Engineering Physics

SEMESTER - V						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	PH 201	Electrodynamics	2	1	0	6
2	EE 202	Introduction to Analog Circuits (Post midsem)	3	0	0	3
3	EE 320	Fundamental of Digital Signal Processing	2	0	2	6
4	EE 212	Devices and Circuits Laboratory	0	0	3	3
5	ME 203	Fluid Mechanics	2	1	0	6
6	-	Institute Elective-1/RND Project-1				
	Fifth Semester Total Credits					29
	Third Year Total Credits					64

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**	Review of electrostatics and magnetostatics. 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. 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. 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. 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. Waveguides, Resonant Cavities and Optical Fibers, Basics of Antennas.
4	**Texts/References**	**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.

1	**Title of the course (L-T-P-C)**	**Introduction to Analog Circuits (3-0-0-3)**
2	**Pre-requisite courses(s)**	Network theory, Electronic Devices
3	**Course content**	**Part 1: Linear circuits** **1.** Introduction to feedback control – Integral control and proportional control **2.** Linear circuits using Op-amps (amplifiers, arithmetic circuits, filters and oscillators) **Part 2: Need for non-linearity for amplification.** Single stage amplifiers, frequency response, Current mirror circuits, Differential amplifier.
4	**Texts/References**	**1.** J.V.Wait, L.P.Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, 2nd edition, McGraw Hill, New York, 1992. **2.** J. Millman and A. Grabel, Microelectronics, 2nd edition, McGraw Hill, 1988. **3.** Ramakant Gayakwad, Op-amps and Linear Integrated Circuit, 4th edition, Pearson, 2000. **4.** P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989. **5.** Behzad Razavi, "Fundamentals of Microelectronics," John Wiley, 2013.

1	**Title of the course (L-T-P-C)**	**Fluid Mechanics (3-0-0-6)**
2	**Pre-requisite courses(s)**	**Nill**
3	**Course content**	**Introduction:** Scope, definition of fluid as continuum, fluid properties. (2hr) **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) **Elementary Fluid Dynamics:** Statics, stagnation pressure, Bernoulli Equation assumptions(4hr) **Fluid Kinematics The velocity filed:** Eulerian and Largrangian flow descriptions, steady and deformation, **Acceleration field:** material derivative, unsteady and convective effects. **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. **Conservation of momentum:** linear momentum and moment of momentum equation and their application., comparison of energy equation with Bernoulli's equation(6hr) **Differential approach:** linear motion and angular motion with deformation, **Conservation of mass:** differential form of continuity equation, stream function, Conservation of linear momentum, Inviscid flows, Irrotational flow(6hr) **Viscous flow:** Stress relationships, NS Equations, Simple solutions for viscous flows(4hr) Dimensional analysis Buckingham's II-theorem, Dimensionless groups & their importance (3hr) **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) **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)
4	**Texts/References**	**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