Course Name	**:**	**INTRODUCTION TO ELECTRONICS & COMMUNICATION ENGINEERING**
Course Code	**:**	**ECN 101**
Credits	**:**	**2**
L T P	**:**	**2-0-0**

Course Objectives:
To familiarize the students with the evolution and basics of electronics and communication engineering. To introduce the various fields of electronics and communication and their applications.

Total No. of Lectures – 28

Lecture wise breakup		**Number of Lectures**
1	**INTRODUCTION TO ELECTRONICS:** History of Electronics Engineering, Applications of electronics, Electronic components	4
2	**DIGITAL PRINCIPLES:** Digital waveforms, digital logic, moving and storing digital information, digital operations, digital integrated circuits	5
3	**COMMUNICATION PRINCIPLES:** Introduction to communication system, communication time line, elements of communication system, time and frequency domain, different types of noise, Electromagnetic spectrum and allocations	6
4	**MAJOR FIELDS OF ELECTRONICS & APPLICATIONS:** Signal processing, telecommunication engineering, control system engineering, Embedded systems, VLSI design engineering.	13

Course Outcomes:	
1	Students will be able to understand the fundamentals of electronics and communication.
2	Students will become aware of the various field of electronics and communication engineering along with their applications.

Suggested Books:		
Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Digital principles & applications, Malvino Leach, TMH	2011
2	Electronic Communication Systems, R.Blake, Cengage Learning	2002
3	Electronic devices & Circuits, J.Millman, C.C.Halkias. Mc.Hill.	2008
4	CMOS digital integrated circuits: Analysis & Design, Sung-MO Kang, Y. Leblebici, TMH	2006
5	Embedded Systems, Raj Kamal, TMH.	2008
6	Control Systems Engineering., Nagrath & Gopal, New Age International.	2006

Course Name	**:**	**ANALOG ELECTRONIC CIRCUITS -I**
Course Code	**:**	**ECN 102**
Credits	**:**	**4**
L T P	**:**	**3-0-2**

Course Objectives:
At the end of this course, the student should be able to identify active and passive components and to solve simple electronic circuits. The student should also be able to explain construction, operation, characteristics and biasing of diodes, transistors and FETs. The student should also be able to analyze the mathematical models of transistor amplifier circuits and describe the operation of feedback amplifiers, oscillators and power amplifiers.

Total No. of Lectures – 42

Lecture wise breakup		Number of Lectures
1	**CIRCUIT THEORY FUNDAMENTALS** Electrical quantities, Electrical components, Circuit laws and theorems, Circuit analysis, Measurement equipment	5
2	**DIODES AND DIODE CIRCUITS** Diode, Diode models, Diode ratings, Rectifier circuits, Clippers, Clampers, Special purpose diodes- Zener diode, Tunnel diode, Varactor Photodiode, Light Emitting diode, Schottky diode, PIN diode.	5
3	**BIPOLAR JUNCTION TRANSISTORS** Junction transistor, Regions of operation, Transistor configurations, Current components in a transistor, Transistor as an amplifier, characteristics of CB, CE and CC configuration.	3
4	**TRANSISTOR AND ITS BIASING:** Load line and Operating point, Bias stability, various biasing circuits, stabilization against variation in Ico, V_{be} and beta, Bias compensation, Thermistor and Sensistor compensation, Thermal Runaway, Thermal stability.	6
5	**BJT MODELING:** Transistor as an amplifier, comparison of CB, CC and CE amplifier stages, BJT modeling, Important parameters: Input Impedance, Output Impedance, voltage and current gain, Transistor h–parameters, conversion formulas, $r_e$model, analysis of transistor amplifiers using h-parameters.	8
6	**BJT FREQUENCY RESPONSE:** Frequency Response of single stage CE amplifier, Multistage amplifiers, Direct coupled, RC coupled and Transformer coupled, frequency response of multistage amplifiers, cascode circuits.	6
7	**FIELD EFFECT TRANSISTORS:** Introduction, FET Construction, types of FET, Characteristics of FETs, MOSFET: types and working principle, FET biasing, FET small signal model, FET applications.	4
8	**POWER AMPLIFIERS:** Classification of amplifiers, Single tuned and double tuned amplifiers, analysis of class A, B, C and AB amplifiers, push pull amplifier, complementary symmetry, amplitude distortion in amplifiers, harmonics, power distortion, heat sinks.	5

