BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207.

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM SYLLABUS (PROBIDHAN-2016)

CIVIL TECHNOLOGY

TECHNOLOGY CODE: 664

FIRST SEMESTER

DIPLOMA IN ENGINEERING PROBIDHAN-2016

Civil Technology 1st Semester

Sl. No	Subject Code	Name of the subject	T	P	C	Marks				
						Theory		Practical		Total
						Cont. asses s	Final exam	Cont. asses s	Final exam	
1	65912	Physics-I	3	3	4	60	90	25	25	200

65912	PHYSICS-I	T	P	C
		3	3	4

OBJECTIVES:

- To develop the students a background of basic science, i.e. Physics required for understanding technological subjects.
- To develop a working knowledge of common engineering and industrial materials and to enable to determine through experiments the properties of such materials.
- To develop through experiments an understanding of fundamental scientific concept.
- To develop a basic knowledge and the concept of physical properties of common engineering and industrial materials.

SHORT DESCRIPTION:

Measurement, Units; Vector and Scalar quantities; Motion and Equations of motion; Force and Newton's Laws of motion; Gravity and Gravitation; Simple Harmonic motion; Hydrostatics; Surface tension and viscosity; Pressure, Sound; wave and sound Concepts and nature of sound, Velocity of sound, Ultrasonic.

DETAIL DESCRIPTION:

Theory:

1. Understand Physical World and Measurement.

1.1. Nature of Physical World.
1.2. Scope and Excitement of Physics.
1.3. Few Terms about Physics.
1.4. Physics and other world of Technological Knowledge.
1.5. Principle of Measurement.
1.6. Fundamental and Derived Quantities and Units.
1.7. Dimensions of Units.
1.8. Errors in Measurement.

2. Understand scalar and vector quantities.

2.1. Define vector and scalar quantities with examples.
2.2. Show the various representations of the vector quantities; and representation of a vector by unit vector.
2.3. Find and explain the resultant of two vectors in different directions.
2.4. Resolve a vector into horizontal & vertical component.
2.5. Explain the dot and cross product of two vectors.
2.6. Define laws of triangle of vector.

3. Understand Motion and equations of motion

3.1. Define rest and motion
3.2. Classify and explain of motion.
3.3. Define and explain displacement, speed, velocity, acceleration and retardation.
3.4. Deduce the relationship between displacement, velocity, acceleration and retardation from these definitions.
3.5. Show motion of a projectile.
3.6. Equation of motion of a freely moving body thrown obliquely vertically upward or motion of a projectile.
3.7. Define angular velocity and linear velocity with their units.
3.8. Deduce the relation between angular velocity and linear velocity.
3.9. Define centripetal and centrifugal force with examples.
3.10 Prove that centrifugal force $= \frac{mv^2}{r}$
3.11 State and explain the laws of falling bodies and mention the equation of motion of a body when it is projected vertically upwards or downwards.

4. Understand Newton's laws of motion, force and friction.

4.1. Define force.
4.2. State Newton's laws of motion.
4.3. Define different units of force and their correlation and also mention the dimension of force.
4.4. Prove P=mf, from Newton's 2nd law of motion.
4.5. Find out the resultant of parallel forces.
4.6. Define inertia and momentum
4.7. State and prove the principles of conservation of momentum.
4.8. Define friction and describe the different kinds of friction.
4.9. Define the co-efficient of static friction.
4.10. Show that the co-efficient of static friction is equal to the tangent of the angle of repose
4.11. State the merits and demerits of friction.

5. Understand Gravity and gravitation.

5.1. Define and explain the Kepler's Law.
5.2. Define gravity and gravitation.
5.3. Define and determine the gravitational constant (G) and also mention its units and dimension.
5.4. Define acceleration due to gravity 'g' and also mention its units and dimension.
5.5. Discuss the variation of 'g' at different places.
5.6. Define mass and weight with their units and dimension.
5.7. Distinguish between mass and weight.
5.8. Define and explain gravitational potential and escape velocity

6. Understand Simple Harmonic Motion (SHM)

6.1. Define Periodic and simple harmonic motion (SHM).
6.2. State the characteristics of SHM.
6.3. Describe a simple pendulum and a second pendulum.
6.4. Define effective length, amplitude, phase, complete oscillation, period of oscillation, frequency.
6.5. State and explain the laws of simple pendulum.
6.6. Explain the motion of a simple pendulum and determine its time period.

