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BET-012

DIPLOMA IN CIVIL ENGINEERING (DCLE(G)) / DIPLOMA IN MECHANICAL ENGINEERING (DME) / DCLEVI / DMEVI / DELVI / DECVI / DCSVI / ACCLEVI / ACMEVI / ACELVI / ACECVI / ACCSVI

00187

Term-End Examination

December, 2017

BET-012 : PHYSICS

Time : 2 hours *Maximum Marks : 70*

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

1. Choose the correct alternative. *7×2=14*

   (a) The ratio of lateral strain to longitudinal strain is

   (i) Modulus of rigidity

   (ii) Young's modulus

   (iii) Bulk modulus

   (iv) Poisson's ratio

(b) The average kinetic energy of translation of a molecule of gas varies with temperature T of the gas, as

(i) $\propto T$

(ii) $\propto T^{-1}$

(iii) $\propto T^{0}$

(iv) $\propto T^{2}$

(c) Laplace's formula for the speed of sound is

(i) $v = \sqrt{\frac{yP}{\rho}}$

(ii) $v = \sqrt{\frac{P}{\rho y}}$

(iii) $v = \sqrt{\frac{\rho P}{y}}$

(iv) $v = \sqrt{\frac{\rho y}{P}}$

(d) Large apertures of telescope are used for

(i) Greater magnification

(ii) Large light gathering power

(iii) Reducing lens aberration

(iv) Ease of manufacture

(e) Relative permeability can be expressed as

(i) $\mu_r = 1 + \mu_a$

(ii) $\mu_r = 1 + \chi_m$

(iii) $\mu_r = \frac{\chi}{\mu_0}$

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

(f) The quantities B, H and I are related as

(i) $B = \mu_0 (H + I\chi)$

(ii) $B = \mu_0 (H + I)$

(iii) $B = \mu_0 H + I$

(iv) $B = \mu_0 I + \chi H$

(g) The relation between current (I) and drift velocity is

(i) $I = nAeV_d$

(ii) $I = n/V_d$

(iii) $I = \frac{nA}{eV_d}$

(iv) $I = \frac{ne}{AV_d}$

2. (a) State and prove Bernoulli's equation. 5

(b) Describe the stress – strain curve for a loaded steel wire and explain the terms Elastic limit, Yield point and Breaking point. 5

(c) Calculate the value of atmospheric pressure in Nm^{-2} at a point where the height of mercury column is 76 cm. (Density of mercury = 13,600 kg m^{-3}, g = 9·8 ms^{-2}) 4

3. (a) State the Zeroth Law of Thermodynamics. How does it lead to the concept of temperature ? 5

(b) Explain (i) Charles' law, and (ii) Avogadro's law. 5

(c) At what temperature is the numerical value same on both, the Celsius and Fahrenheit scales ? 4

4. (a) What are Longitudinal Waves ? Give examples. 5

(b) Discuss the effect of temperature, pressure and humidity on the speed of sound in a gaseous medium. 5

(c) Velocity of sound in air is 330 ms^{-1}. Calculate the frequency of sound of wavelength 16·5 m. 4

5. (a) Establish a relation between refractive index, angle of minimum deviation and angle of prism, for a prism. 5

(b) Discuss the working of a compound microscope. 5

(c) Draw the ray diagram to locate the position of the image formed by a concave mirror, when the object is placed at

(i) the focus, and

(ii) a point between the focus and the pole. 4

6. (a) Describe the working of a Wheatstone bridge. 5

(b) Describe the construction and working of a voltaic cell. 5

(c) Calculate the force of repulsion between two insulated charged copper spheres P and Q, each having a charge of 5×10^{-7} C, and separated by a distance of 50 cm. 4

($\varepsilon_0 = 8{\cdot}854 \times 10^{-12}\ C^2\ N^{-1}\ m^{-2}$)

7. (a) Distinguish between Ferromagnetic and Diamagnetic substances. 5

(b) What is a Galvanometer ? How can a galvanometer be converted into an ammeter and voltmeter ? 5

(c) The radius of a cyclotron's dee is 50 cm and the frequency is 15 MHz. Calculate the magnetic field required for accelerating protons. ($e = 1{\cdot}6 \times 10^{-19}$ C, $m = 1{\cdot}67 \times 10^{-27}$ kg) 4

8. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Archimedes' Principle

(b) Equation of Continuity

(c) Intensity of Sound

(d) Kirchhoff's Law for Blackbody

(e) Biot-Savart's Law

(f) Mirage