List of Experiments: ANALOG ELECTRONIC CIRCUITS – I (LAB)		Number of Turns
1.	To study electronic components and usage of multimeter for various measurements.	1
2.	To study CRO and function generator and their usage.	1
3.	To study the V-I characteristics of pn junction diode and determine static resistance and dynamic resistance.	1
4.	To simulate and implement clipper and clamper circuits.	2
5.	To simulate and implement half wave and full wave rectifier.	1
6.	Verification of Network theorems: Superposition Theorem, Thevenin's Theorem	2
7.	Verification of Network theorems: Maximum Power Transfer Theorem and Reciprocity Theorem	2
8.	To study the characteristics of BJT and FET.	2
9.	To simulate and verify the operation of BJT as an amplifier and draw the frequency response.	2

Course Outcomes: At the end of this course, the student will be able to	
1	Describe the behavior of electronic devices such **as** diodes, transistors and FETs.
2	Explain the frequency response of BJT amplifier.
3	Compare the various configurations of feedback amplifiers and different types of oscillator circuits.
4	Demonstrate the capability to apply the theoretical concepts for the designing of practical circuits.

Suggested Books:		
Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Integrated Electronics, Millman & Halkias, TMH.	2008

2	Electronics Devices & Circuit Theory, RL Boylestead & L Nashelsky, PHI	2009
3	Circuits and Networks: Analysis and Synthesis, Sudhakar and ShyamMohan, TMH	2009
4	Microelectronic Circuits, AS Sedra & KC Smith, OXFORD	2010
5	Electronics Circuit Analysis and Design, Donald A. Neamen, Tata McGraw Hill	2008

Course Name	**:**	**DIGITAL DESIGN**
Course Code	**:**	**ECN 103**
Credits	**:**	**4**
L T P	**:**	**3-0-2**

Course Objectives:
At the end of this course, the student should be able to demonstrate the ability to use logic gates, Basic Boolean laws, minimization techniques for the designing of various combinational circuits. The student should also be able to describe operation, characteristic equations, excitation table of various flip flops and explain the conversion of flip flops. Design and analyze sequential circuits from the basic building blocks and describe memories, A/D, D/A Converters, Logic families and their characteristics.

Total No. of Lectures – 42

Lecture wise breakup		**Number of Lectures**
1	**BOOLEAN ALGEBRA AND LOGIC GATES** Theorem of Boolean algebra, reducing Boolean expressions, logic gates, Universal building blocks- NAND and NOR gates, logic diagram, converting circuit to universal logic, positive and negative logic.	3
2	**MINIMIZATION TECHNIQUES** Sum of Products and Products of Sum forms, Minterms & Maxterms, Karnaugh Map for two, three, four five and six variables, Quine-McCluskey method	6
3	**COMBINATIONAL CIRCUIT DESIGN** Half adder, full adder, subtractor, BCD adder, comparator, code converter, encoder decoder, multiplexer, demultiplexer, parity detector and generator	6
4	**FLIP FLOPS** 1-bit memory cell, clocked and unclocked flip flops, S-R Flip flop, D flip flop, JK Flip flop, T flip flop, edge triggered flip flop, race around condition , Master slave flip flop, conversion of flip flops.	4
5	**COUNTERS AND SHIFT REGISTERS** Ripple counter, design of Mod-N ripple counter, design of synchronous sequential circuits, State machines, synchronous counter, decade counter, ring counter, Johnson counter, serial in serial out shift register, serial in parallel out shift register, parallel in serial out shift register and parallel in parallel out shift register, bidirectional shift register, universal shift register.	8
6	**DIGITAL MEMORIES & PROGRAMMABLE LOGIC** ROM, RAM (static and dynamic), PROMS, PLA and PAL	4
7	**A/D AND D/A CONVERTERS** Weighted resistor D/A converter, Binary ladder D/A converter. A/D Converters- flash type, successive approximation, counter ramp type, dual slope type, characteristics of ADC and DAC.	6
8	**LOGIC FAMILIES** Characteristics of logic families, RTL, TTL, ECL, DTL, DCTL, I^2L, HTL, CMOS logic families.	5

