

# WEEKLY TEST - 2080/09/15

XII (SCIENCE)

Set : 'B'

Subject: Physics

F. M.: 40

P. M.: 20

Time: 1.30 hrs.

Attempt all the Questions

## Group-A

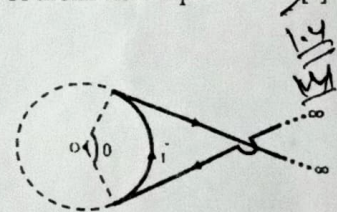
[7x1=7]

- A particle is executing SHM with period 'T'. Time taken in completing  $\frac{3}{8}$  oscillation from mean position is (a)  $\frac{3}{8}T$  (b)  $\frac{5}{8}T$  (c)  $\frac{5}{12}T$  (d)  $\frac{7}{12}T$
- An ideal gas at  $27^\circ\text{C}$  is compressed adiabatically to  $\frac{8}{27}$  of its original volume. If  $\gamma = \frac{5}{3}$ , then the rise in temperature is (a) 450 K (b) 375 K (c) 225 K (d) 405 K
- The velocity of sound generally greater in solid than gas because (a) The density of solid is high but elasticity is low. (b) The density as well as elasticity is very high. (c) The density and elasticity of solids are low. (d) The density of solid is low but elasticity is high.
- The magnetic field outside the infinite solenoid is: (a) Zero (b)  $\mu_0 n I$  (c)  $\mu_0 \frac{nI}{2}$  (d) Infinite
- For constructive interference to take place between two monochromatic light waves of wavelength  $\lambda$ , the path difference should be (a)  $(2n-1)(\lambda/4)$  (b)  $(2n-1)(\lambda/2)$  (c)  $n\lambda$  (d)  $(2n+1)(\lambda/2)$
- The ratio of energies of the hydrogen atom in its to second excited state is (a)  $\frac{1}{4}$  (b)  $\frac{4}{9}$  (c)  $\frac{9}{4}$  (d) 4
- Which series of hydrogen atom lies in visible region? (a) Lyman (b) Balmer (c) Humphreys (c) P-fund.

## Group-B

[5x5=25]

- (a) Define simple harmonic motion. [1]  
(b) A particle of mass 'm' is execution simple harmonic motion with amplitude A and angular frequency  $\omega$ . Derive the relation for its (a) P.E. (b) K.E. [2+2]
- (a) Discuss the effect of pressure, temperature and density of medium on the velocity of sound. [1+1+1]  
(b) Calculate the velocity of sound in air at  $27^\circ\text{C}$ . (density of air at STP =  $1.293\text{kg/m}^3$ , ratio of molar heat capacities = 1.4) [2]
- (a) Describe the construction of petrol engine. [2]  
(b) Describe the working of petrol engine with the help of indicator diagram. [3]
- A wire carrying current I has the configuration as shown in figure. Two semi-infinite straight sections, each tangent to the same circle of radius 'r', are connected by a circular arc of angle  $\theta$  along the circumference of the circle, with all sections lying in the same plane.  
(a) Write down the relation for magnetic field intensities due to two semi-infinite straight sections and circular section.  
(b) What must  $\theta$  be in order for  $\vec{B}$  to be zero at the center O of the circle?
- (a) Describe Coolidge tube for the production of X-rays.  
(b) How do you control (i) the intensity (ii) the penetrating power of the emitted X-rays?



## Group-C

[8x1=8]

- (a) State Biot-Savart's Law. [1]  
(b) Derive an expression for the magnetic field intensity along the axis of current carrying circular coil. [3]  
(c) Sketch the graph for the variation of magnetic field intensity derived in (b). [1]  
(d) A circular coil has 100 turns and a mean diameter of 20 cm. it carries a current of 5 A. Find the strength of the magnetic field at a point on its axis at a distance of 15 cm from the centre of the coil. [3]

Good Luck

10<sup>-5</sup>

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