Syllabus Completion Report
Academic Year-2020-2021
Dept of Physics

Sem I

F.Y.B.Sc. CBCS Pattern

Name: Mr. Barne N.D.   PHY-111 Mechanics and Properties of Matter

Sr. No.	Months	Topics	Lectures
01	29 Sep2020 - 27 Oct 2020	**1. Motion:** Introduction to motion, Types of motion, Displacement, Velocity, Acceleration, Inertia, Newton's laws of motion with their explanations, Various types of forces in nature, Frames of reference (Inertial and Non inertial), Laws of motion and it's real life applications, Problems	09
02	02 Nov 2020 - 01 Dec 2020	**2. Work and Energy:** Kinetic energy, Work Energy Theorem, Work done with constant force, Work done with varying force (spring force), Conservative and Non conservative forces, Potential energy, Law of energy conservation, Gravitational potential energy, Problems	07
03	02 Dec2020 – 12 Jan 2021	**3. Fluid Mechanics:** Concept of viscous force and viscosity, Coefficient of viscosity, Steady and Turbulent flow, Reynolds number, Equation of continuity, Bernoulli's Principle, Applications of Bernoulli's Principle (Ventury Meter, PitotTube), Applications of viscous fluids, Problems.	08
	02 Jan 2021	**Internal Exam**	
04	18 Jan 2021	**4. Properties of Matter:** Surface tension, Angle of contact, Factors affecting surface tension, Jaeger's method	12

	- **09 March** **2021**	for determination of surface tension, Applications of surface tension. Stress and Strain, Hook's law and Coefficient of elasticity, Young's modulus, Bulk modulus, Modulus of rigidity, Work done during longitudinal strain, Volume strain, Shearing strain, Poisson's ratio, Relation between three elastic moduli, (Y, η, K), Applications of elasticity, Problems.	
	30 March **2021**	**Internal Exam**	

Mr. Barne N.D.

Syllabus Completion Report
Academic Year-2020-2021
Dept of Physics
Sem I
T.Y.B.Sc.

Name: Mr. Barne N.D.   **PH 333 Classical Mechanics**

Months	Topics	Lectures
09 Sept2020 - 07 Oct 2020	**1. Mechanics of system of particles** Introduction –Newton's laws	**10**
	Applications of Newton's laws of motion Projectile motion in various medium,	
	Rocket motion,	
	Motion of a charged particle in constant electric, magnetic and electromagnetic field.	
	General features of motion, equation of orbit, Deduction of Kepler's laws of planetary motion, Orbits of artificial satellite, Problems.	
	System of particles, Centre of mass, Conservation of linear momentum, angular momentum,	
	Energy of system of particles (statements only) Problems	
08 Oct 2020 - 6 Nov 2020	**2. Motion in Central Force Field** Central force, equivalent one body problem	10
	Motion in central force field	
	General features of motion, equation of orbit	
	Deduction of Kepler's laws of planetary motion	
	Orbits of artificial satellite Problems	

	Problems	
11Nov 2020 - 10 Dec 2020 - 12 Jan 2021	**3. Scattering of particles** Elastic and inelastic scattering,	**10**
	Elastic scattering - Laboratory and centre of mass system.	
	Scattering, Relation between scattering angles in laboratory and centre of mass system.	
	Problems	
02 Jan 2021	**Internal Exam**	
13 Jan 2021 - 12 Feb 2021	**4. Lagarangian and Hamiltonian formulation** 1 Limitations of Newtonian formulation	10
	Types of constraints, degrees of freedom, generalized coordinates, configuration space	
	D' Alembert's principle of virtual work	
	Lagarangian equation from D' Alembert's principle, cyclic coordinates, problems	
	Phase space, Hamiltonian's equations State of Systems, Ensembles	
17 Feb 2021 - 18 March 2021	**5. Canonical Transformation and Poisson's Bracket** Generating function	**08**
	Condition for Canonical transformation and problems.	
	Definition , Identities	

Mr. Barne N.D.