List of Experiments:		**Number of Turns**
1	To Study the data sheets of TTL and ECL.	**1**

2	To investigate the logic behavior of various logic gates (NAND, NOR, NOT, AND, OR, XOR)	**1**
3	To simulate and Implement a logic function using logic gates.	**1**
4	To design, simulate and Implement Adder and Subtractor circuits.	**1**
5	To design, simulate and implement code converters.	**2**
6	To design, simulate and implement combinational circuits using Multiplexers.	**1**
7	To simulate and implement Flip-flops using NAND and NOR Gates.	**1**
8	To study the operation of shift register.	**1**
9	To study the operation of counter ICs.	**1**
10	To design, simulate and implement the synchronous sequential circuits.	**2**
11	To design an application based on digital circuits.	**2**

Course Outcomes:	
1	Identify the components and design combinational and sequential circuits using them.
2	Compare the different logic families, memories and A/D-D/A converters.
3	Design an application based on digital circuits.

Suggested Books:

Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Digital Design by Morris Mano, PHI, 4th edition	2008
2	Digital principles and Applications, by Malvino Leach, TMH	2011
3	Digital System Principles and Applications, by R J Tocci (PHI)	2009
4	Modern Digital Electronics, by R P Jain, TMH	2006
5	Digital Integrated Electronics, by Taub Schilling, TMH	2004

Course Name	**:**	**COMMUNICATION ENGINEERING**
Course Code	**:**	**ECN 201**
Credits	**:**	**4**
L T P	**:**	**3-1-0**

Course Objectives:

By the end of this course, the students should be able to analyse a transmission line, do transmission line calculations using smith chart, design rectangular and circular waveguides, explain various analog modulation techniques, their generation and detection, and enlist the various functional blocks in analog communication receiver and transmitter. The students should also be able to describe the basic radiating antennas, antenna arrays, calculate the basic antenna parameters, and identify antenna specifications.

Total No. of Lectures – 42

Lecture wise breakup		**Number of Lectures**
1.	**TRANSMISSION LINES:** Concept of Distributed elements, Equations of Voltage and Current, Types of Transmission lines, Standing Waves and Impedance Transformation, Lossless and Low loss Transmission lines, Power transfer on a transmission line, Transmission line calculations using Smith Chart ,Applications of transmission lines	7
2.	**WAVEGUIDES:** Rectangular Waveguides, Field analysis and characteristics of TE and TM modes, Losses in waveguides, Circular waveguides	7
3.	**INTRODUCTION TO COMMUNICATION SYSTEMS:** Principles of Communication Signal to Noise Ratio, Channel Bandwidth, Rate of	2

Course Name	**:**	**ENVIRONMENTAL SCIENCES**
Course Code	**:**	**GSC101**
Credits	**:**	**3**
L T P	**:**	**3 0 0**

Course Objectives:
This course aims to acquaint students with the basics of Environmental Sciences.

Total No. of Lectures – 42

Lecture wise breakup		**Number of Lectures**
1	Multi-discipline nature of environmental studies as applied to different engineering streams - Definitions, scopes and explanations.	6
2	Types of Ecosystems – System dynamics – Understanding ecosystems, Ecosystem degradation, Resource utilization, Ecosystem diversity, Habitat classification.	6
3	Natural Resources; Renewable and non-renewable- Natural resources and associated problems, Non-renewable resources, Renewable resources	6
4	Energy and Environment- Fossil fuel, Geothermal, tidal, nuclear, solar, wind, hydropower & biomass.	6
5	Environment pollution- Air Pollution, Water Pollution, Soil Pollution, Marine Pollution, Noise Pollution, Thermal Pollution, Nuclear hazards	6
6	Cleaner Production and life cycle analysis: - LCA methodology, steps and tools, EIA and Environment audit	6
7	Environment Development and Society:- Emerging technology for sustainable development and environment management, public participation and provision in management and legislation.	6

Course Outcomes:	
1	Students will be able to relate the importance of Environmental Sciences for sustainable development of society.
2	Students will be able to understand the problems and remedies of Environmental Sciences.

Text Books:	
Sr. No.	**Name of Book/ Authors/ Publisher**
1	Environmental Science Ceonage Learning Publication, Miller G.T. and Spool Mar
2	Environmental Studies, Tata McGraw Hill Pub., Banny Joseph

Course Name	**:**	**PROBABILITY AND STATISTICS**
Course Code	**:**	**MAN 103**
Credits	**:**	**4**
L T P	**:**	**3-1-0**

Course Objectives:
At the end of this course, the students should be able to use statistical methods to collect and analyze the data. The students should be able to estimate unknown parameters of populations and apply the tests of hypotheses.

Total No. of Lectures – 42

Lecture wise breakup		**Number of Lectures**
1	**RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS** **Random variables, Discrete, Continuous and Joint Probability distributions, Marginal and Conditional distributions, Independent random variables, Expectation, Variance and Covariance, Means and variances of linear combinations of random variables, Chebyshev's inequality, Binomial, Poisson, Uniform and Normal distributions, Normal and Poisson approximations to Binomial, Moments, Moment generating function.**	20
2	**SAMPLING DISTRIBUTIONS & ESTIMATION** **Population, Sample, Sampling distributions, Law of large numbers, Central limit theorem, Distribution of sample mean, Difference of means, Proportions and difference of proportions, Chi-square distribution, Student's t-distribution, Estimation of parameters, Point estimate, Confidence interval for mean, difference of means and proportions.**	16
3	**TESTS OF HYPOTHESES** **Hypothesis, Test statistic, Critical region, Significance level, Single Sample and Two Samples tests for mean.**	6

Course Outcomes: By the end of this course, the student will be able to:	
1	Collect and analyze the data statistically.
2	Describe sampling distributions of sample means and sample proportions
3	Estimate unknown parameters of the population from a sample.
4	Construct confidence intervals for mean difference of means and proportions; and perform hypothesis tests for means.

Suggested Books:		
Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Probability and statistics for Engineers and Scientists, Walpole, Myers, Myers and Ye, Pearson Education	2012
2	**Introduction to Mathematical Statistics, Hogg and Craig, Pearson Education**	2013
3	**Miller and Freund's: Probability and Statistics for Engineers, Richard A. Johnson, Prentice Hall**	2010
4	**John E. Freund's: Mathematical statistics with Application, Miller and Miller, Pearson Education**	2012

Course Name	**:**	**VECTOR CALCULUS, FOURIER SERIES AND LAPLACE TRANSFORM**
Course Code	**:**	**MAN105**
Credits	**:**	**4**
L T P	**:**	**3-1-0**

Course Objectives:
At the end of this course, the students should be able to use concepts of vector calculus to analyze scalar and vector fields and compute the gradient, divergence and curl. They should be able to evaluate line, surface and volume integrals. The students should be able to expand functions in a Fourier series and apply Harmonic analysis to numerical data. They should be able to evaluate Laplace transforms and inverse Laplace transform and apply Laplace transforms to solve ordinary differential equations.

