

WEEKLY TEST – 2080/05/31

XII (SCIENCE)

Subject: Physics

F. M.: 40

P. M.: 20

Time: 1.30 hrs.

Set : 'A'

Attempt all the Questions

Group-A

[7x1=7]

- Which of the following is longitudinal wave (a) Light wave (b) Radio wave (c) Sound wave in air (d) Micro wave
- The distance between two particle in a wave motion vibrating out of the phase is (a) $\frac{\lambda}{4}$ (b) $\frac{\lambda}{2}$ (c) $\frac{3\lambda}{4}$ (d) λ
- In photoelectric effect if the intensity of light is doubled then maximum kinetic energy of photoelectrons will become (a) double (b) half (c) four times (d) no change
- Planck's constant has the dimension of (a) energy (b) mass (c) frequency (d) angular momentum
- The internal energy of an ideal gas depends on its (a) A pressure (b) Volume (c) Temperature (d) All of above
- If torque acting on a system is zero, then quantity that conserved is (a) force (b) linear momentum (c) Angular momentum (d) Angular impulse
- If specific resistance of a potentiometer wire is $10^{-7} \Omega\text{m}$, current flowing through it is 0.1A and cross sectional area of wire is 10^{-6}m^2 , then potential gradient will be, (a) 10^{-2}V/m (b) 10^{-4}V/m (c) 10^{-6}V/m (d) 10^{-8}V/m

Group-B

[5x5=25]

- (a) Define couple.
(b) Derive an expression for the work done by a couple.
(c) A fly wheel of moment of inertia 0.32kgm^2 is rotated steadily at 120 rad/s by a 50W electric motor. Find the kinetic energy of the flywheel.

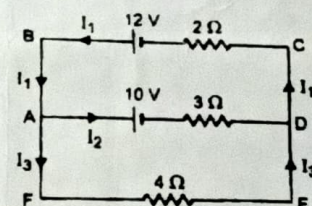
[1]

[3]

[2]

- Using Kirchhoff's law, find I_1, I_2, I_3 and V_{FE} in the given figure.

[1+1+1+2]



- The displacement equation for a transverse plane wave at any instant is,

$y(x, t) = 0.03 \sin(3\pi t - 0.03\pi x)$, where x and t are in meters and seconds. Calculate

- wavelength, frequency and velocity of the wave.
- The phase difference between two particles 0.05m apart at same instant.
- The equation of a wave with double the amplitude & half the frequency but travelling exactly in opposite direction.

[1+1+1]

[1]

[1]

- (a) What is photoelectric effect?

(b) Derive Einstein's photo electric equation.

(c) Define threshold frequency.

[1]

[3]

[1]

- Photorefractive keratectomy (PRK) is a laser-based surgical procedure that corrects near and far sightedness by removing part on the lens of the eye to change its curvature and hence focal length. This procedure can remove layers $0.25 \mu\text{m}$ thick using pulses lasting 12 ns from a laser beam of wavelength 192 nm.

i) In what part of the electromagnetic spectrum does this light lie?

ii) What is the energy of a single photon?

iii) If a 1.5 mW beam is used, how many photons are delivered to the lens of the eye in each pulse?

[1+2+2]

Group-C

[8x1=8]

- (a) What is the principle of a potentiometer?

(b) Explain with necessary theory how you would determine the internal resistance of a cell using this principle.

(c) The total length of the wire of a potentiometer is 10m. A potential gradient of 0.0015V/cm is obtained when a steady current is passed through this wire. Calculate, (i) the distance of null point on connecting standard cell of 1.018V. (ii) the unknown p.d. if the null point is obtained at a distance of 940 cm, and (iii) the maximum p.d. which can be measured by this instrument.

[2+1+1]