COURSE OUTCOMES:

SEMESTER – I (MECHANICS)			
CourseCode	**CourseName & Category**	**Credits**	**COURSE OUTCOMES**
BS105	Mechanics (DSC-2A)	4	• Students after completion of this course have deep understanding of Newton's Laws to solve the problems ofsimpleconfigurations.
			• Understandthefoundationsofpotential,fields,centralforcesandKepler'sLaws.
			• Studentswilllearngradientofscalarfield,divergence&curlofvectorfield,vectorintegrationsandtheirconversions.
			• Studentsgetgoodknowledgeaboutlawsofmotionandvariablemassystemwhich mostlyappearsinphysicalworldlikemotionofrocket.
			• Studentsstudytherigidbodydynamicsandgetcomparativeideabetweenlinear & rotational motions. Students understand the working principle ofGyroscope which serves as 3D compass and get the idea of precision ofequinoxes.
			• Students study the central forces which helps to understand the motion ofplanetsandsatellites.
			• Understand the negative result of Michelson Morley experiment, Galilean andLorentz transformation. Study relativistic effects such as length contractionandtimedilationandunderstandtwinsparadox
SEMESTER II THERMAL PHYSICS			
BS205	Thermal Physics DSC-2B	4	• Learnthebasicaspectsof kinetictheoryofgases, Maxwell-Boltzmann • distribution law, equipartition of energies, mean free path of molecularcollisions,viscosity,thermalconductivity anddiffusion..
			• Students learn the laws of Thermodynamics & absolute scale of temperatureandcometoknowentropychangeinreversible&irreversibleprocesses.
			• Studentslearnthermodynamicpotentials,Maxwell'sthermodynamicrelations,real gas equations, Vander Waal equation of state, the Joule-Thompson effect.Thompsoneffect.
			• Studentslearn the methodstoproduce low temperatures,principle ofrefrigeration,workingprincipleofpressurecooker(Clausius-Clapeyron'sequation).

			• Students know about black bodies and radiation laws of black body radiation.Students know why hot objects appear in different colours and about hightemperaturemeasuringdevices&solar constant measuringdevices.
			• Understand the concepts of micro state, macro state, ensemble, phase space,thermodynamicprobability.
			• Understand and compare the three different distribution laws e.g. Maxwell-Boltzmann distribution,Bose-Einsteindistributionand Fermi-Diracdistributionlawsofparticlesandtheirderivation.
SEMESTER III **ELECTROMAGNETIC THEORY**			
BS306	Electromagnetic Theory (DSC-2C)	4	• LearnCoulomb'slaw,Gauss'law inelectrostaticsandapply itto systemsof pointcharges as wellasline,surfaceandvolumedistributionsof charges.
			• LearntheconceptofmagneticfieldB, magneticflux,Biot-Savart'slaw, • Ampere laws and applications of these laws. Solve the problems ofdeterminationofBdue tomagnetic dipoles andelectriccurrents.
			• Learn the concepts of Faraday's laws of induction, Lenz's law, self and mutualInduction, modificationof Ampere's law,displacement current,Maxwellequations.
			• Learn Maxwell's equations in vacuum and dielectric medium, boundaryconditions,planewaveequation&Poyntingtheorem.
			• Observe the voltage-current relations of passive components (like resistor,capacitor and inductor). Learn about electrical oscillatory circuits like LR, RCandLCcircuits.Learnaboutresonantcircuits(LCRseries &parallel)andAC &DC motors.
			• Understand and verify Thevenin's, Norton's, Superposition and Maximumpower transfer theorems by doing experiments. Determine a small resistancebyCarey Foster'sbridge.Determine the ratio oftwo capacitancesbyDe Sauty's bridge. Determine self-inductance of a coil by Anderson's bridgeusingAC.
			• Know about Passive & Active Elements, Power sources and T to πTransformations.understandanddemonstrateSuperpositiontheorem,
			• Thevenin'sTheorem,Norton'stheorem,ReciprocityTheorem andMaximumpowertransfertheorem.
SEMESTER IV **WAVES & OPTICS**			
BS406	WAVES & OPTICS	4	• Know the distinction betweenFresnel and Fraunhofer diffraction.Know thelimitofresolution,resolvingpower of grating,dispersive of prismand