Total No. of Lectures – 42

Lecture wise breakup		**Number of Lectures**
1	**VECTOR CALCULUS** Gradient, Divergence and Curl – their physical interpretation and representation in cylindrical and spherical coordinates. Line, surface and volume integrals; Green's theorem in the plane, Stoke's theorem, Divergence theorem; Irrotational and Solenoidal Fields, Applications to Science and Engineering.	20
2	**FOURIER SERIES** **Periodic functions, Trigonometric series, Fourier Series, Euler's formulae, Conditions for existence of Fourier series, Even and odd functions, Half range expansions, Complex Fourier series, Applications of Fourier series, Parseval's identity, Harmonic analysis.**	12
3	**LAPLACE TRANSFORM** **Laplace transform, Inverse transform, properties, Transforms of derivatives and integrals, Unit step function, Dirac's delta function, Differentiation and integration of transforms, Applications to differential equations.**	10

Course Outcomes:	
1	Use vector calculus to analyze scalar and vector fields and compute the gradient, divergence and curl.
2	Evaluate line, surface and volume integrals.
3	Apply Green's Theorem, Divergence Theorem and Stoke's theorem to evaluate integrals..
4	Expand a function in terms of its Fourier series and to apply harmonic analysis to numerical data.
5	Evaluate Laplace transforms and inverse Laplace transforms of functions.
6	Apply Laplace transforms to solve ordinary differential equations arising in engineering problems.

Suggested Books:		
Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Calculus and Analytic Geometry, G. B. Thomas and R. L. Finney, Pearson Education	2014
2	Advanced Engineering Mathematics, E. Kreyszig, John Wiley	2006
3	Advanced Engineering Mathematics, M.D. Greenberg, Pearson Education Asia	2010
4	Advanced Engineering Mathematics, Wylie and Barrett, McGraw Hill	2003

Course Name	**:**	**PARTIAL DIFFERENTIAL EQUATIONS AND SPECIAL FUNCTIONS**
Course Code	**:**	**MAN 106**
Credits	**:**	**4**
L T P	**:**	**3-1-0**

Course Objectives:
At the end of this course, the students should be able to formulate and solve linear and nonlinear partial differential equations and apply partial differential equations to engineering problems. The students should be able to solve ordinary differential equations using series solutions, describe special functions as solutions to differential equations and expand functions in terms of eigenfunctions and to solve Sturm Liouville's problems.

9	**THREE-DIMENSIONAL KINEMATICS OF A RIGID BODY**: Rotation About a Fixed Point. The Time Derivative of a Vector Measured from a Fixed and Translating-Rotating System. General Motion. Relative-Motion Analysis using Translating and Rotating Axes.	3
10	**THREE-DIMENSIONAL KINETICS OF A RIGID BODY**: Moments and Products of Inertia. Angular Momentum. Kinetic Energy. Equations of Motion. Gyroscopic Motion. Torque-Free Motion.	3

Course Outcomes:	
1	The student will be able to understand the concepts of Mechanics.
2	The students will be able to apply the concepts of Mechanics in fluid of energy.
3	The students will be able to understand various types of motion characteristic and found characteristic of rigid body.

Suggested Books:	
Sr. No.	**Name of Book/ Authors/ Publisher**
1	R.C. Hibbeler, Dynamics (11th Ed) Pearson Publishers.
2	F.P. Beer et al. Dynamics (8th Ed) Mc GrawHill Publishers.
3	Merriam and Kraige; Dynamics (5th Ed) Wiley and Sons Publications Merriam and Kraige.
4	R.C. Hibbeler, Statics (11th Ed) Pearson Publishers.

Course Name	**:**	**ELECTROMAGNETIC THEORY**
Course Code	**:**	**PYN-106**
Credits	**:**	**4**
L T P	**:**	**3 1/2 2/2**

Course Objectives:
At the end of the course, the student should be able to understand the classification of the vector fields. The student should be able to apply the concepts of electrostatics and boundary value problems. The student should be able to understand concepts of electromagnetic wave propagation.

