplitude and frequency), Digital modulation techniques (PCM,PWM,PPM, PAM, ASK,FSK,PSK, QAM), Introduction to advanced communication systems (Optical and wireless).	9

Course Outcomes: By the end of the course the students will be able to	
1	Identify the various electronic devices and predict their behavior in an electronic system.
2	Draw the architecture of Microprocessor.
3	Differentiate between various modulation techniques in a communication system and relate them to practical systems.

Suggested Books:

Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Electronics Devices & Circuit Theory, RL Boylestead & L Nashelsky (PHI)	2009
2	Digital principles & applications, Malvino Leach, TMH	2011
3	Microprocessor Architecture programming and Applications with 8085 by R Gaonkar, Penram International Publishing Pvt ltd.	2002
4	Circuits and Networks: Analysis and Synthesis, Sudhakar and ShyamMohan, TMH	2009
5	Electronic Communication Systems by G. Kennedy, Mc Graw Hill, 4th Edition	2008
6	Electronic Communications, 4th Edition, Roddy & Coolen.	2009

Course Name	**:**	**BASIC ELECTRICAL SCIENCES**
Course Code	**:**	**ESC 206**
Credits	**:**	**04**
L T P	**:**	**3- 0-2**

Course Objectives:

At the end of this course, the student should be able to acquire knowledge of analytical techniques to solve electrical circuits, basic electrical machines, and electrical measuring instruments.

Total No. of Lectures – 42

Lecture wise breakup		Number of Lectures
1	**BASIC DEFINITIONS AND NETWORK THEOREMS** Basic definitions of voltage, current, power and energy. Nodes, branches, loops, mesh, Kirchhoff 's laws, nodal & mesh analysis. Circuit theorems: linearity, superposition, Norton, thevenin, max power transfer.	8
2	**AC CIRCUITS** Introduction, Generation of alternating voltage, sinusoidal waveform, phasor diagram, power relations in AC circuits, single phase AC circuits, Steady State Analysis: Nodal and Mesh analysis, Thevenin's, Norton's, Maximum Power Transfer theorems. AC Power Analysis: Instantaneous and average power, max average power transfer, RMS value, apparent power and power factor, complex power, conservation of AC power. THREE PHASE CIRCUITS**:** Phase sequence, Star and delta connection, Relation between line and phase voltages and currents in balanced systems, Analysis of balanced and Unbalanced three phase circuits, Measurement of active and reactive power.	10
3	**MAGNETICALLY COUPLED CIRCUITS** Mutual Inductance, Energy in a coupled circuit. Transformer : construction, equivalent circuit, voltage regulation, efficiency, OC and SC tests.	5
4	**DC MACHINES** Construction, emf and torque equations, circuit model, methods of excitation, characteristics of generators and motors, starting and speed control of dc motors, starters, losses, efficiency.	5
5	**AC MACHINES** Rotating magnetic field theory, three phase induction machines: General construction features, per phase equivalent circuit, approximate equivalent circuit, production of torque, slip, torque speed characteristics, no load and blocked rotor test to determine performance parameters, Starting: rotor rheostat starter, reduced voltage starting, star delta starting, centrifugal start. Synchronous motors: types, salient pole and cylindrical rotor, emf equation. Principle of operation of single phase induction motor, types and applications.	10
6	**BASIC MEASURING INSTRUMENTS** Introduction, Classification of instruments, essential features and operating principles, moving coil and moving iron instruments.	4

List of Experiments:		Number of Turns
1	Verification KCL and KVL	01
2	Verification of Ohm's Law	01
3	Verification of the principle of , superposition with ac and dc sources	01
4	Verification of Thevenin, and Nortan theorems.	01
5	Verification of maximum power transfer theorem in dc circuit.	01
6	To study resonance in series and parallel RLC circuits and plot various responses.	01
7	To verify the line voltage and phase voltage , and line current and phase current relationship in a star and delta three phase balanced circuit.	01
8	Measurement of active and reactive power in single-phase ac circuit.	01
9	To perform open and short circuit test on a 1-phase transformer and determine its equivalent circuit and efficiency	01
10	To study dc machine and determine open circuit characteristic.	02
11	To perform open circuit test and block rotor test on a 3 phase IM to draw equivalent circuit.	01
12	To perform load test on D.C. shunt motor.	01

Course Outcomes: By the end of this course, the student will be able to:	
1	Apply different techniques to solve electrical circuits.
2	Acquire the knowledge of electrical machines and electrical measuring instruments.
3	Design and conduct experiments, as well as analyze and interpret data.

Suggested Books: