Ramgarhia Polytechnic College, Phagwara

Computer Science Engineering Department

Head of The Department: Er. Poonam Rana

Name of the Faculty: Sh. Jaswinder Singh

Discipline: CSE

Semester: 1st

Subject: Applied Physics– I

Lesson Plan Duration: 16 Weeks

RATIONALE

RATIONALE Applied physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects will behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles. In all contents, SI units should be followed.

Course Outcomes

After undergoing this course, the students will be able to:

CO1. Identify physical quantities, parameters and select their units for use in engineering solutions and make measurements with accuracy by optimising different types of errors Overcome communication barriers.

CO2. Represent physical quantities as scalar and vectors and calculate area of an engineering design and determine net flow (flux) through a given closed surface, etc..

CO3. Solve difficult problems (walking of man, horse and cart problem, flying of bird/ aircraft, etc.)Read various genres adopting different reading techniques.

CO4. Analyse and design banking of roads/railway tracks and apply conservation of momentum principle to Explain rocket propulsion, recoil of gun etc.

CO5. Define work, energy and power and their units. Drive work, power and energy relationship and solve problems about work and power

CO6. Classify sources of energy as renewable or non renewable. State the principle of conservation of energy. Give advantages and disadvantages of each energy source and Identify forms of energy, conversions. Compare and contrast the physical properties associated with linear motion and rotational motion and give examples of conservation of angular momentum. Describe the surface tension phenomenon and its units, cause of surface tension and effects of temperature on surface tension and Solve statics problems that involve surface tension related forces

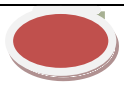
CO7. Describe the viscosity of liquids, coefficient of viscosity and the various factors affecting its value. calculate the viscosity of an unknown fluid using Stokes' Law and the terminal velocity

CO8. Define stress and strain. State Hooke’s law and conditions under which it is valid. Given an engineering stress–strain diagram, determine (a) the modulus of elasticity, (b) the yield strength , and (c) the tensile strength, and (d) estimate the percent elongation

CO9. Express physical work in term of heat and temperature; Measure temperature in various processes on different scales (Celsius, Kelvin Fahrenheit etc.)

CO10. Distinguish between conduction, convection and radiation, identify the different methods for reducing heat losses

CO11. Define the terms: specific heat capacity, specific latent heat, analyse the result of heat transfer between bodies at different temperatures and states measure the specific heat capacity of a solid or a liquid.

PO ⇨ CO ⇩	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							
CO6							
CO7							
CO8							
CO9							
CO10							
CO11							

Syllabus

Units	Details	Hours
1.	Units and Dimensions 1.1 Physical quantities Units - fundamental and derived units, systems of units (FPS, CGS and SI units) 1.2 Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, coefficient of viscosity, stress, strain, moment of inertia, gravitational constant.) 1.3 Principle of homogeneity of dimensions 1.4 Dimensional equations and their applications, conversion from one system of units to other, checking of dimensional equations and derivation of simple equations) 1.5 Limitations of dimensional analysis 1.6 Error in measurement, absolute error, relative error, rules for representing significant figures in calculation. 1.7 Application of units and dimensions in measuring length, diameter, circumference, volume, surface area etc. of metallic and non metallic blocks, wires, pipes etc (at least two each).	*(10hrs)*
2.	Force and Motion 2.1 Scalar and vector quantities – examples, representation of vector, types of vectors 2.2 Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product. 2.3 Resolution of Vectors and its application to lawn roller. 2.4 Force, Momentum, Statement and Derivation of Conservation of linear momentum, its applications such as recoil of gun. 2.5 Impulse and its Applications 2.6 Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period. 2.7 Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical) 2.8 Expression and Applications of Centripetal and centrifugal forces with examples such as banking of roads and bending of cyclist 2.9 Application of various forces in lifts, cranes, large steam engines and turbines.	(12 hrs)
3.	Work, Power and Energy 3.1 Work: and its units, examples of zero work, positive work and negative work 3.2 Friction: modern concept, types, laws of limiting friction, Coefficient of friction and its Engineering Applications. 3.3 Work done in moving an object on horizontal and inclined plane for rough and plane surfaces with its applications 3.4 Energy and its units: Kinetic energy and gravitational potential energy with examples and their derivation 3.5 Principle of conservation of mechanical energy for freely falling bodies, examples of transformation of energy. 3.6 Power and its units, calculation of power in numerical problems 3.7 Application of Friction in brake system of moving vehicles, bicycle, scooter, car trains etc	(10hrs)

