Diploma in Civil Engineering / Diploma in Electrical & Mechanical Engineering

Term-End Examination

June, 2011

03241

BET-012 : PHYSICS

e : 2 hours   *Maximum Marks : 70*

e :   *Question no. 1 is **compulsory**. Attempt **any four** questions from the Question no. 2 to 8. Use of calculator is permitted.*

(a) The surface tension is due to :   **7x2=14**
   (i) adhesive forces
   (ii) cohesive forces
   (iii) electrostatic forces
   (iv) frictional forces

(b) Hooke's law defines :
   (i) stress
   (ii) strain
   (iii) modulus of elasticity
   (iv) elastic limit

(c) Average kinetic energy of the molecules of an ideal gas depends upon :
   (i) the nature of gas
   (ii) the absolute temperature
   (iii) the volume
   (iv) none of these.

(d) Quality of musical sound depends upon :
  (i) pitch
  (ii) loudness
  (iii) amplitudes
  (iv) number of harmonics

(e) Power of a lens is measured in :
  (i) metres
  (ii) cm
  (iii) kilometres
  (iv) diopters

(f) Four resistances of same values are connected in parallel. The total resistance of the combination will be :
  (i) four times the resistance
  (ii) one fourth of the resistance
  (iii) half of the resistance
  (iv) twice of the resistance

(g) The relative permeability can be expressed as :
  (i) $\mu_r = 1 + \mu_a$
  (ii) $\mu_r = 1 + x_m$

  (iii) $\mu_r = \dfrac{x_m}{\mu_0}$

  (iv) $\mu_r = \mu_0 + \mu_a$

2. (a) State and explain Archimedes' principle.
  (b) Derive the equation of continuity for flow of liquid.

(c) A 4m long copper wire of cross sectional area 1.2 cm^2 is stretched by a force of 4.8×10^3 N. If the Young's modulus for copper is 1.2×10^{11} Nm^{-2} calculate : **6**

    (i) the stress,

    (ii) the strain, and

    (iii) increase in the length of the wire

3. (a) Explain the three modes of heat transfer. **5**

    (b) State the basic assumption of kinetic theory of gas and derive the expression for its pressure. **5**

    (c) Calculate the average kinetic energy of an air molecule at a temperature of 300 K. $(K_B = 1.38 \times 10^{-23} JK^{-1})$ **4**

4. (a) Explain the factors affecting the speed of sound in a gaseous medium. **5**

    (b) Explain the difference between a longitudinal wave and transverse wave. **5**

    (c) Velocity of sound in air is 330 ms^{-1}. Calculate the frequency of sound of wavelength 16.5 m. **4**

5. (a) Derive the formulae $n = \dfrac{\sin\left(\dfrac{A+\delta m}{2}\right)}{\sin\left(\dfrac{A}{2}\right)}$ **5**

For prism where δm angle of minimum deviation, A angle of the prism, n is the refractive index.

(b)   Describe Compound Microscope by   5
      drawing ray diagram.

(c)   Calculate the critical angle for a glass water   4
      interface if the refractive indices of glass and
      water are 3/2 and 4/3 respectively.

(a)   Define and explain electrical potential.   4

(b)   Explain the principle of wheatstone Bridge.   4

(c)   An electric bulb of 40 W works at 220 volts.   6
      Calculate its resistance and current carrying
      capacity.

(a)   What are the characteristics of   6
      paramagnetic, diamagnetic and
      ferromagnetic substances ?

(b)   Describe the working of a cyclotron.   4

(c)   5A current is flowing in a circular loop of   4
      diameter 0.5 m. Calculate the magnetic field
      due to this coil at a distance of 0.15 m along
      the axis of the loop from its centre

$$\left(\frac{\mu_0}{4\pi} = 10^{-7} \ T \, mA^{-1} \right)$$

8. Write short notes on any four of the following :
   (a) Surface Tension $4 \times 3\frac{1}{2} =$
   (b) Stefan's law
   (c) Simple Microscope
   (d) Coulomb's law
   (e) Ohm's law
   (f) Biot- Savart's law

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