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Answer Sheet No. \_\_\_\_\_

Sig. of Candidate. \_\_\_\_\_

Sig. of Invigilator. \_\_\_\_\_

## PHYSICS HSSC-I

### SECTION – A (Marks 17)

Time allowed: 25 Minutes

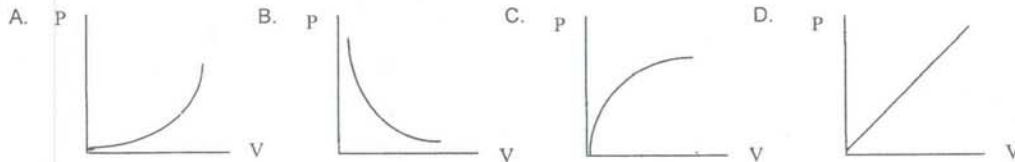
NOTE:- Section-A is compulsory and comprises pages 1-2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

- (i) What is the number of significant figures in a measurement recorded as  $8.70 \times 10^4$  kg?  
A. 1                      B. 3                      C. 4                      D. 7
- (ii) The only natural satellite of the planet Earth revolves with orbital speed of 1.01 km/sec at a distance of 384,000 km from the Earth's surface. What is its period of one revolution?  
A. 30.0 days              B. 29.4 days              C. 27.5 days              D. 31.5 days
- (iii) At what angle, the two vectors of the same magnitude have to be oriented, if they were to be combined to give a resultant equal to a vector of the same magnitude?  
A.  $60^\circ$                       B.  $72^\circ$                       C.  $120^\circ$                       D.  $36^\circ$
- (iv) Which of the following is a Non-Conservative force?  
A. Electric              B. Magnetic              C. Frictional              D. Gravitational
- (v) A 100 gm golf ball is moving to the right with a velocity of 20m/sec and collides elastically with a 8.0 kg steel ball, initially at rest. The velocity of steel ball after collision will be \_\_\_\_\_  
A. 19.5 m/sec              B. 0.5 m/sec              C. 2.5 m/sec              D. 13.5 m/sec
- (vi) The apparent weight of a man of mass 50 kg in a lift moving upward with an acceleration of  $9.8 \text{ m/sec}^2$  will be \_\_\_\_\_  
A. 980 N                      B. 580 N                      C. 490 N                      D. Zero
- (vii) The terminal velocity of a water drop of radius 0.010 cm descending through air from a high building is \_\_\_\_\_  
(Co-efficient of viscosity " $\eta$ " for air =  $19 \times 10^{-6} \text{ kg m}^{-1} \text{ sec}^{-1}$  and density of water =  $1000 \text{ kg/m}^3$ )  
A. 10.1 m/sec              B. 100.1 m/sec              C. 1.1 m/sec              D. 13.75 m/sec
- (viii) The unit torr is opted instead of SI unit of pressure. One torr is equal to \_\_\_\_\_  
A.  $9.8 \text{ Nm}^{-2}$               B.  $133.3 \text{ Nm}^{-2}$               C.  $273.3 \text{ Nm}^{-2}$               D.  $1.0 \text{ Nm}^{-2}$
- (ix) Keeping the length constant and doubling the mass of the bob, the time period of a simple pendulum will \_\_\_\_\_  
A. Be double                      B. Become four times  
C. Remain constant              D. None of these
- (x) Length of a simple pendulum having a time period of 1.0 second will be \_\_\_\_\_ (value of  $g = 9.8 \text{ ms}^{-2}$ )  
A. 9.8 m                      B. 0.50 m                      C. 0.75 m                      D. 0.25 m
- (xi) The speed of sound is independent of \_\_\_\_\_  
A. Medium                      B. Source of sound              C. Pressure                      D. Temperature
- (xii) Grating element of a grating plate containing 2000 lines/cm will be \_\_\_\_\_  
A. 0.001 mm              B. 0.003 mm              C. 0.005 mm              D. 0.025 mm
- (xiii) The fundamental frequency of vibration of air column in a pipe with one end closed is 85 Hz. The next two higher frequencies will be \_\_\_\_\_  
A. 170 Hz, 255 Hz                      B. 255 Hz, 340 Hz  
C. 170 Hz, 340 Hz                      D. 255 Hz, 425 Hz

DO NOT WRITE ANYTHING HERE

- (xiv) When light enters from water into air, its speed \_\_\_\_\_  
 A. Increases B. Decreases C. Becomes zero D. Remains unchanged
- (xv) Near point of a normal human eye is \_\_\_\_\_  
 A. 25 cm B. 25 m C. Zero cm D. Infinity
- (xvi) For a diatomic gas  $C_V = \frac{5}{2}R$ , therefore gamma " $\gamma$ " for this gas is \_\_\_\_\_  
 A. 5/7 B. 4/35 C. 7/5 D. 35/4
- (xvii) Which of the following curves represents Boyle's Law?