Total No. of Lectures – 42

Lecture wise breakup		**Number of Lectures**
1	**VECTORS AND FIELDS:** Cartesian coordinate System, Cylindrical and Spherical coordinate Systems, Constant coordinate surfaces, Del operator, Gradient, Divergence of a Vector and Divergence Theorem, Curl of a vector and Stoke's theorem, Gradient, Divergence, Curl and Laplacian in the three coordinate Systems, Laplacian of a scalar, Scalar & Vector Fields, Classification of Vector field. Sinusoidally time-varying fields, Complex Numbers and Phasor technique.	10
2	**ELECTROSTATICS:** Field intensity, Gauss's law & its applications, Maxwell's 1st eqn. (Electrostatics), Electric Energy and potential, the line integral, Potential gradient, the dipole fields, Energy density in an electrostatic field. Current and current density, Continuity of current, Metallic conductors, Conductor properties and boundary conditions, the nature of Dielectric materials and related Boundary conditions, Capacitance, Capacitance of a two-wire line, Current analogies. Electrostatic boundary-value problems, Laplace's and Poisson's equations, Uniqueness theorem, General procedure for solving Laplace's and Poisson's equation , Resistance and capacitance, Method of images.	10
3	**MAGNETOSTATICS:** Biot-Savart's law, Ampere's circuital law, Applications of Ampere's law, Magnetic flux and	11

	magnetic flux density-Maxwell's eqn., Maxwell's eqn. for static electromagnetic fields, Scalar and vector magnetic potentials. Magnetic dipole, Force due to Magnetic field on a differential current element, force between two differential current elements, Force and torque on a closed circuit, The nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, Inductors and inductances, Magnetic energy, Magnetic circuits, Potential energy and force on magnetic materials.	
4	**MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVE PROPAGATION:** Faraday's law, Displacement current, Maxwell's equations in point form, Maxwell's equations in integral form, Kirchoff's Voltage law and Kirchoff's Current law from Maxwell's equations, EM waves in general, EM wave propagation in Lossy Dielectrics, Wave propagation in lossless dielectrics, Plane waves in free space, Plane waves in Good conductors, Power & Poynting Vector, Reflection of a plane wave at normal incidence, Reflection of a plane wave at oblique incidence.	11

List of Experiments:		**Number of Turns**
1	To design a method to draw equipotential lines with various geometries of electrodes kept at different potentials	1
2	To study the variation of magnetic field with distance along the axis of a circular coil carrying current by plotting a graph	1
3	To find the energy band gap of the given semiconductor by four probe method	1
4	To study the Hall effect of a given semiconductor	1
5	To determine the dielectric constant of the given materials	1
6	To study the B-H curve of the ferromagnetic materials	1

Course Outcomes:	
1	By the end of the course, the student will be equipped with the tools of electromagnetic theory.
2	The student will be able to solve numerical problems based on vector fields, electrostatics, magnetostatics and electromagnetic wave propagation.

Suggested Books:		
Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	Engineering Electromagnetics, William H Hyat, Jr., and John A. Buck, Tata McGraw Hill	2013 / 5th edition
2	Elements of Engineering Electromagnetics, Matthew N.O. Sadiku, Oxford University Press	2012 / 4th edition
3	Introduction to Electrodynamics, D.J. Griffiths, Prentice Hall	2012 / 4th edition

Course Name	**:**	**APPLIED CHEMISTRY**
Course Code	**:**	**CHN101**
Credits	**:**	**4**
L T P	**:**	**3 0 3**

Course Objectives: Upon completion of this course, students will have fundamental knowledge of the following:
Concepts of water and its analysis, polymer chemistry, solid state chemistry, lubricants, coordination chemistry and substitution reactions as applied to various industries. Spectroscopic methods required for the characterization of engineering materials. Design and development of novel future engineering materials and processes.