4.	Rotational Motion 4.1 Concept of translatory and rotatory motions with examples 4.2 Definition of torque and angular momentum and their examples 4.3 Conservation of angular momentum (quantitative) and its examples 4.4 Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only), Moment of inertia of rod, disc, ring and sphere (hollow and solid) (Formulae only). 4.5 Application of rotational motions in transport vehicles, and machines.	(10hr)
5.	Properties of Matter 5.1 Elasticity: definition of stress and strain, different types of modulii of elasticity, Hooke's law, significance of stress strain curve 5.2 Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications 5.3 Surface tension: concept, its units, angle of contact, Ascent Formula (No derivation), applications of surface tension, effect of temperature and impurity on surface tension 5.4 Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems. 5.5 Concept of fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem and their applications (no derivation and numerical).	(12 hrs)
6.	Thermometry 6.1 Difference between heat and temperature 6.2 Modes of transfer of heat (Conduction, convection and radiation with examples) 6.3 Different scales of temperature and their relationship 6.4 Types of Thermometer (Mercury Thermometer, Bimetallic Thermometer, Platinum resistance Thermometer, Pyrometer) 6.5 Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them 6.6 Concept of Co-efficient of thermal conductivity 6.7 Application of various systems of thermometry in refrigeration and airconditioning etc.	(10hr)

LIST OF PRACTICALS(to perform minimum eight experiments)

1. To find volume of solid sphere using a vernier calipers
2. To find internal diameter and depth of a beaker using a vernier calipers and hence find its volume.
3. To find the diameter of wire using a screw gauge
4. To determine the thickness of glass strip using a spherometer
5. To verify parallelogram law of forces
6. To study conservation of energy of a ball or cylinder rolling down an inclined plane.
7. To find the Moment of Inertia of a flywheel about its axis of rotation
8. To determine the atmospheric pressure at a place using Fortin's Barometer
9. To determine the viscosity of glycerin by Stoke's method
10. To determine the coefficient of linear expansion of a metal rod
11. To determine force constant of spring using Hooks law.

Reference Books:

1. Text Book of Physics for Class XI (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
3. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
4. A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
5. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
6. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
7. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar 8. Engineering Physics by DK Bhhatacharya & Poonam Tandan.

Delivery/Instructional Methodologies

Sr.No.	Description
1.	Chalk and Talk
2.	PowerPoint Presentation
3	Practical Demonstrtion
4	Charts

Assessment Methodologies

Sr. No.	Description	Type
1.	Student Assignment	Direct
2.	Test	Direct
3.	Board Examination	Direct
4.	Student Feedback	Direct

Gaps in the syllabus - to meet industry/profession requirements

S.NO.	DESCRIPTION	PROPOSED ACTIONS	PO MAPPING
	N/A	N/A	N/A

Topics beyond syllabus/advanced topics

Units	Details	Hours
N/A	N/A	N/A

Web Source References

Sr. No.	URL
1.	www.wikipedia.com

Lesson Plan

	Theory		Practical	
WEEK	**Lecture/Day**	**Topic including Assignment,Test and Parent Teacher meetings.**	**DAY**	**TOPIC (to perform minimum eight experiments)**
1ST	1	1. Units and Dimensions, Introduction to physics and the unit, why physics is called mother of all sciences, importance of measurement.	1.	Demonstration Experiment no.1. To find volume of solid sphere using a vernier calipers.
	2	1.1 Physical quantities, Units.		
	3	Fundamental and derived units, systems of units (FPS, CGS,MKS and SI units)		
	4	1.2 Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, coefficient of viscosity, stress, strain, moment of inertia, gravitational constant.)		
2ND	5	1.3 Principle of homogeneity of dimensions 1.4 Dimensional equations and their applications,	2.	Demonstration Experiment no. 2. To find internal diameter and depth of a beaker using a vernier calipers and hence find its volume.
	6	Conversion from one system of units to other,		
	7	Checking of dimensional equations		
	8	Derivation of simple equations		
3RD	9	1.5 Limitations of dimensional analysis 1.6 Error in measurement, absolute error, relative error, rules for representing significant figures in calculation.	3.	

