

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2018

APPLIED SCIENCE - II (Physics)

[Time : 1½ hours

(Maximum marks : 50)

PART — A

(Maximum marks : 4)

Marks

Answer *all* questions in one or two sentences. Each question carries 2 marks.

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| 1 | (a) Write down the differential equation of a simple harmonic oscillator. | 2 |
| | (b) Write the truth table of AND gate. | 2 |

PART — B

(Maximum marks : 16)

(Answer any *two* full questions. Each question carries 8 marks.)

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| II | (a) State Bernoulli's principle and explain the working of an airfoil. | 4 |
| | (b) Define wavelength (λ) wave velocity (v) and frequency (f) of a wave. Derive the relation connecting wave velocity, wavelength and frequency of a wave. | 4 |
| III | (a) With the help of a diagram explain the principle and working of a simple microscope. | 4 |
| | (b) State Biot-Savart Law. Write down the expression for magnetic field intensity due to a current carrying circular coil at the axial point and deduce magnetic field at its center. | 4 |
| IV | (a) With the help of a neat diagram, explain the working of a Ruby laser. | 4 |
| | (b) When a metal is irradiated with a light of wave length 300 nm, the maximum kinetic energy of the liberated electron is 2×10^{-19} J. Calculate the work function of the metal. (Given : $h = 6.626 \times 10^{-34}$ Js, $c = 3 \times 10^8$ m s ⁻¹) | 4 |

PART — C

Marks

(Maximum marks : 30)

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

UNIT — I

- V (a) Explain the term couple and write the equation for moment of couple. 3
- (b) Explain the different energies associated with a flowing liquid and write expression for them. 3
- (c) Find out the excess pressure inside a drop of radius 2mm. Surface tension of water is 7.3×10^{-2} N/m. 3
- (d) State parallelogram law of forces. Derive an expression for the magnitude and direction of the resultant of two forces using parallelogram law of forces. 6

OR

- VI (a) Describe Poiseuille's method to determine coefficient of viscosity of water. 3
- (b) Explain the term angle of contact. How does it depend on the capillary height ? 3
- (c) Find out the wavelength of ultrasonic wave of frequency 60kHz in air if it is propagated through air with velocity 300m/s. 3
- (d) Describe the motion of a small sphere through a viscous fluid and deduce the expression for coefficient of viscosity of a highly viscous liquid. 6

UNIT — II

- VII (a) State the laws of refraction. Write a relation connecting refractive index and velocity of light. 3
- (b) How will you convert a galvanometer into an ammeter ? 3
- (c) Draw the symbol and write the truth table of OR gate. 3
- (d) Explain the lens maker's formula for double convex lens. An object of length 2 cm is placed in front of convex lens at a distance 40 cm. The image is formed on the other side on screen at a distance 60 cm. Find the focal length of the lens and size of the image. 6

OR

- VIII (a) A straight conductor 3 cm long carrying a current 6 amp is placed at 60° to a magnetic field of intensity 1.5 Tesla. Calculate the force on the conductor. 3
- (b) Why population inversion is important in Laser ? How population inversion is achieved in Laser ? 3
- (c) Explain quantum theory of light and write Einstein's photoelectric equation. 3
- (d) Explain the construction and working of a moving coil galvanometer. 6