Course Syllabus
Gyanmanjari Diploma Engineering College
Semester-1

Subject: - Physics – DETXX10101

Type of course: Multidisciplinary

Prerequisite: Basic mathematics, understanding of shapes, different states of matter.

Rationale:

Physics is a branch of science mainly dealing with interaction of energy and matter and considered as the mother of all engineering disciplines. Diploma engineers (technologists) have to deal with various materials while using/ maintaining machines. Moreover, the basic knowledge of principles of physics helps diploma students to lay foundations of core engineering courses. The laws and principles of physics, formulae and knowledge of physical phenomena and physical properties provide a means of estimating the behavior of things before we design and observe them. This course of physics has been designed as per program requirements to help students to study the relevant core engineering courses. The complicated derivations have been avoided and micro projects are introduced. This course will help the diploma engineers to use/apply the basic concepts and principles of physics solve well designed engineering problems and comprehend different technology-based applications.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
3	-	2	4	60	30	10	20	30	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Continuous Assessment:

(For each activity maximum-minimum range is 5 to 10 marks)

Sr. No	Active Learning Activities	Marks
1	**Quiz** Unit wise Quiz of 10 MCQs	10
2	**Draw and Label** Name of instruments will be given by faculty; students need to draw and label and counter sign is must	5
3	**Report writing** On Current Physics affair in 150 words (as per format).	10
4	**Student Choice Activity** Students must select any activity of their choice relevant to subject and submit outcome via MOODLE.	5
Total		30

Course Content:

Unit	Course content	Hrs	% Weightage
1	**Chapter: 1 Units and Measurements** Measurements and units in engineering and science, Physical quantities; fundamental and derived quantities, Systems of units: CGS, MKS and SI, definition of units (only for information and not to be asked in examination), Interco version of units MKS to CGS and vice versa, requirements of standard unit, Vernier caliper, Micrometer screw gauge, Accuracy, precision and error, estimation of errors absolute error, relative error and percentage error, error propagation, significant figures. **Chapter: 2 Heat and Thermometry** Heat and Temperature, Modes of Heat transfer: Conduction, Convection and Radiation, Temperature measurement scales: Kelvin, Celsius and Fahrenheit and inter conversion between them, Heat Capacity and Specific Heat, Types of thermometers (Mercury thermometer, Bimetallic thermometer, Platinum resistance thermometer, Pyrometer) and their uses, Coefficient of thermal conductivity and its engineering applications, Expansion of solids, coefficient of linear expansion	12	25 %

2	**Chapter: 3 Wave motion and its applications** Waves, wave motion, and types of waves: longitudinal and transverse waves, Frequency, periodic time, amplitude, wavelength and wave velocity and their relationship, Properties of sound and light waves, phase, phase difference and various terms of wave equation ($y = Asin(\omega t + \varphi)$) [NO equations of velocity and acceleration], Superposition of waves, Interference: constructive and destructive interference , condition for stationary interference pattern, beat formation, Ultrasonic waves, production of ultrasonic waves magnetostriction and piezoelectric method, their properties, applications of ultrasonic waves in the field of engineering and medical.	10	25 %
3	**Chapter: 4 Optics and Modern Physics** Refraction, refractive index and Snell's law, Total internal reflection, critical angle and necessary conditions for total internal reflection, Application of total internal reflection in optical fire, LASER, characteristics of LASER, differences between LASER and ordinary light, Applications of LASER in engineering and medical field, Optical fiber and light propagation through optical fiber, acceptance angle and numerical aperture, Step index and graded index, Applications of optical fiber in engineering and medical, Advantages of optical fiber over coaxial cable.	10	25 %
4	**Chapter: 5 Elasticity** Deforming and restoring Force, Stress-Strain with their types, Hooke's law, Modules of elasticity, Young's modulus, Bulk modulus, Shear modulus, Stress-Strain curve **Chapter: 6 Surface Tension** Surface tension; concept and units, Cohesive and adhesive forces, Molecular range and sphere of Influence, Laplace's molecular theory, Angle of contact, Ascent Formula (No derivation), Surface energy, Applications of surface tension, Effect of temperature and impurity on surface tension, Applications of viscosity in hydraulic systems **Chapter: 7 Viscosity** Viscosity and its SI units, Newton's law of Viscosity, Viscous force, velocity gradient and coefficient of viscosity and its SI units, free fall of an object through viscous medium and terminal velocity, Types of fluid motion, stream line and turbulent flow, critical velocity, Reynold's number, Stokes' law, Effect of temperature on viscosity, Applications of viscosity in hydraulic systems.	10	25 %

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30 %	40 %	30 %	0	0	0

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Use relevant instruments with precision to measure the dimension of given physical quantities in various engineering situations.
CO2	Apply the basic concepts of heat transfer and thermometric properties to provide solutions for various engineering problems.
CO3	Use the concept of waves and sound waves for various engineering applications involving wave dynamics.
CO4	Use the concepts of LASER and Fiber optics for various engineering applications
CO5	Use the concepts of Elasticity, Surface Tension and Viscosity for various engineering applications

List of Practical

(Minimum-10 practical):

Sr. No	Descriptions	Unit No	Hrs
1	Use Vernier calipers to measure the dimensions of a given object.	1	2
2	Use a micrometer screw gauge to measure diameter of a given wire and determine volume of a given metallic piece.	1	2
3	Use different types of thermometers to measure temperature of a hot bath and convert it into different scales .	1	2
4	Use Lee's method to measure the coefficient of thermal conductivity of a given bad conductor.	1	2

5	Use the resonator to determine unknown frequency of tuning fork.	2	2
6	To determine Melde's tuning fork frequency and to verify laws of vibrating strings.	2	2
7	Determine the refractive index of a given semi-circular glass block using TIR.	3	2
8	Determine refractive index of liquid by convex lens by liquid lens method.	3	2
9	To determine Young's modulus of a given wire.	4	2
10	Use capillary rise method and traveling microscope to determine the surface tension of a given liquid.	4	2
		Total	20

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

[1] Modern Physics by P. K. Chattopadhyay

[2] Principles of Physics by Jearl Walker, David Halliday, Robert Resnick

[3] Concept of Physics (volume I & II) by H.C. Verma

[4] A textbook of optics by Dr. N. Subramanyam

[5] Introduction to Fiber optics by Ajoy Ghatak & K. Thyagarajan

[6] Applied Physics for diploma by Dineshkumar Mehta

[7] Physics for Scientists and Engineers with Modern Physics by John W. Jewett & Raymond