Lesson Plan for academic year 2019 – 2020
Physics -1(BS PH201)

Module	Lecture No	Topic Covered	Taxonomical Activity
CO 1	1	Recapitulation of vector algebra, vector analysis and vector calculus; Discussion on Physical significances of grad, div, curl.	Informative, conceptual and analytic
CO 1	2	Line integral, surface integral, volume integral- and statements of Stokes theorem and Gauss Divergence theorem	Informative, conceptual, analytic and application
CO 1	3	Discussion on curvilinear coordinates and Expression of grad, div, curl and Laplacian in Spherical and Cylindrical co-ordinates.	Informative, conceptual and analytic
CO 1	4	Problems on vector calculus	Application
CO 2	5	Conservative and non – conservative forces. Conservation laws of energy & momentum, Motion of a rigid body in a plane and in 3D. Angular velocity vector	Conceptual, analytic and Application
CO 2	6	Moment of inertia, Determination of Moment of inertia for various rigid bodies	Conceptual, analytic and Application
CO 2	7	Determination of Moment of inertia for various rigid bodies, Perpendicular Axes and Parallel Axes theorem and applications	Conceptual, analytic and Application
CO 2	8	Problems including constraints & friction	Conceptual, analytic and Application
CO 3	9	Introduction to Periodic motion and oscillation in particular. Definition of SHM. Differential equation and its solution. Calculation of velocity and energy of simple harmonic oscillator.	Define, Calculate
CO 3	10	Superposition of two SHMs – parallel to each other with same/different frequencies. Combination of two SHM perpendicular to each other (Lissajous Figure)	Analyse Categorize, Classify, Compare, Distinguish, Identify
CO 3	11	Analysis of Damped vibration – Derivation of equation of motion and its solution	Analyse
CO 3	12	Definitions of relaxation time, logarithmic decrement and quality factor of an oscillator – their interrelation. Discussions of problems	Determine, Compare, Compute, Calculate
CO 3	13	Concept of steady oscillation – Forced vibrations. Derivation of equation of motion – its solution.	Compare, Determine, Classify, Arrange

CO 3	14	Fundamentals of resonance – Amplitude resonance and energy resonance. Sharpness of resonance.	Categorize, Classify, Compare, Differentiate, Distinguish, Identify, Infer
CO 3	15	Electrical analogy of free and forced oscillations. Discussions of Problems	Study, Analyse, Apply
CO 4	16	Introduction: concept of corpuscular theory, wave theory, quantum theory, light as an em wave, e.m spectrum.Fundamentals of wave – definition of amplitude, phase, path difference and relation between them.	Describe, Define
CO 4	17	Concept of geometrical path, optical path, superposition principle, Definition of interference, Condition for sustained pattern of interference. Definition of coherence, concept of spatial and temporal coherence.	Choose, Describe, Define, List, Explain, Express
CO 4	18	Derivation of the expression for intensity and to find the condition for maximum intensity and minimum intensity idea of constructive and destructive interference, conservation of energy Explanation of different class of interference: Division of wave-front and division of amplitude with example	Study, Distinguish, Explain, Express
CO 4	19	Derivation of fringe width and description of intensity pattern using young's double slit experiment –an example of division of wave-front, nature of fringe pattern with white light and calculation of the shift of central fringe due to insertion of a film of thickness 't' in one of the path of the interfering beam.	Show, Solve, Use, Calculate
CO 4	20	Wedge shaped film, demonstration of newton's ring experiment: an example of division of amplitude, calculation of wavelength of light, characteristics of fringe pattern, calculation of refractive index of unknown liquid, numerical problems	Calculate, Show, Estimate
CO 4	21	Diffraction: Definition of diffraction, different class of diffraction , derivation of intensity due to single slit diffraction (Fraunhofer class)	Compare, Classify
CO 4	22	Study the intensity distribution due to single slit diffraction, condition for maxima and minimum,	Explain, Discuss
CO 4	23	Derivation for intensity distribution of double slit diffraction(Fraunhofer class).	Discuss, Calculate
CO 4	24	Study the intensity pattern, study the absent spectra.	Compare
CO 4	25	Grating: idea of grating, intensity distribution due to grating, study grating spectra, condition of maximum and minimum for diffraction as well as interference term , calculation of Principal maxima and secondary maximum, difference between interference and diffraction	Describe, Define, Explain, Express
CO 4	26	Resolving power : Idea of resolving power of grating and	Explain,