7. Understand Work, Power and Energy.

7.1. Define work, power and energy.
7.2. State the units and dimensions of work, power and energy.
7.3. State and prove the principle of the conservation of energy.
7.4. Define potential energy (PE) and kinetic energy (KE).
7.5. Derive the equation of potential and kinetic energy.
7.6. Recognize that the useful work can be found from:

$$\text{Efficiency} = \frac{\text{output work}}{\text{input work}} \times 100.$$

8. Understand Elasticity.

8.1. Name some of the general and special properties of matter.
8.2. Define Elasticity and Elastic limit.
8.3. Define perfectly elastic body and perfectly rigid body.
8.4. Define stress and strain with their units and dimensions.
8.5. State and explain the Hook's law.
8.6. Describe various kinds of modulus of elasticity.
8.7. Mention the units and dimensions of modulus of elasticity.
8.8. Define and explain Poisson's ratio.

9. Understand Hydrostatics.

9.1. Define pressure as force per unit area and state that it is measured in N/m2 or Pascal.
9.2. State characteristics of liquid pressure.
9.3. 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.
9.4. State surface tension and surface energy, Angle of contact.
9.5. Define capillarity and theory of capillarity.

9.6. Explain viscosity and co-efficient of viscosity.
9.7. Mention the necessity of viscosity.

10. Understand Wave and sound.

10.1. Define wave and wave motion.
10.2. Differentiate transverse wave and longitudinal wave.
10.3. Define some terms relating waves.
10.4. Compare progressive wave and stationary waves.
10.5. Mention equation of progressive wave.
10.6. Define sound and production of sound.
10.7. Explain sound is a longitudinal traveling wave.
10.8. Interference of sound: Constructive and Destructive interference.
10.9. Define beats and Mechanism of formation of beats.

11. Understand Sound and velocity of sound.

11.1. Identify that sound is produced by vibration and travels through a medium as a longitudinal wave.
11.2. Recognize that sound can be produced of different pitches (frequencies) & that the human ear has an audible frequency range covering approximately 20 Hz to 20 KHz.
11.3. State the approximate frequency range for
11.4. Define Infrasonic sound and Ultrasonic (supersonic) sound.
11.5. Explain how sound is absorbed, reflected & refracted by different types of surface.
11.6. Describe the practical uses of echo sounding devices.
11.7. Define velocity of sound.
11.8. State the velocity of sound at NTP in still air.
11.9. Compare the effects of pressure, temperature & humidity on the velocity of sound in air.

PRACTICAL:

1. Determine accurate diameter/side of an object using vernier calipers.
2. Measure the area of cross section of a wire by micrometer screw gage.
3. Measure the thickness of a glass plate by speedometer.
4. Verify the law of the parallelogram of forces by a force board.
5. Draw L-T^2 graph and determine the value of "g" by using a simple pendulum.
6. Determine the coefficient of static friction.
7. Determine Young's modulus of a steel wire by Searle's apparatus.
8. Determine gravity of a solid heavier than and insoluble in water by hydrostatic balance.
9. Determine specific gravity of a liquid by specific gravity bottle.
10. Determine velocity of sound by resonance air column method.

REFERENCE BOOKS:

1. Higher Secondary Physics - First Part - Dr. Shahjahan Tapan
2. A Text Book of Properties of matter - N Subrahmanyam and Brij Lal
3. A Text Book of Sound - N Subrahmanyam and Brij Lal
4. Higher Secondary Physics- First Part - Prof. Golam Hossain Pramanik
5. Higher Secondary Physics- First Part - Ishak Nurfungnabi