	DSC-2D		measurementofλoflightusingabovedevices.
			• Understand theconceptof coherence,temporal &spatialcoherence.UnderstandInterferencebydivisionofamplitude&divisionofwavefront.
			• UnderstandthemeasurementofwavelengthoflightusingBiprism,Lloyd'smirror, Newton's rings, Wedge shaped film and Michelson Interferometerexperiments.Knowthe reason for colors of thin films likesoapbubbles.
			• Understandthemeasurementofdiameterofthinwires. • Studentsstudythepropagationoftransversewavesinstringsand energy transport
			• Students study the longitudinal vibrations in bars in differentvibratingmodesandstudythevibrationsoftuningfork.
			• DeterminethewavelengthoflightusingdiffractiongratingandNewton'sringssetup.Calculatethe dispersivepower ofaprismandresolvingpowerofgrating&Telescopethroughexperiments.
			• Determination of refractive index of liquid using Pulfrichrefractometer andthat ofglass usingBoys'method experiments.Determine the radius of curvatureofagivenconvexlensbyformingNewton'srings.
			• Determinethe thicknessoftinywiresusingwedgemethod. • understand different methods of Polarization, Optical rotation, Babinet'scompensator,Laurent'shalfshadepolarimeter. •
SEMESTER V **PAPER – V:: (A) MODERN PHYSICS (DSE-1: ELECTIVE)**			
BS505	Modern Physics DSE-2E	4	• Learn the basic properties of nucleus, nuclear models:Liquid Drop model -semi-empiricalmassformulaandbindingenergy, NuclearShellModelandmagicnumbers
			• Know the Inadequacy of Bohr atomic model and modification of atomicmodels. Learn the spectroscopic terms and study doublet fine structure,Zeeman,Paschen-BackandStarkeffectsofspectrallines.
			• Know different types of spectra. Study the rotational, vibrational spectra ofmoleculesandRamaneffect.
			• Learn Schrodinger's Time dependent and independent wave equations. Learnabout wave function and it's properties. Learn about operators, Eigen functionsandEigenvalues.

			• Understand the concepts of Photoelectric effect, Compton effect, de-BrogliematterwavesandHeisenbergUncertaintyPrinciple.
			• Understand thedifferencebetween amorphous and crystallinematerials.Understand the topics Unit Cell, miller Indices, types of lattices, reciprocallattice,BrillouinZonesanddiffractionof X-raysby Crystals.Knowabout typesof bondings incrystals andlattice energyofioniccrystals.
			• DeterminethePlanck'sconstantusingPhotoCell. DeterminetheEnergygap of semi-conductor through experiments. Verify Photo electric effect withexperiment.
			• Understand thestabilityof the nucleus,Law of radioactive decay; Meanlifeand half-life ofnucleus; Alphadecay; Betadecay and Particledetectors.
SEMESTER V **COMPUTATIONAL PHYSICS (DSE-1: Elective)**			
BS505	Computational Physics DSE-2E	4	**Programming in C;** Students able to understand Flow charts, algorithms, Integer and floating-point arithmetic, precision, variable types, arithmetic statements, input and output statements, control statements, executable and non-executable statements, arrays, Repetitive and logical structures, Subroutines and functions, operation with files, operating systems, Creation of executable programs.
			Numerical methods of Analysis Students are able to solve Solution of algebraic and transcendental equation, Newton Ramphan method, Solution of simultaneous linear equations. Matrix inversion method, Interpolation, Newton and Lagrange formulas, Numerical differentiation. Numerical integration, Trapezoidal, Simpson and gaussian quadrature methods, Least square curve fitting, Straight line and Polynomial fits.
			Numerical solution of ordinary differential equations Students are able to solve Eulars and Rungekutta methods, simulation. Generation of uniformly distributed random integers, statistical tests of randomness. Monte-Carlo evaluation of integrals and error analysis, Non-uniform probability distributions, Importance sampling, Rejection method.
			Computational methods Students are able to derive Metropolis algoritham, Molecular diffusion and Brownian motions, Random walk problems and their Montecarlo simulation. Finite element and Finite difference methods. Boundary value and initial value problems, density functional methods.
SEMESTER VI **PAPER – VI :: (A) ELECTRONICS (DSE-2: ELECTIVE)**			