	10	1.7 Application of units and dimensions in measuring length, diameter, circumference, volume, surface area etc. of metallic and non metallic blocks, wires, pipes etc (at least two each).		**REVISION**
	11	2.Force and Motion, 2.1 Scalar and vector quantities – examples, representation of vector, types of vectors		
	12	2.2 Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only),		
4TH	13	Examples and Numerical problems based upon Parallelogram Law of Vectors.	4.	Demonstration Experiment no.5. To verify parallelogram law of forces
	14	Scalar and Vector Product,		
	15	2.3 Resolution of Vectors and its application to lawn roller.		
	16	2.4 Force,Momentum,		
5TH	17	Statement and Derivation of Conservation of linear momentum, its applications such as recoil of gun.	5.	Demonstration Experiment no.3. To find the diameter of wire using a screw gauge
	18	2.5 Impulse and its Applications		
	19	2.6 Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period. 2.7 Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical)		
	20	2.8 Expression and Applications of Centripetal and centrifugal forces with examples such as banking of roads and bending of cyclist		
6TH	21	2.9 Application of various forces in lifts, cranes, large steam engines and turbines	6.	Demonstration Experiment no. 4. To determine the thickness of glass strip using a spherometer
	22	Parent Teacher meeting-1		
	23	House test-1		
	24	3.Work, Power and Energy (10 hrs) 3.1 Work: and its units, examples of zero work, positive work and negative work		
7TH	25	3.2 Friction: modern concept, types, laws of limiting friction, Coefficient of friction and its Engineering Applications.	7.	

	26	3.3 Work done in moving an object on horizontal and inclined plane for rough and plane surfaces with its applications		Demonstration Experiment no.6. To study conservation of energy of a ball or cylinder rolling down an inclined plane.
	27	3.4 Energy and its units: Kinetic energy and gravitational potential energy with examples and their derivation		
	28	3.5 Principle of conservation of mechanical energy for freely falling bodies, examples of transformation of energy.		
8TH	29	3.6 Power and its units, calculation of power in numerical problems	8.	**REVISION**
	30	3.7 Application of Friction in brake system of moving vehicles, bicycle, scooter, car trains etc.		
	31	4 Rotational Motion , 4.1 Concept of translatory and rotatory motions with examples		
	32	4.2 Definition of torque and angular momentum and their examples		
9TH	33	4.3 Conservation of angular momentum (quantitative) and its examples	9.	Demonstration Experiment no. 7. To find the Moment of Inertia of a flywheel about its axis of rotation
	34	Applications and Discussion		
	35	4.4 Moment of inertia and its physical significance, radius of gyration for rigid body,		
	36	Numerical problems and discussion of topic		
10TH	37	Theorems of parallel and perpendicular axes (statements only)	10.	Demonstration Experiment no.11. To determine force constant of spring using Hooks law.
	38	Moment of inertia of rod, disc, ring and sphere (hollow and solid) (Formulae only).		
	39	4.5 Application of rotational motions in transport vehicles, and machines.		
	40	Parents And Teachers meeting, And Test-2		
11TH	41	5. Properties of Matter (12 hrs) 5.1 Elasticity: definition of stress and strain,	11.	Demonstration Experiment no.8. To determine the atmospheric
	42	Different types of modulii of elasticity, Hooke's law, significance of stress strain curve		

	43	5.2 Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications	11 .	pressure at a place using Fortin's Barometer
	44	5.3 Surface tension: concept, its units, angle of contact, Ascent Formula (No derivation),		
12TH	45	Applications of surface tension, effect of temperature and impurity on surface tension	12.	**REVISION**
	46	Parent teacher meet-2		
	47	House Test-2		
	48	Discussion, Oral Test, Practice numericals		
13TH	49	5.4 Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems.	13.	Demonstration Experiment no. 9. To determine the viscosity of glycerin by Stoke's method
	50	5.5 Concept of fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity,		
	51	Bernoulli's Theorem and their applications (no derivation and numerical).		
	52	Applications of Bernoulli's Theorm.		
14TH	53	Discussion on difficulties and Problems	14.	Demonstration Experiment no. 10. To determine the coefficient of linear expansion of a metal rod
	54	6. Thermometry, 6.1 Difference between heat and temperature		
	55	6.2 Modes of transfer of heat (Conduction, convection and radiation with examples)		
	56	6.3 Different scales of temperature and their relationship		
15TH	57	6.4 Types of Thermometer (Mercury Thermometer, Bimetallic Thermometer, Platinum resistance Thermometer, Pyrometer)	16.	**REVISION**
	58	6.5 Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them		
	59	6.6 Concept of Co-efficient of thermal conductivity		
	60	6.7 Application of various systems of thermometry in refrigeration and airconditioning etc.		

16TH	61	Discussion about dificulties	16.	**REVISION**
	62	Parent teacher meet-3		
	63	House Test-3		
	64	Discussion.		