

Government Polytechnic Dehri-on-sona

Tentative Lecture Plan

Course: Diploma

Subject	Applied Physics A		Subject Code:2400102A		
Semester:I			Department: Applied Sciences		
Name of Faculty:	Dr. Rajesh Niranjana		Branches: Civil & Mechanical Engg.		
S. No	Unit No.	Topic to be covered	Theory Session Outcome (TSO)	No of Class Room Instructions Hours	Total Marks Weightage in Final exam
	Unit-1	Unit and Measurements		6	8
1	Unit-1.1	Physical quantities, fundamentals and derived units and system of units	Distinguish between fundamental and derived physical quantity.	1	
2	Unit-1.2	Accuracy, precision and errors (systematic and random) in measurements, Method of estimation of errors (absolute and relative) in measurement, propagation of errors, significant figures	Estimate the errors in the measurement of given physical quantity.	1	
3	Unit-1.3	Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimension in an equation	(a) Derive dimensional formula of given physical quantity. (b) Establish relation among physical quantities using dimensional analysis.	2	
4	Unit-1.4	Applications of dimensions: conversion from one system of units to other, corrections of equations and derivation of simple equations.	(a) Apply dimensional analysis for inter conversion of units. (b) Use dimensional analysis to check the correctness of a given equation.	2	

	Unit-2	Circular and Rotational Motion		10	12
5	Unit-2.1	Circular motion, angular displacement, angular velocity, frequency, time period, angular acceleration, relation between angular & linear velocity, linear acceleration & angular acceleration	Explain circular motion and various terms related to circular motion.	2	
6	Unit-2.2	Centripetal and centrifugal forces: banking of roads and bending of cyclist	(a) Apply the concept of centripetal and centrifugal forces in a given situation.	3	
7	Unit-2.3	Translational and rotational motion, torque and angular momentum, conservation of angular momentum and its applications	(a) Distinguish between translational and rotational motion. (b) Explain the terms torque and angular momentum.	2	
8	Unit-2.4	Moment of inertia and its physical significances, radius of gyration of rigid body, theorem of parallel and perpendicular axes (statements only), moment of inertia of rod, ring, disc and sphere (hollow and solid)	(a) Apply the principle of conservation of angular momentum in a given situation. (b) Find the moment of inertia of a given regular shape body.	3	
	Unit-3	Physical Properties of Matter and Heat		12	20
9	Unit-3.1	Elasticity: Hooke's law, Coefficient of elasticity; Young's modulus, Bulk Modulus and modulus of rigidity and their inter-relation (No derivation), Poisson's ratio, stress-strain curve, elastic potential energy	(a) Explain the stress-strain curve of a given elastic or plastic body. (b) Interrelate different coefficient of elasticity.	3	

10	Unit-3.2	Surface tension: Intermolecular Force, cohesive and adhesive forces, Surface Tension, Surface Energy, angle of contact, Ascent formula (No derivation), applications of surface tension, capillary action, effect of temperature and impurity on surface tension	(a) Apply the concepts of surface tension and viscosity to solve a given engineering problem	3	
11	Unit-3.3	Viscosity: Fluid, Viscosity and coefficient of viscosity, Critical Velocity, Reynold's number, streamline and turbulent flow, Terminal velocity, Stokes law and effect of temperature on viscosity.	Explain the behavior of given fluids on the basis of their viscosity.	3	
12	Unit-3.4	Heat: Concept of Heat and Temperature and it's difference, modes of heat transfer: conduction, convection, radiation, coefficient of thermal conductivity, thermal expansion of solid, liquid and gas, coefficient of linear, surface and cubical expansions and relation amongst them.	(a) Determine the various modes heat transfer in a given engineering problem. (b) Establish relation between coefficients of thermal expansion.	3	
	Unit-4	Simple Harmonic Motion and Wave Motion		8	12
13	Unit-4.1	Periodic and Oscillatory Motion	Differentiate among periodic, oscillatory and simple harmonic motion	3	
14	Unit-4.2	Simple Harmonic Motion (SHM): Displacement, Amplitude, phase, velocity, acceleration, time period, frequency and their interrelation, Conservation of energy in SHM, Compound pendulum: Bar pendulum	(a) Explain the various terms related to SHM. (b) Derive the expression for time period of given Bar pendulum.	4	

