

Engineering Physics

SEMESTER - V						
Sl. No.	Course Code	Course Name	L	T	P	C
1	PH301T	<u>Electrodynamics</u>	2	1	0	6
2	PH420T	<u>Electronics</u>	3	0	0	6
3	EE302C	<u>Fundamentals of Digital Signal Processing</u>	2	0	2	6
4	PH402L	<u>Electronics Laboratory</u>	0	0	3	3
5	ME203T	<u>Fluid Mechanics</u>	2	1	0	6
6	PH401L	<u>Advanced Physics Laboratory</u>	0	0	3	3
7		Institute Elective-				6
	Total Credits					36

Engineering Physics

1	Title of the course (L-T-P-C)	Electrodynamics (2-1-0-6)
2	Pre-requisite courses(s)	Successful completion of PH102
3	Course content	<p>Review of electrostatics and magnetostatics.</p> <p>Electrodynamics: Differential and integral forms of Maxwell's equations, Scalar and vector potentials, gauge transformations, Coulomb and Lorentz Gauge; Maxwell's equations in terms of potentials. Energy and momentum in electrodynamics.</p> <p>Electromagnetic waves: Electromagnetic waves in non-conducting media: Monochromatic plane waves in vacuum, propagation through linear media; Boundary conditions; Reflection and transmission at interfaces. Fresnel's laws; Electromagnetic waves in conductors: Modified wave equation, monochromatic plane waves in conducting media, Dispersion: Dispersion in non-conductors, free electrons in conductors and plasmas. Guided waves.</p> <p>Retarded potentials, Electric dipole radiation, magnetic dipole radiation. Radiation from a point charge: Lienard-Wiechart potentials, fields of a point charge in motion, power radiated by a point charge.</p> <p>Electrodynamics and Relativity: Review of special theory of relativity, Lorentz transformations, Minkowski four vectors, energy-momentum four vector, covariant formulation of mechanics; Transformation of electric and magnetic fields under Lorentz transformations, field tensor, invariants of electromagnetic field, Covariant formulation of electrodynamics, Lorentz force on a relativistic charged particle.</p> <p>Waveguides, Resonant Cavities and Optical Fibers, Basics of Antennas.</p>
4	Texts/References	<ol style="list-style-type: none"> 1. D. J. Griffith: Introduction to Electrodynamics, 4th edition, Pearson, 2015. 2. J.D. Jackson: Classical Electrodynamics, Wiley student edition, 3rd edition, 2007. 3. Modern Electrodynamics, Andrew Zangwill, Cambridge University Press, 2012. 4. Foundations of Electromagnetic Theory, J. R. Reitz, F. J. Milford, and R. W. Christy, Addison-Wesley, 4th edition, 2008. 5. W K H Panofsky and M Philips: Classical Electricity and Magnetism Addison Wesley, 2nd edition, 1962. 6. W Greiner: Classical Electrodynamics, Springer, 1998. 7. Hayt, William H., Jr., and John A. Buck, "Engineering Electromagnetics", 7th ed. McGraw-Hill, 2006. 8. M.A. Heald and J.B. Marion, Classical Electromagnetic Radiation, Saunders, 1983.

Engineering Physics

1	Title of the course (L-T-P-C)	Electronics 3-0-0-6
2	Pre-requisite courses(s)	--
3	Course content	<p>Network theorems; application to simple circuits. Semiconductor basics, diodes, p-n junction devices, transistors; biasing schemes; small signal amplifiers; feed-back theory; oscillators; power supply; wave shaping circuits. Bipolar junction transistor: configurations, small signal amplifier, oscillators; JFET and MOSFET: characteristics, small signal amplifier. OP-AMP: Differential amplifiers; Op-Amp (741) circuits (amplifiers; scalar; adder; subtractors; comparator; logarithmic amplifiers; etc.) Digital electronics : Logic gates, Boolean algebra, Karnaugh maps, flip flops, shift registers, adders, counters, ADC and DAC.</p>
4	Texts/References	<ul style="list-style-type: none"> • J. Millman, C. C. Halkias, C. D. Parikh, Integrated Electronics, 2nd edition, McGraw Hill Education (2017). • A. P. Malvino, Electronic Principles, 7th edition, McGraw Hill Education (2017). • R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 11th edition, Prentice Hall (2013). • D. P. Leach, A. P. Malvino and G. Saha, Digital Principles and Applications, 8th edition, McGraw Hill Education (2014). • R. Gaekwad, Op-Amps and Linear Integrated Circuits, 4th edition, Prentice Hall of India (2015).

