DIPLOMA IN ENGINEERING/TEXTILE ENGINEERING

DETAILED SYLLABUS

PROBIDHAN-2022

Subject Code: 25912 **Subject Name: Physics-1** **T P C**

3 3 4

Rationale

Physics is the basic science for all engineering students as well as diploma engineering students. To develop a foundation in scientific principle and processes for the understanding and application of various technologies. It will help the students to study in technical subject of diploma engineering students and it is also a prerequisite of physics- 2. This subject will cover quantities, Motion, mass, weight, force, pressure, wave, sound, velocity of sound, work, power and energy, elasticity of matter, behavior of fluids, and gas.

Learning Outcome
(Theoretical)

After undergoing the subject, students will be able to:

➢ Describe Various types of quantities

➢ Enumerate Motion, mass, weight, force, pressure, wave, sound, velocity of sound, work, power and energy, elasticity of matter, behavior of fluids, and gas.

➢ Describe measurement of various quantities.

➢ Explain different techniques for improving the knowledge of matter.

Learning Outcome
(Practical)

After undergoing the subject, students will be able to:

- **Determine the diameter and area of the cross section of wire.**
- **Measure thickness of glass plate.**
- **Verify the law of parallelogram of forces**
- **Determine the value of "g'' and student will can draw L –T 2**

graph.

- **Calculate the Young's modulus of a steel wire.**
- **Determine the specific gravity of solid.**
- **Calculate the moment of inertia.**
- **Determine unknown frequency of tuning fork.**

Detailed Syllabus (Practical)

Unit Topics with Contents

Class
(1 Period) Final Marks

1
PHYSICAL WORLD AND MEASUREMENT

2 2

1.1 Mention the Scope and excitement of physics.
1.2 Describe relation between Physics and other knowledge of technological world.
1.3 Describe Principle of measurement.
1.4 Relate units of Fundamental and derived quantities.
1.5 Describe the errors of the measuring instrument.
1.6 Describe Slide calipers, Screw gauge and Spherometer.

2
VECTOR QUANTITIES 3 8

2.1 Describe vector and scalar quantities.
2.2 Prove the various representations of the vector quantities; and representation of a vector by unit vector.
2.3 Explain the resultant of two vectors in different directions.
2.4 Resolve a vector into horizontal and vertical component.

2.5 Explain the dot and cross product of two vectors.
2.6 Define laws of triangle and parallelogram of Vector.
2.7 Solve the problems related with vectors.

3
MOTION AND EQUATIONS OF MOTION

3 5

3.1 Define rest and motion.
3.2 Mention the Classification of motion.
3.3 Explain different motions.
3.4 Deduce equations of motion.
3.5 Explain the laws of falling bodies and mention the equation of motion of a body when it is projected vertically upwards or downwards.
3.6 Solve the problems related with Motion.

4
CIRCULAR MOTION

5 8

4.1 Define circular motion and projectile motion.
4.2 Deduce Equation of motion of a freely moving body thrown obliquely vertically upward or motion of a projectile.
4.3 Define angular velocity and linear velocity with their units.
4.4 Deduce the relation between angular velocity and linear velocity.
4.5 Define centripetal and centrifugal force with examples.

4.6
Prove that centrifugal force F =mv
2
r

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4.7 Define moment of inertia, torque and angular momentum.
4.8 Deduce the relation between moment of inertia, angular momentum and angular velocity.
4.9 Deduce the relation between torque and angular acceleration.
4.10 Explain the law of conservation of angular momentum.
4.11 Solve the problems related with Circular Motion.

5
FORCE AND FRICTION

3 8

5.1 Define force, constant force, Variable force, conservative and non-conservative force.
5.2 State Newton's law of motion and Prove that F=ma; from Newton's second law of motion.
5.3 Describe different units of force, unit correlation and dimension of force.
5.4 Derive the resultant of parallel forces.
5.5 State and prove the principles of conservation of momentum.
5.6 Describe friction.
5.7 Define the coefficient of static friction.
5.8 Prove that the coefficient of static friction is equal to the tangent of angle of repose.
5.9 Mention the merits and demerits of friction.
5.10 Solve the problems related with Force and Friction.