15	Unit-4.3	Types of waves: Mechanical and Electromagnetic waves, Transverse and longitudinal waves, wave velocity, frequency and wave length and their relationship, wave equation, amplitude, phase, phase difference, superposition of waves, Beats formation	(a) Distinguish between mechanical and electromagnetic waves with examples (b) Differentiate between longitudinal and transverse waves with examples © Find the relation between the terms used to describe wave motion. (d) Explain the principle of Superposition of waves and beat formation with examples.	3	
	Unit-5	Modern Physics		12	18
16	Unit-5.1	Photoelectric effect; Photon, threshold frequency, work function, Stopping Potential, Einstein's photoelectric equation.	Apply the concept of photoelectric effect to explain the of photonic devices.	3	
17	Unit-5.2	Lasers: Properties, Energy levels, ionization and excitation potentials; spontaneous and stimulated emission; population inversion, pumping methods, types of lasers: Ruby laser, He-Ne Laser, engineering and medical applications of lasers.	Explain Laser, components of laser and its various engineering applications.	4	
18	Unit-5.3	Optical fibers: Total internal reflection, acceptance angle and numerical aperture, Optical fiber types, applications of optical fibers	Explain propagation of light in optical fiber and applications of optical fiber.	3	
19	Unit-5.4	Nanotechnology: Properties (optical, magnetic and dielectric properties) of Nanomaterials and its application	Describe the properties of nanomaterials and its various applications.	2	

Suggested Learning Resources	Titles	Author(s)	Publisher and Edition with ISBN
	Concept of Physics-1	H.C. Verma	Bharti Bhawan Publications
	Concept of Physics-2	H.C. Verma	Bharti Bhawan Publications
	Text Book of Physics for Class XI (Part-I, Part-II)	N.C.E.R.T., Delhi	N.C.E.R.T., Delhi, 2019
	Text Book of Physics for Class XII (Part-I, Part-II)	N.C.E.R.T., Delhi	N.C.E.R.T., Delhi, 2019
	Engineering Physics	P. V. Naik	Pearson Education
	Applied Physics-I	Dr. Mina Talati & Vinod Kumar Yadav	Khanna Book Publicining , 2021
	Applied Physics-II	Dr. Mina Talati & Vinod Kumar Yadav	Khanna Book Publicining , 2021
Engineering Physics	D. K. Bhattacharya & Poonam Tandon	Oxford University Press	

Online Educational Resources:

	1. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype
	2. www.nanowerk.com
	3. https://www.open2study.com/courses/basic-physics-150315/
	4. https://nptel.ac.in/courses/122107035
	5. https://nptel.ac.in/courses/122104016
	6. http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html
	7. https://www.physicsclassroom.com/
	8. https://phys.org/
	9. https://vlab.amrita.edu/?sub=1
	10. https://www.olabs.edu.in/?pg=topMenu&id=40
	11. https://www.khanacademy.org/science/physics

Others Educational Resources:

	1. Fundamentals of Physics, David Halliday, Robert Resnick and Jearl Walker
	2. Engineering Physics, R.K. Gaur and S. L. Gupta
	3. University Physics with Modern Physics, Sears and Zemansky

	4. Physics for Scientists and Engineers with Modern Physics by Raymond A. Serway and John W. Jewett	
	5. Physics Laboratory Manual, David H Loyd	
	Sd/-	Sd/-
	Signature of Faculty (Dr. Rajesh Niranjana)	Signature of HOD (Dr. Rajesh Niranjana)