Engineering Physics

1	Title of the course (L-T-P-C)	Fluid Mechanics (3-0-0-6)
2	Pre-requisite courses(s)	Nil
3	Course content	<p>Introduction: Scope, definition of fluid as continuum, fluid properties. (2hr)</p> <p>Fluid Statics: Pressure at a point, basic equation for pressure field, pressure variation (fluid at rest): standard atmosphere, Measurement of pressure manometer, Hydrostatics force on a plane and curve surface, Buoyancy, flotation and stability, pressure variation in a fluid with rigid body motion linear motion, rigid body rotation(4hr)</p> <p>Elementary Fluid Dynamics: Statics, stagnation pressure, Bernoulli Equation assumptions(4hr)</p> <p>Fluid Kinematics The velocity field: Eulerian and Lagrangian flow descriptions, steady and deformation,</p> <p>Acceleration field: material derivative, unsteady and convective effects.</p> <p>Control volume and system representation: Reynolds' Transport Theorem, physical interpretation, steady, unsteady effects, moving control volume, potential function(6Hr) Integral approach Conservation of mass derivation of continuity, fixed, non-deforming control volume, moving non-deforming control volume, deforming control volume.</p> <p>Conservation of momentum: linear momentum and moment of momentum equation and their application., comparison of energy equation with Bernoulli's equation(6hr)</p> <p>Differential approach: linear motion and angular motion with deformation,</p> <p>Conservation of mass: differential form of continuity equation, stream function, Conservation of linear momentum, Inviscid flows, Irrotational flow(6hr)</p> <p>Viscous flow: Stress relationships, NS Equations, Simple solutions for viscous flows(4hr) Dimensional analysis Buckingham's II-theorem, Dimensionless groups & their importance (3hr)</p> <p>Viscous Flow in Pipes: General characteristics of pipe flow, fully developed laminar and turbulent flow, turbulent shear stress, turbulent velocity profile, Pipe Flow rate measurement. (4hr)</p> <p>Boundary layer: Boundary layer characteristics boundary layer structure and thickness on a plate, Blasius boundary layer, momentum integral boundary layer equation for a flat plate(4hr)</p>
4	Texts/References	<ol style="list-style-type: none"> 1. Yunus A. Cengel, John M. Cimbala, Fluid Mechanics, Tata McGraw Hill Education,2011 2. F.M.White Fluid Mechanics, Seventh Edition, Tata McGraw Hill Education,2011, 3. Kundu, Pijush K., and Ira M.Cohen.Fluid Mechanic, Elsevier,2001

Engineering Physics

1	Title of the course (L-T-P-C)	Electronics Laboratory 0-0-3-3
2	Pre-requisite courses(s)	--
3	Course content	<p>The following is the proposed list of experiments/topics for this lab:</p> <ul style="list-style-type: none"> ● Diode properties of transistor junctions ● Transistor as function generator ● Characteristics of field-effect transistor ● Half and full-wave rectifier ● RC-coupled amplifier ● Differential amplifier circuits ● Unregulated and regulated power supply ● Wein bridge oscillator using OP-Amp ● Op-Amp as adder/subtractor/integrator/differentiator ● MOSFET characteristics ● Universality of NOR/NAND gates ● Verification of De Morgan's theorem ● RC/ LR/ LCR circuit
4	Texts/References	<ul style="list-style-type: none"> ● J. Millman, C. C. Halkias, C. D. Parikh, Integrated Electronics, 2nd edition, McGraw Hill Education (2017). ● A. P. Malvino, Electronic Principles 7th edition, McGraw Hill Education (2017). ● R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory 11th edition, Prentice Hall (2013). ● D. P. Leach, A. P. Malvino and G. Saha, Digital Principles and Applications 8 th edition, McGraw Hill Education (2014). ● R. Gaekwad, Op-Amps and Linear Integrated Circuits, 4th edition, Prentice Hall of India (2015).

Engineering Physics

1	Title of the course (L-T-P-C)	Fundamentals of Digital Signal Processing (2-0-2-6)
2	Pre-requisite courses(s)	Signals and Systems (EE 210)
3	Course content	Lecture: Review of basic signal processing, and sampling, introduction to DSP, Z transform, DFT, FFT, Implementation of discrete time systems, and Introduction to digital filters. Laboratory: Overview of DSP kit, generation of waveform, convolution and correlation, DFT and FFT, design of digital filters
4	Texts/References	1. Proakis and Manolakis, "Digital Signal Processing," 4th edition, Prentice Hall, 2006. 2. S K Mitra, "Digital Signal Processing," McGraw Hill, Inc., 4th edition, 2017. 3. Alan V Oppenheim, "Digital Signal Processing," Prentice Hall, 1975.