BS605	Electronics DSE-2F	4	• Students are able to understand the workingprincipleof Bipolar Junction Transistor -CB,CEand CC configurations, R-C coupled amplifier circuit, Concepts ofOscillators andphaseshiftoscillatorcircuit.
			• Students are able to study about different special purpose electronic devices like photo diode, solarcell,optocouplers,Shockleydiode,UJT,SCRandFET.
			• Students are able to describeand demonstrate thecircuits of OR,AND,NOT,NOR, NAND andEX-OR gates.Understandandverify DeMorgan'sLaws bydoingexperiments.
			• Students are able to understand Binary, Decimal and Hexadecimal number systems. Convertnumbersfromonesystemtoanother.
			• Students are able to to drawthe curvesofV-Icharacteristics ofp-n junctiondiode,Zenerdiodeand transistor. Students determine the frequency of RC phase shift oscillatorand studythefrequencyresponseofRCphaseshiftoscillatorbydoing Experiments.
			• Students are able to understand bandtheoryofsolids,intrinsic semiconductors,extrinsicsemi-conductors (p-type & n-type), p-n junction diode, rectifier circuit, Zener diodeandvoltageregulatorcircuit.
SEMESTER VI **Paper – VI:: (B) APPLIED OPTICS (DSE-2: ELECTIVE)**			
BS605	Applied Optics DSE-2F	4	• Students are able to Principles of LASER principles, working and types of LASER
			• Students are able to Classify LASER Systems- Gas, Liquid and Solid Lasers such as He-Ne and Argon Lasers, their energy level schemes- Ruby Laser and YAG laser, GA-As Laser and their applications in various fields.
			• Students are able to understand basic principle of Holography- Recording of amplitude, phase, and concept of wave front and classification of holograms.
			• Students are able to understand Thin lens as phase transformation-thickness function-various types of lenses- Fourier transforming properties of lenses
			• Students are able to understand Non-Linear Optics: harmonic generation- phase matching condition. Optical mixing- parametric generation of Light- Self focusing of light.
			• Students are able toOptical Fibers, types and their structures. Step index and graded index fibers. Sigle mode and multi-mode fibers. Material dispersion, wave guide dispersion, inter modes distortion and pulse broadening
Skill Enhancement Course- I **FUNDAMENTALS OF NANO TECHNOLOGY**			

BS301	Applied Optics SEC-1	4	studycomparativelythelengthscales inphysics,1D,2D, 3D nano structures andtheir consequences
			know synthesis techniques of nano materials like chemical vapor depositionmethod,thermaldecomposition,ballmilling,e-beamevaporation,pulsedlaserdeposition,MBEgrowthofquantumdots
			know characterization techniques like X-Ray Diffraction, Scanning electronmicroscopy,Travellingelectronmicroscopy,Scanningtunnelingmicroscopy,atomicforcemicroscopy
			know about coulombic interactions and dielectric constant of nano structures,quasi particles andexcitonsand getcomparativeideaabout theopticalpropertiesofheteroandnanostructures
			get idea about carrier transport in nano structures, blockade effect, tunnelling&hopingconductivity.
			know the applications of nano structures, CNT based transistor, quantum dotsheterostructure lasers, optical switching and optical data storage, magneticdots-magneticdatastorage,microelectromechanicalsystems(MEMS),nano electromechanicalsystems(NEMS)