6
GRAVITY AND GRAVITATION

3 8

6.1 Explain Kepler's law.
6.2 Define gravity and gravitation.
6.3 Explain Newton's law of gravitation.
6.4 Find out the relation between acceleration due to gravity (g) and gravitational constant(G).
6.5 State acceleration due to gravity 'g' with units and dimension.
6.6 Discuss the variation of 'g' at different places.
6.7 Define mass and weight.
6.8 Mention the units and dimension of mass and weight.
6.9 Describe escape velocity.
6.10 Solve the problems related with Force and Friction.

7
SIMPLE HARMONIC MOTION

3 5

7.1 Describe periodic and simple harmonic motion (SHM).
7.2 Mention the characteristics of SHM.
7.3 Describe a simple pendulum.

7.4 Define effective length, amplitude, phase, complete oscillation, period of oscillation and frequency.
7.5 State the laws of simple pendulum.
7.6 Describe Motion of simple pendulum.
7.7 Deduce the differential equation of SHM.
7.8 Solve the problems related with SHM.

8
WORK, POWER AND ENERGY

5 8

8.1 Define work, power, and energy.
8.2 State the units and dimensions of work, power and energy.

8.3 Prove the principle of conservation of energy for freely falling body.
8.4 Explain potential energy (PE) and kinetic energy (KE).
8.5 Derive work energy theorem.
8.6 Deduce the equation of potential and kinetic energy.
8.7 Recognize that the useful work can be found from:

Efficiency= output work
input work × 100%
8.8 Solve the problems related with work, power and energy.

9
ELASTICITY

3 5

9.1 Define Elasticity and elastic limit.
9.2 Define perfectly elastic body and perfectly rigid body.
9.3 Explain stress and strain.
9.4 Explain the hook's law.
9.5 Describe various kinds of modulus of elasticity.
9.6 Define and explain Poisson's ratio.
9.7 Prove that the potential energy per unit volume is equal to 1
2
×stress×strain.

9.8 Solve the problems related with elasticity.

10
SURFACE TENSION AND VISCOSITY

3 5

10.1 Describe cohesive and adhesive force.
10.2 Discuss the molecular theory of surface tension.
10.3 Define surface tension, surface energy and angle of

contact.
10.4 Explain theory of capillarity.
10.5 Define viscosity and coefficient of viscosity.
10.6 Mention the necessity of viscosity.
Solve the problems related with surface tension and viscosity.

11
PRESSURE AND CHARACTERISTICS OF PRESSURE

2 3

11.1 Discuss density and pressure as force per unit area and state that it is measured in N m 2／or pascal.
11.2 Mention characteristics of liquid pressure.

11.3 Establish the pressure at a point in a fluid depend upon the density of the fluid, the depth in the fluid and acceleration due to gravity.
11.4 Solve the problems related to pressure.

12
WAVE

3 8

12.1 Explain wave and wave motion.
12.2 Mention some definition of relating waves.
12.3 Describe the principle of superposition.
12.4 Mention characteristics of progressive and stationary waves.
12.5 Derive the equation of progressive wave.
12.6 Define beats.
12.7 Describe the mathematical analysis of beats.
12.8 Solve the problems related to waves.

13
SOUND AND VELOCITY OF SOUND

4 6

13.1 Explain sound and production of sound.
13.2 Describe that sound can be produced of different frequencies and that the human ear has an audible frequency range covering approximately 20Hz to 20KHz.
13.3 State the approximately frequency for Infrasonic sound and Ultrasonic sound.
13.4 Describe the practical uses of echo sounding devices.
13.5 Explain resonance, free vibration and forced vibration.
13.6 Derive the equation for velocity of sound, v = fƛ .
13.7 Explain intensity and intensity level of sound.
13.8 Mention the effects of pressure, temperature, and humidity on the velocity of sound in air.
13.9 Solve the problems related with sound.

14
IDEAL GAS AND KINETIC THEORY OF GASES

3 8

14.1 Define Ideal gas.
14.2 Describe the laws of gas.
14.3 Define absolute zero temperature
14.4 Define STP or NTP.
14.5 Describe fundamental postulates of gas molecules.
14.6 Explain the kinetic theory of gas molecules.
14.7 Prove that the ideal gas equation is PV = nRT
14.8 Solve the problems related with the theory of gasses.

15
HUMIDITY

3 3

15.1 Explain Humidity, Absolute Humidity, Relative Humidity

and Dew point.

15.2 Derive relation between vapor pressure and air pressure.

15.3 Determine humidity by wet and dry Bulb
Hygrometer.

15.4 Explain few phenomena related to hygrometry.

15.5 Solve the problems related with humidity.

Total 48 90