For Examiner's use only:

Total Marks:

17

Marks Obtained:

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Time allowed: 2:35 Hours

Total Marks Sections B and C:

NOTE:- Sections B and C comprises page 1-2. Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2 Attempt any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. ( 14 x3 = 42 )

- (i) A picture is suspended from a wall by two strings. Show by a diagram the configuration of the strings, for which the tension in the strings will be minimum.
- (ii) The vector sum of three vectors gives a zero resultant. What can be the orientation of the vectors?
- (iii) Velocity of an object increases uniformly from zero to "v" in time "t". Prove that area under velocity-time graph is numerically equal to the distance covered by the object.
- (iv) Show that the range of projectile is maximum when projectile is thrown at an angle of  $45^\circ$  with the horizontal.
- (v) Name any six Non-conventional energy sources.
- (vi) Define Radian and prove that: (a)  $S=r\theta$  (b)  $v=r\omega$
- (vii) A disc without slipping rolls down a hill of height 10.0 m. If it starts from rest at the top of the hill, what is its speed at the bottom?
- (viii) Explain how the swing is produced in a fast moving tennis ball.
- (ix) Describe any three common phenomena in which resonance plays an important role.
- (x) Show that in SHM the acceleration is zero when the velocity is greatest and the velocity is zero when the acceleration is greatest.
- (xi) Why does sound travel faster in solids than in gases?
- (xii) Given that  $\frac{v_t}{v_0} = \sqrt{\frac{T}{T_0}}$ . Prove that one degree Celsius rise in temperature produces approximately 0.61 m/sec increase in the speed of sound.
- (xiii) Explain briefly the Huygen's Principle.
- (xiv) A screen is separated from a double slit source by 1.2 m. The distance between two slits is 0.03 mm. The second order bright fringe ( $m=2$ ) is measured to be 4.5 cm from the central line. Calculate the wavelength of the light and fringe width.
- (xv) A magnifying glass gives a five times enlarged image at a distance of 25 cm from the lens. Find the focal length of the lens, verifying with a ray diagram.
- (xvi) How is power lost in an optical fibre through dispersion? Explain.
- (xvii) Using the pressure formula derived from kinetic theory of gases, prove that Absolute temperature of an ideal gas is directly proportional to the average translational kinetic energy of gas molecules.
- (xviii) Calculate the entropy change when 1.0 kg of ice melts into water at  $0^\circ\text{C}$ .  
(Latent heat of fusion of ice  $L_f = 3.36 \times 10^5 \text{ J/kg}$ )
- (xix) Give the drawbacks to use the period of a simple pendulum as a time standard.

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**SECTION – C (Marks 26)**

Note:-

**Attempt any TWO questions. All questions carry equal marks.**

- Q. 3**
- Define and explain Random Error and Systematic Error in the measurement of a physical quantity. 06
  - Derive a relation for the Time Period of a Simple Pendulum using dimensional analysis. The various possible factors on which the time period "T" may depend upon are: 06
    - Mass of the bob (m)
    - Length of the pendulum (l)
    - Angle " $\theta$ " which the thread makes with vertical
    - Acceleration due to gravity (g)
  - The radius of a small sphere is measured as 2.25 cm by a vernier callipers with least count 0.01 cm. Find volume of the sphere. 04
- Q. 4**
- Define Moment of Inertia and prove that torque acting on a rotating rigid body equals the product of its Moment of Inertia and Angular Acceleration. 04
  - What is Geostationary Satellite? Show that square of its time period is directly proportional to the cube of its orbital radius. 04
  - Calculate the Angular Momentum of a star of mass  $2.0 \times 10^{30}$  kg and radius  $7.0 \times 10^5$  km. If it makes one complete rotation about its axis once in 20 days, what is its kinetic energy? 05
- Q. 5**
- Define Resolving Power of an instrument. How can it be expressed in terms of diameter of a lens and wavelength of the light? 02
  - What is a Compound Microscope? Sketch its labelled diagram. Also derive different expressions for its total magnification. 06
  - A compound microscope has lenses of focal length 1.0 cm and 3.0 cm. An object is placed 1.2 cm from the object lens. If a virtual image is formed at near point (25 cm from the eye), calculate the separation between the lenses and the magnification of the instrument. 05

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