

WEEKLY TEST – 2080/08/17

XII (SCIENCE)

Subject: Physics

F. M.: 40

P. M.: 20

Time: 1.30 hrs.

Set : 'B'

Attempt all the Questions

Group-A

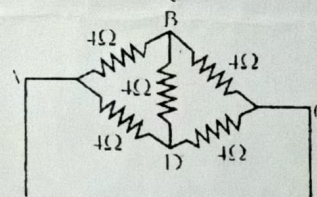
[7×1=7]

1. A couple is acting on a body under the action of two forces \vec{F}_1 and \vec{F}_2 . Which of the following statement is not true for the pairs of \vec{F}_1 and \vec{F}_2 ? [a] they have same magnitude [b] they are in opposite direction [c] they are acting with different lines of action [d] they are in same direction.
2. Which of the following statement is true for a real gas? (a) they obey gas laws at all temperature and pressure (b) intermolecular force is negligible (c) they obey gas laws at low temperature and high pressure (d) they obey gas laws at low pressure and high temperature.
3. If a current of 0.8A passes through a bulb connected across a battery of 5V for 30 s, then the energy transferred to the bulb is (a) 30 J (b) 60 J (c) 120 J (d) 20 J
4. Two sound waves are respectively represented by, $y = a \sin (\omega t - kx)$ and $y = b \cos (\omega t - kx)$. The phase difference between the two waves is (a) $\pi/2$ (b) $\pi/4$ (c) π (d) $3\pi/4$
5. The velocity of the electron in the first Bohr orbit as compared to that of light is about (a) 1/300 (b) 1/500 (c) 1/137 (d) 1/187
6. The longest wavelength of the Lyman series for hydrogen atom is the same as the wavelength of a certain line in the spectrum of He⁺ when the electron makes a transition from $n = 2$. The value of n is (a) 3 (b) 4 (c) 5 (d) 6
7. If L represents momentum, I represents moment of inertia, then $\frac{L^2}{2I}$ represents. a) Rotational kinetic energy b) Torque
c) Power d) Potential energy

Group-B

[5×5=25]

8. a) Establish the relation between the moment of inertia of a rigid body with its rotational kinetic energy? [2]
b) A constant torque of 200 Nm turns a wheel about its center. The moment of inertia about it is 100 kgm². Find the
(i) angular acceleration of the wheel (ii) angular displacement of the wheel in 20 revolutions (iii) kinetic energy gained at 20 revolutions when it starts from rest. [1+1+1]
9. a) Draw a Wheatstone Bridge circuit. [1]
b) In the given circuit- (i) calculate the equivalent resistance between two points A and C.
(ii) which point B or D is at higher potential? (iii) in which direction, the current will flow, from B to D or D to B? [2+1+1]
10. a) What do you mean by progressive wave? [1]
b) Derive the progressive wave equation in terms of the wave vector and its displacement. [3]
c) A transverse wave of amplitude 0.5m, wavelength 1m and velocity 2 m/s is propagating in a string along positive x-direction. Write down the equation for the wave. [1]
11. a) What is meant by angular simple harmonic motion? [1]
b) Show that motion of a simple pendulum is simple harmonic and hence calculate its time period. [3]
c) A pendulum clock is in an elevator that descends at constant velocity. Does it keep correct time? [1]
12. (a) Derive the state equation for adiabatic process. [3]
(b) A certain volume of dry air at NTP is allowed to expand five times of its original volume under adiabatic condition. Calculate the final pressure. [2]



Group-C

[8×1=8]

13. a) Write down the dimensional formula of Planck's constant. [1]
b) Discuss the Millikan's experiment to determine the value of Planck's constant. [3]
c) In the given graph, kinetic energy of an electron is plotted on Y- axis (eV) and frequency of incident photon on X - axis (Hz). Answer the following questions on the basis of given graph: (i) What is work function of the given metal? (ii) Find the value of h from graph. (iii) Calculate the value of stopping potential of given metal at frequency 30×10^{14} Hz. [1+2+1]