Syllabus Completion Report
Academic Year-2020-2021
Dept of Physics

S.Y.B.Sc. CBCS Pattern, Sem I

Name: Mr. Barne N.D.   PHY-231: Mathematical Methods in Physics-I

Sr. No.	Months	Topics	Lectures
01	29 Sep 2020 - 27 Oct 2020	**1. Complex Numbers** **1.1** Introduction to complex numbers **1.2** Rectangular, polar and exponential forms of complex numbers **1.3** Argand diagram **1.4** Algebra of complex numbers using Argand diagram **1.5** De-Moivre's Theorem (Statement only) **1.6** Power, root and log of complex numbers **1.7** Trigonometric, hyperbolic and exponential functions **1.8** Applications of complex numbers to determine velocity and acceleration in curved motion. **1.9** Problems.	09
02	02 Nov 2020 - 01 Dec 2020	**2. Partial Differentiation** **2.1** Definition of partial differentiation **2.2** Successive differentiation **2.3** Total differentiation **2.4** Exact differential **2.5** Chain rule **2.6** Theorems of differentiation **2.7** Change of variables from Cartesian to polar co-ordinates **2.8** Conditions for maxima and minima(without	09

		proof)	
		2.9 Problems.	
	02 Jan 2021	**Internal Exam**	
03	**02 Dec2020** **–** **12 Jan 2021**	**3. Vector Algebra and Analysis** **3.1** Introduction to scalars and vectors, dot product and cross product of two vectors and their physical significance. (Revision) **3.2** Scalar triple product and its geometrical interpretation **3.3** Vector triple product and its proof **3.4** Scalar and vector fields **3.5** Differentiation of vectors with respect to scalar **3.6** Vector differential operator and Laplacian operator **3.7** Gradient of scalar field and its physical significance **3.8** Divergence of scalar field and its physical significance **3.9** Curl of vector field and its physical significance. **3.10** Vector Identities. a. $\Box$ X ($\Box\Phi$) = 0 b. $\Box$.($\Box$XV) = 0 c. $\Box$.($\Box\Phi$) =$\Box$2Φ d. $\Box$.(ΦA) =$\Box\Phi$.A+Φ($\Box$.A) e. $\Box$ X (ΦA) = Φ ($\Box$ X A) + ($\Box\Phi$) X A f. $\Box$.(AXB) = B**.**($\Box$XA) - A($\Box$X B) **3.11** Problems.	**12**
04	**18 Jan 2021** **-** **09 March 2021**	**4. Differential Equation** **4.1** Degree, order, linearity and homogeneity of differential equation. **4.2** Concept of Singular points. Example of singular points (x = 0, x = x_0 and x = ∞) of differential equation.	**06**

		4.3 Problems	

Mr. Barne N.D.

Syllabus Completion Report
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Sem I

T.Y.B.Sc.

Name: Mr. Barne N.D.   PH331: Mathematical Methods in Physics-II

Sr. No.	Months	Topics	Lectures
01	12 Sep 2020 - 28Nov 2020	**2. The Special Theory of Relativity** Introduction, Newtonian relativity Galilean transformation equation, Michelson-Morley experiment, Postulates of special relativity, Lorentz transformations, Kinematic effects of Lorentz transformation, Length contraction, Proper time, Transformation of velocities, Variation of mass With velocity, Mass-energy relation. Four vectors.	14
	02 Jan 2021	**Internal Exam**	
02	05 Dec 2020 - 13 March 2020	**3. Differential equations** Frequently occurring partial differential equations, degree, order, linearity and homogeneity (revision), Method of separation of variables, Singular points, Fuch's theorem (Statement only), Frobenius method for power series solution of Legendre, Hermite and Bessel differential equation. Problems	10

Mr. Barne N.D.

Teaching Report

2020-2021

DEPARTMENT OF PHYSICS

Term II

F.Y.B.Sc.