		resolving power of microscope, discussion of numerical problems	Define, Calculate
CO 4	27	Polarization definition of polarization, giving idea of different types of polarized light: circularly, elliptically and linearly polarized light, Brewster's law,	Explain, Classify, Categorize, Classify, Compare Differentiate, Distinguish
CO 4	28	Double refraction, properties of e ray and o ray, Nicol prism, nicol prism as a analyser and polarizer,Malus law	Identify Infer, Point out, Select
CO 4	29	Retardation plate: quarter and half wave plate, calculation of thickness of crystal for creating a reqd. path diff or phase difference, dicroism, positive and negative crystal, analysis of light using nicol prism	Analyze, Calculate, Detect
CO 5	30	Theory of emission of ordinary light and its properties. Introduction to LASER – its difference with ordinary light.	Explain, Prepare, Produce,Design, Develop
CO 5	31	Lasing action – absorption of radiation, population inversion, spontaneous and stimulated emission of radiation.	Analyze, Classify, Compute, Discover
CO 5	32	Components of Laser; details of optical resonator. Active Lasing action. Einstein's A & B coefficients.	Study, Analyze, Compute, Illustrate, Outline
CO 5	33	Ruby Laser, He-Ne Laser – Applications of LASER. Discussions on related problems.	Point out, Explain, Grade, Justify, Measure
CO 6	34	Maxwell's equation, Dielectric Material, Idea of Polarization, Polarizability, Relation between D, E and P.	Informative
CO 6	35	Electronic, Ionic, Orientation and Space charge polarization.	Informative, analytic
CO 6	36	Behaviour of Dielectric under alternating field, Dielectric loses, Associated problems.	Analytical
CO 6	37	Magnetization M, Relation between B, H & M. Bohr Magneton. Associated problems.	Analytical
CO 6	38	Diamagnetism – Larmor& susceptibility, Curie law	Analytical
CO 6	39	Weiss molecular field theory & Curie-Weiss law, Hysteresis loss,	Analytical
CO 6	40	Antiferromagnetism, Ferromagnetism & Ferrites (analitative). Associated problems	Analytical, Application
CO 7	41	Hot body radiation – Kirchoff's laws. Definition of emissive power, absorptive power and Blackbody.	Study, Analyze,

		Prediction of Blackbody radiation. Realization of Blackbody in Laboratories. Experimental Blackbody radiation spectrum.	Describe, Classify, Demonstrate, Represent, Restate, Associate, Compute, Convert, Discuss
CO 7	42	Empirical laws on Blackbody radiation. Wien's distribution law, Stefan-Boltzmann law, Wien's displacement law – qualitative analysis. Derivation of Rayleigh-Jeans' thermal radiation law – Ultraviolet Catastrophe. Failure of Classical Physics.	Study, Analyze, Describe, Classify, Demonstrate, Represent, Restate, Associate, Compute, Convert, Discuss
CO 7	43	Planck's quantum assumptions in explaining Blackbody radiation. Derivation of Planck,s radiation law.	Study, Analyze, State, Count, Draw, Outline, Point, Quote
CO 7	44	Discussions on related problems.	Understand
CO 7	45	Compton Effect – failure of classical theories. Compton's explanation using quantum assumption. Calculation of Compton-shift, kinetic energy of recoil electron.	Explain, Express, Discuss, Estimate
CO 7	46	Concept of Special Theory of Relativity. Computation of relativistic energy-momentum relation. Hence estimation of momentum of photon. Compton Effect – discussion on failure of classical theories explaining this phenomenon.	Understand, Calculate, Estimate, Discuss
CO 7	47	Concept of group velocity and phase velocity of a wave. de Broglie hypothesis and its application.	Understand, Calculate, Estimate, Apply
CO 7	48	Heisenberg's Uncertainty Principle. Applications.	Understand, Calculate, Estimate, Apply
CO 7	49	Introduction to quantum mechanics. Basic postulates, concept of probability and probability density.	Informative and conceptual
CO 7	50	Concept of operators, commutators operator correspondence. Simple problems.	Informative and

			conceptual
CO 7	51	Concepts of wave function, Physical interpretation of wave function ψ (normalization and probability interpretation), Expectation values,	Informative and conceptual
CO 7	52	Time dependent Schrödinger's equation	Application
CO 7	53	Formulation of time independent Schrödinger's equation by method of separation of variables	Application
CO 7	54	Application: Particle in an infinite square well potential(in 1D),	Analytical
CO 7	55	Application: Particle in an infinite square well potential(in 3D)	Analytical
CO 7	56	Hydrogen Atom Problem	Application
CO 7	57	Hydrogen Atom Problem	Application
CO 7	58	Problem discussion.	Analytical
CO 8	59	Introduction to Statistical Mechanics, Basic postulates of statistical mechanics. Concepts of microstates and macrostates	Informative
CO 8	60	Concepts of thermodynamic probability, equilibrium macrostate. Classification of Statistical mechanics, Basic properties and examples of MB Statistics.	Informative and descriptive
CO 8	61	Basic properties and examples of BE statistics and FD statistics.	Informative and descriptive
CO 8	62	Application of BE statistics, calculation of Planck's law of blackbody radiation	Application
CO 8	63	Application of FD statistics, Fermi distribution at zero & non-zero temperature, Calculation of Fermi level in metals, also total energy at absolute zero of temperature and total number of particles	Application
CO 8	64	Associated problems	Application