# Diploma in Civil Engineering (DCLE(G)/ Diploma in Mechanical Engineering (DME)

## DCLEVI/DMEVI/DELVI/DECVI/DCSVI/ ACCLEVI/ACMEVI/ACELVI/ACECVI/ACCSVI

### Term-End Examination    04573
### December, 2012

### ET-012 : PHYSICS

*Time : 2 hours*                           *Maximum Marks : 70*

*Note : Question No. 1 is **compulsory**. Attempt **any four** questions from question **No. 2** to question **No.7**. Use of calculator is **permitted**.*

1.   Choose the correct alternative.          **14x1=14**

(a)   The unit of pressure is :

   (i)   $Nm^{-1}$            (ii)   $Nm$

   (iii)   $Nm^2$            (iv)   $Nm^{-2}$

(b)   Hydraulic brakes operates on :

   (i)   Pascal's Law

   (ii)   Archimedes' principle

   (iii)   Bernoulli's equation

   (iv)   None of these

(c)   The flow of fluid is said to be laminar when the value of Reynold number K is :

   (i)   less than 2000

   (ii)   between 2000 and 3000

   (iii)   above 3000

   (iv)   for all of them

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(d) The thermal conductivity of copper is :

   (i)   0.6 $wm^{-1}k^{-1}$

   (ii)  0.02 $wm^{-1}k^{-1}$

   (iii) 400 $wm^{-1}k^{-1}$

   (iv)  none of these

(e) According to Stefan-Boltzmann law, the amount of heat energy radiated per second by unit area of a perfectly black body is directly proportional to the :

   (i)   absolute temperature of the body

   (ii)  square of absolute temperature of the body

   (iii) fourth power of the absolute temperature of the body

   (iv)  none of them

(f) Intensity of sound determines its :

   (i)   loudness          (ii)  quality

   (iii) pitch             (iv)  none of these

(g) When an object is kept beyond centre of curvature (C) of a concave mirror, the image is formed :

   (i)   at C

   (ii)  between focus and C

   (iii) at focus

   (iv)  none of these

(h) The magnification produced by the combination of lenses is given by :

(i) $m = m_1 + m_2 + m_3 + \ldots$

(ii) $m = m_1 \times m_2 \times m_3 \times \ldots$

(iii) $m = m_1 - m_2 + m_3 - \ldots$

(iv) $m = \dfrac{m_1}{m_2} + \dfrac{m_2}{m_3} + \ldots$

(i) The luminous flux is measured in :

(i) steradian     (ii) candela

(iii) lumen     (iv) lux

(j) Faraday's constant is equal to :

(i) $96500 \ C \ mol^{-1}$

(ii) $9650 \ C \ mol^{-1}$

(iii) $1/96500 \ C \ mol^{-1}$

(iv) $1/9650 \ C \ mol^{-1}$

(k) An example of secondary cell is :

(i) Lead-acid accumulator

(ii) Voltaic cell

(iii) Leclanche cell

(iv) Daniel cell

(l) A galvanometer G, can be converted into an ammeter by joining :

(i) a high resistance in series with G

(ii) a high resistance in parallel with G

(iii) a low resistance in series with G

(iv) a low resistance in parallel with G

(m) The SI unit of magnetic flux is :

(i) $Wb \, m^{-2}$     (ii) $Wb$

(iii) $Am^{-1}$     (iv) no unit

(n) The relative permeability of a diamagnetic substance is :

(i) slightly greater than one

(ii) slightly less than one

(iii) extremely large

(iv) none of these

2. (a) Differentiate between streamline motion and turbulent motion of a fluid.     4+4+6

(b) Define the term stress and strain. Draw a stress-strain curve for a steel wire.

(c) State Archimede's principle. A solid floats with one fourth of its volume above the surface of water. Calculate the density of the solid.

3. (a) State Kirchhoff's Law of black body radiation. Write its mathematical formula.

(b) Derive an expression for the pressure exerted by the gas molecules on the walls of the container.     4+6+4

(c) A mass of 5 kg falls through a height of 40 m and rotate a paddle wheel which churns 0.5 kg of water. The initial temperature of water is 1.5°C. Calculate the increase in the temperature. (Given $1J = 4.2 \times 10^7 erg. \, cal^{-1}$).

4. (a) Define intensity of sound. How it is related with amplitude of the wave ? **4+6+4**

 (b) What are the three factors affecting speed of sound in a gaseous medium ? Discuss them.

 (c) An air column disturbed by a tuning fork of frequency 256 Hz, gives resonance at column lengths 33.4 cm and 101.8 cm. Determine the speed of sound in air.

5. (a) State the laws of refraction. **4+6+4**

 (b) What is a compound microscope ? Explain its construction and working with a neat labelled diagram.

 (c) An object is at a distance of 6 m from a convex mirror of focal length 12 cm. Where is the image formed ?

6. (a) State Faraday's laws of electrolysis. **4+6+4**

 (b) Define drift velocity of electrons. Show that the current in a conductor is proportional to the drift velocity of free electrons.

 (c) Two charged spheres having charges $4 \times 10^{-7}C$ and $6 \times 10^{-7}C$ are placed 60 cm apart in air. Calculate the electric force between them.

7. Write short notes on **any four** of the following :

    (a) Cyclotron $4\times3\frac{1}{2}=14$

    (b) Ferromagnetic substances

    (c) Potentio meter

    (d) Voltmeter

    (e) Voltaic cell

    (f) Mirage

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