Name: Mr. Barne N.D.   **PHY-121 Heat and Thermodynamics**

Months	Topic taken	Periods
10 May .2021- 18 May 2021	**1. Fundamentals of Thermodynamics** Concept of thermodynamic state, Equation of state, Van der Waal's equation of state, Thermal equilibrium, Zeroth law of thermodynamics, Thermodynamic processes: Adiabatic, Isothermal, Isobaric and Isochoric changes, Indicator diagram, Work done during isothermal change, Adiabatic relations, Work done during adiabatic change, Internal energy, Internal energy as state function, First law of thermodynamics, Reversible and Irreversible changes, Problems.	10
24 May 2021-30 May 2021	**2. Applied Thermodynamics** Conversion of heat into work and it's converse, Second law of thermodynamics, Concept of entropy, Temperature - entropy diagram, T-dS equations, Clausius - Clapeyron latent heat equations, Problems.	09
31 May 2021- 08 June 2021	**3. Heat Transfer Mechanisms** Carnot's cycle and Carnot's heat engine and its efficiency, Heat Engines: Otto cycle & its efficiency, Diesel cycle & its efficiency, Refrigerators: General principle and coefficient of performance of refrigerator, Simple structure of Vapor compression refrigerator, Air Conditioning: Principle and it's applications, Problems	09
01 June 2021	**INERNAL EXAM**	
13 June 2021- 29 June 2021	**4. Thermometry** Concept of heat & temperature, Principle of thermometry, Temperature scales & inter-conversions, Principle, Construction and Working: (Liquid thermometers, Liquid filled thermometers, Gas filled thermometers, Bimetallic thermometers, Platinum resistance thermometer, Thermocouple), Problems	08

Mr. Barne N. D.

Teaching Report
Academic Year-2020-2021
Dept of Physics
Term II
T.Y.B.Sc.

Name: Mr. Barne N.D.   **Subject: PHY 341 Classical Electrodynamics**

Months	Topics	Lectures
12 May 2021-19 May 2021	**1. Electrostatics:** 1.1. Coulomb's law, Gauss law, Electric field, Electrostatic Potential 1.2. Potential energy of system of charges. 1.3. Statement of Poisson's equation, Boundary Value problems in electrostatics-solution of Laplace equation in Cartesian system, 1.4. Method of image charges: Point charge near an infinite grounded conducting plane, Point charge near grounded conducting sphere. 1.5. Polarization P, Electric displacement D, Electric susceptibility and dielectric constant, bound volume and surface charge densities. 1.6. Electric field at an exterior and interior point of dielectric.	**16**
20 May 2021-02 June 2021	**2.Magnetostatics:** 2.1. Concepts of magnetic induction, magnetic flux and magnetic field 2.2. Magnetic induction due to straight current carrying conductor, Energy density in magnetic field, magnetization of matter. Relationship between B,H and M. 2.3 Biot-Savart's law, Ampere's law for force between two current carrying loops, Ampere's circuital law, 2.4Equation of continuity, Magnetic vector potential A. 2.5. Magnetic susceptibility and permeability, Hysteresis loss, B-H curve.	**16**
03 June 2021	**Internal Exam**	
03 June 2021-07 June 2021	**3. Electrodynamics:** 3.1.Concept of electromagnetic induction, Faradays law of induction, Lenz's law, displacement current, generalization of Amperes' law 3.2. Maxwell's equations (Differential and Integral form) and their physical significance 3.3. Polarization, reflection & refraction of electromagnetic waves through media	**10**

Mr. Barne N. D.

Teaching Report
Academic Year-2020-2021
Dept of Physics
Term II
T.Y.B.Sc.

Name: Mr. Barne N.D.   **Subject: PHY 346 LASERS**

Months	Topics	Lectures
25 May 2021- 27 May 2021	**1. Introduction to Lasers:** Ordinary light and Lasers, Brief history of Lasers, Interaction of radiation with matter, Energy levels, Population density, Boltzmann distribution, Transition Lifetimes, Allowed and Forbidden Transitions, Stimulated Absorption, Spontaneous Emission and Stimulated Emission, Einstein's Coefficients, Einstein's relations.	08
28 May 2021- 29 May 2021	**2. Laser Action:** Condition for large stimulated emission, Population inversion Condition for light amplification, Gain coefficient Active medium, Metastable states Pumping schemes: three level and four level	07
04 June 2021	**Internal Exam**	
09 June 2021- 12 June 2021	**3. Laser Oscillator:** Optical feedback, round trip gain, threshold gain, critical population inversion, Optical resonator, condition for steady state oscillations, cavity resonance frequencies.	06
16 June 2021 – 20 June 2021	**4. Laser Output:** Line shape broadening: - Lifetime broadening - Collision broadening - Doppler broadening	03
23 June 2021 – 30 June 2021	**5. Characteristics of Laser:** Directionality, Monochromaticity Coherence Brightness	04

Mr. Barne N.D.