Course Name	**:**	**ETHICS AND SELF AWARENESS**
Course Code	**:**	**HSS 101**
Credits	**:**	**2**
L T P	**:**	**2-0-0**

Course Objectives:
To provide basic knowledge about ethics, values, norms and standards and their importance in real life. To improve the personality of students by their self-assessment

Total No. of Lectures – 28

Lecture wise breakup		**Number of Lectures**
1	**INTRODUCTION TO ETHICS** Concept of Ethics – Nature, Scope, Sources, Types, Functions and Factors influencing Ethics, Approaches to Ethics – Psychological, Philosophical and Social, Broader Ethical Issues in Society	**6**
2	**VALUES, NORMS, STANDARDS AND MORALITY** Concept and Role, Relation with Ethics, Psycho-Social Theories of Moral Development – Kohlberg and Carol Gilligan	**4**
3	**ETHICS AND BUSINESS** Concept of Business Ethics – Nature, Objectives and Factors influencing Business Ethics, 3 C's of Business Ethics, Ethics in Business Activities, Ethical Dilemmas in Business, Managing Ethics	**5**
4	**SELF-AWARENESS** Concept of Self Awareness – Need, Elements, Self Assessment – SWOT Analysis, Self Concepts – Self-Knowledge, Assertiveness and Self-Confidence, Self-Esteem	**4**
5	**SELF-DEVELOPMENT** Concept of Self-Development, Social Intelligence, Emotional Intelligence, Managing Time and Stress, Positive Human Qualities (Self-Efficacy, Empathy, Gratitude, Compassion, Forgiveness and Motivation), Personality Development Models – Johari Window, Transactional Analysis, Myers Briggs Type Indicator, Self-Awareness and Self-Development Exercises	**9**

Course Outcomes:	
1	Helps to distinguish between right and wrong in both personal and professional life
2	Students learn about their strengths, weaknesses, opportunities & threats and work enthusiastically to transform weaknesses into strengths and threats into opportunities

Reference Books:	
1	Murthy, C.S.V., "Business Ethics – Text and Cases", Himalaya Publishing House
2	Hartman, Laura P. and Chatterjee, Abha, "Business Ethics", Tata McGraw Hill
3	Rao, A.B., "Business Ethics and Professional Values", Excel Books
4	Velasquez, Manuel G., "Business Ethics – Concepts and Cases", Prentice Hall
5	Corey, G., Schneider, Corey M., and Callanan, P., "Issues and Ethics in the Helping Professions", Brooks/Cole
6	Hall, Calvin S., Lindzey, Dardner and Cambell, John B., "Theories of Personality", Hamilton Printing Company
7	Leary, M.R., "The Curse of Self: Self-awareness, Egotism and the Quality of Human Life", Oxford University Press

Course Name	**:**	**COMMUNICATION SKILLS (BASIC)**

1	Flow Measurement by Orifice Meter
2	Flow Measurement by Venturimeter
3	Flow Measurement by V Notche
4	Computation of various coefficients involving in through orifice.
5	Determination of friction factors of pipes Minor losses in pipes
6	Determination of friction factors of pipes
7	Verification of Bernoulli's theorem
8	To determination of the metacentric height of a given vessel under unloaded condition.

Course Outcomes:	
1	To apply the learned techniques in real life problems related to fluid mechanics.

Text Books:	
1	G.L. Asawa, "Experimental Fluid Mechanics-Volume I" Nem Chand & Brothers
2	B. S. Kapoor, "Manual of Fluid Mechanics" Khanna Publishers
3	S. Singh, "Experiments in Fluid Mechanics-Second Edition" PHI Publications

Reference Books:	
1	Frank M. White, "Fluid Mechanics", McGraw Hill.
2	H. Rouse , "Elementary Mechanics of Fluids"
3	Streeter, V.L.,"Fluid Mechanics" McGraw Hill Co
4	Lewitt, E.H.,"Hydraulics and the Mechanics of Fluids" Pitman

Course Name	**:**	**INTRODUCTION TO MANUFACTURING**
Course Code	**:**	**ESC 103**
Credits	**:**	**4**
L T P	**:**	**2-0-4**

Course Objectives:
At the end of the course the students should be able to describe the properties of engineering materials and different manufacturing processes. The students should be able to select appropriate manufacturing process and manufacture a job in the different shops and areas of applications.

