No. of Printed Pages : 7

BET-012

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

Term-End Examination

June, 2015

00230

BET-012 : PHYSICS

Time : 2 hours *Maximum Marks : 70*

Note : *Question no. 1 is* ***compulsory****. Attempt any* ***four*** *questions from the remaining. Use of scientific calculator is permitted.*

1. Choose the correct answer :

(a) For steady flow, the velocity of flow *2*

(i) changes with time

(ii) remains constant with time

(iii) changes with space coordinate

(iv) remains constant with space coordinate

(b) Centre of buoyancy is 2

(i) same as the centre of gravity of body

(ii) the centre of volume of liquid displaced by body

(iii) same as metacentre

(iv) same as centre of pressure

(c) Fourier's law of heat conduction is given as, where Q is the amount of heat flow ΔT = change in temperature : 2

(i) $\frac{Q}{\Delta t} = -kA\frac{\Delta T}{\Delta x}$

(ii) $\frac{Q}{\Delta t} = \frac{k}{A}\frac{\partial x}{\partial T}$

(iii) $\frac{Q}{\partial A} = -k\Delta t\frac{\partial x}{\partial T}$

(iv) $\frac{Qk}{\Delta t} = \frac{A\Delta T}{\Delta x}$

(d) The net potential energy for three point charges q_1, q_2 and q_3 is given as 2

(i) $\frac{1}{4\pi\varepsilon_o} \frac{q_1 q_2 q_3}{r_{12}}$

(ii) $\frac{1}{4\pi\varepsilon_o} \frac{q_2 q_3 q_1}{r_{23}}$

(iii) $\frac{1}{4\pi\varepsilon_o} \frac{q_1 q_2}{r_{12}} + \frac{1}{4\pi\varepsilon_o} \frac{q_2 q_3}{r_{23}} + \frac{1}{4\pi\varepsilon_o} \frac{q_1 q_3}{r_{13}}$

(iv) $\frac{1}{4\pi\varepsilon_o} \left(\frac{q_1 q_2 + q_2 q_3}{r_{12}\, r_{23}\, r_{13}} \right)$

(e) At a distance of 60 m from a jet airliner engaged in take-off, the intensity of sound is 1 W/m^2. What is the intensity at a distance of 180 m in the same direction ? 2

(i) 0·22 W/m^2

(ii) 0·44 W/m^2

(iii) 0·30 W/m^2

(iv) 0·11 W/m^2

(f) The magnetic field due to current carrying wire, carrying a current I at a distance r is given as 2

(i) $B = \frac{\mu_0 I}{2\pi r}$

(ii) $B = \frac{\mu_0 I^2}{2\pi r}$

(iii) $B = \frac{\mu_0 I^2}{2\pi r^2}$

(iv) $B = \frac{\mu_0 \sqrt{I}}{2\pi r}$

(g) In a simple harmonic motion, the acceleration is given by 2

(i) $a = \omega^2 \sqrt{x}$

(ii) $a = -\omega x^2$

(iii) $a = -\omega^2 x$

(iv) $a = \omega^2 x$

2. (a) How many ice cubes (at 0°C) must be added to a bowl containing a litre of boiling water at 100°C, so that the resulting mixture reaches a temperature of 40°C ? Assume that each ice cube has a mass of 20 g and that the bowl and the environment do not exchange heat with the water. 7

(b) Define the various kinds of specific heat of a gas. Also prove the relationship $C_p = C_v + R$, where C_p and C_v are the specific heat at constant pressure and volume respectively and R is the universal gas constant. 7

3. (a) Explain Transverse and Longitudinal wave motion with suitable examples. 6

(b) Briefly explain the periodic waves. 4

(c) An ocean wave has a wavelength of 120 m and a period of 8·77 s. Calculate the frequency and speed of this wave. 4

4. (a) An object of size 3·0 cm is placed at a distance of 14 cm in front of a concave lens of focal length 28 cm. Calculate the distance of the image formed. What type of image will it be ? 7

(b) What is a 'Mirage' and why does it occur ? Explain in detail with the help of a neat diagram. 7

5. (a) Derive the equation of continuity in Cartesian coordinates. 7

(b) When a solid rubber ball is taken from the surface to the bottom of a lake, its volume decreases by 0·0012%. The depth of the lake is 360 m, density of lake water is 10^3 kg/m^3. Calculate the bulk modulus of rubber. Take g = 10 m/s^2. 7

6. (a) Discuss in detail the Faraday's laws of electrolysis and applications of electrolysis. 7

(b) Calculate the current flowing through each resistor in the circuit shown in Figure 1. 7

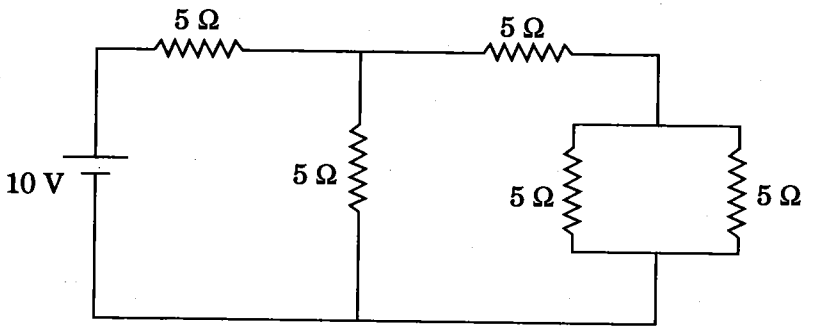

Figure 1

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

(a) Venturimeter

(b) Luminous Intensity

(c) Meter Bridge

(d) Biot-Savart Law

(e) Specific Heat Capacity

(f) Cyclotron