

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017**

APPLIED SCIENCE — II (Physics)

[Time : 1½ hours

(Maximum marks : 50)

PART — A

(Maximum marks : 4)

Marks

- I Answer *all* questions in one or two sentences. Each question carries 2 marks.
- (a) State Bernoulli's theorem.
- (b) Write the symbol and truth table of NAND gate. (2×2=4)

PART — B

(Maximum marks : 16)

(Answer any *two* of the following questions. Each question carries 8 marks.)

- II (a) Distinguish between resultant and equilibrant. 4
- (b) List four applications of ultrasonic waves. 4
- III (a) Distinguish between spontaneous emission and stimulated emission. 4
- (b) A needle is placed at a distance 60 cm in front of a concave lens of focal length 20 cm. Find the position and nature of the image. What is the size of the image if the length of the needle is 4 cm ? 4
- IV (a) How will you convert a galvanometer into a voltmeter and ammeter ? 4
- (b) Calculate the work done in blowing a soap bubble of radius 3 cm, if surface tension of the soap solution is $25 \times 10^{-3} \text{N/m}$. 4

PART — C

(Maximum marks : 30)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

- V (a) State Lami's theorem. 3
- (b) Distinguish between streamline flow and turbulent flow. 3

- (c) A sphere of radius 3 mm and density 1600 kg/m^3 falls through a liquid of density 800 kg/m^3 with uniform velocity 5 cm/s. Calculate the coefficient of viscosity of the liquid. 3
- (d) Distinguish between transverse and longitudinal waves. Derive the relation connecting frequency, wavelength and velocity of a wave. 6

OR

- VI (a) Discuss the variation of viscosity of a liquid and gas with temperature. 3
- (b) Define surface tension. What is its unit and dimensional formula? 3
- (c) Ultrasonic waves of frequency $7 \times 10^4 \text{ Hz}$ are propagated through water with a velocity 1400 m/s. Calculate the wavelength of these waves in water. 3
- (d) Derive the equation for work done by a couple and hence deduce the equation for power. 6

UNIT — II

- VII (a) State the laws of refraction. Write relation connecting velocity of light and refractive index. 3
- (b) Write down the characteristics of laser light. 3
- (c) Determine the current that should flow through a circular coil of 20 turns and radius 31.4 cm to produce a magnetic field $4 \times 10^{-5} \text{ tesla}$ at its centre. 3
- (d) Explain the laws of photo electric effect. Derive Einstein's photo electric equation. 6

OR

- VIII (a) Explain population inversion. 3
- (b) The threshold wavelength for photoelectric effect in a metal is 600 nm. What is the maximum kinetic energy of the emitted electrons when it is irradiated with ultraviolet light of wavelength 200 nm? 3
- (c) Explain the principle of a simple microscope with the help of a diagram. 3
- (d) State and explain Kirchhoff's laws. Using these laws, derive the balancing condition of a Wheatstone's bridge. 6