Total No. of Lectures – 28

Lecture wise breakup		**Number of Lectures**
1	**INTRODUCTION** Classification of manufacturing processes, classification of engineering materials, comparison of material properties of metals, ceramics and plastics, crystal structures, strain hardening effects, stress-strain curves. Safety measures in workshop.	3
2	**MATERIALS AND HEAT TREATMENT** Objective of heat treatment, classification of heat treatment, annealing, normalizing, hardening & tempering, case hardening, carburizing, nitriding, flame hardening, induction hardening, applications of heat treatment.	4
3	**FOUNDRY** Pattern, properties of pattern material, types of pattern, cores. Types of sand, moulding sand ingredients. Types of moulding processes. Types of casting processes: sand casting, shell casting, investment casting and centrifugal casting. Casting defects & remedies. Case studies and applications.	4
4	**FORMING** Metal forming, types and applications, hot & cold working, forging, drawing, rolling and sheet metal operations.	3

5	**MACHINING** Metal removal processes, machines, single-point tool, cutting tool geometry, lathe - types, elements and main parts of lathe, drilling, milling and grinding machines. Applications.	3
6	**FINISHING** Surface finishing processes, principle and applications, lapping, honing, super finishing, polishing, buffing, electroplating, galvanizing.	2
7	**WELDING** Classification of welding processes, mechanism of arc formation, arc welding processes, gas welding, and resistance welding, principles and applications, welding defects, causes and remedies. Soldering and brazing. Applications and case studies in welding.	3
8	**PLASTICS MANUFACTURING** Types and properties of plastics, thermosetting and thermoplastic resins, elastomers. Fabrications of plastics, injection moulding, blow moulding, extrusion moulding etc.	2
9	**MODERN MANUFACTURING PROCESSES** Introduction, classification, electric discharge machining (EDM), electro chemical machining (ECM), laser beam machining (LBM) and Rapid Prototyping Techniques. Case studies on modern and hybrid manufacturing processes.	2
10	**CASE STUDIES** Considerations of selecting manufacturing processes for industrial products like compact disc, PCB and emerging technological applications.	2

List of Experiments:		**Number of Turns**
1	To prepare half lap T & L joint in the carpentry shop.	1
2	To prepare the pattern of half nut in carpentry shop.	1
3	To prepare cube from a piece of round bar in forging shop.	1
4	To study the lathe, milling, planer, and shaper operations.	1
5	To manufacture a multi-operational job on lathe/milling in the machining shop.	1
6	To prepare series and parallel wiring connections in the electrical shops.	1
7	To prepare the butt joint by SMAW in welding shop.	1
8	To prepare the mould of a given pattern in foundry shop.	1
9	To cast the prepared mould in foundry shop.	1
10	To prepare a square job in the fitting shop.	1
11	To prepare rectangular box in sheet-metal shops.	1
12	To prepare different joints in the sheet-metal shop.	1

Course Outcomes: By the end of this course, the students will be able to:	
1	Compare the properties of the engineering materials.
2	Select the appropriate manufacturing process for a given job/ application.
3	Identify the advantages and limitations of different manufacturing processes.
4	
5	

Suggested Books:		
Sr. No.	**Name of Book/ Authors/ Publisher**	**Year of Publication/ Reprint**
1	"Manufacturing Engineering and Technology", Serope Kalpakjian and Steven Schmid, Pearson Publications.	2009
2	"A Textbook of Production Technology: Manufacturing Processes", P. C. Sharma, S. Chand & Company Ltd.	2004
3	"Foundry, Forming and Welding", P.N. Rao, Tata M/C Graw Hill Publication.	2007
4	DeGarmo, Materials and Processes In Manufacturing, John Wiley & Sons	2011