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Sig. of Candidate. _____

Answer Sheet No. _____

Sig. of Invigilator. _____

PHYSICS HSSC-I

SECTION – A (Marks 17)

Time allowed: 25 Minutes

NOTE: Sections–A is compulsory and comprises page 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) The component of velocity that remains constant during the projectile motion is its _____
 A. Vertical component B. Horizontal component
 C. Both A and B D. Initial component
- (ii) Two bodies of masses 2 kg and 3 kg having final velocities as 2m/sec and 3m/sec, respectively, are initially at rest. Their initial momentum will be _____
 A. $7\text{ kg} - \text{m} \cdot \text{sec}^{-1}$ B. Zero $\text{kg} - \text{m} \cdot \text{sec}^{-1}$
 C. $60\text{kg} - \text{m} \cdot \text{sec}^{-1}$ D. None of these
- (iii) The waves which propagate by the oscillation of material particle are known as _____
 A. Magnetic waves B. Material waves
 C. E.M waves D. Mechanical waves
- (iv) In a diffraction grating, distance between the two adjacent slits is called _____
 A. Grating element B. Normal to grating
 C. Fringes D. Diffraction
- (v) The X-component of a force of 10N acting along horizontal, will be _____
 A. 5 N B. 10 N
 C. 15 N D. 20 N
- (vi) To evaluate gravitational P.E, final point should be situated at _____
 A. Zero B. 1000 km
 C. Infinite D. None of these
- (vii) γ is the ratio of specific heat at _____
 A. $Cons\ tan t \frac{Pr\ essure}{Temper\ ature}$ B. $Cons\ tan t \frac{V\ olume}{Pr\ essure}$
 C. $Cons\ tan t \frac{Pr\ essure}{V\ olume}$ D. $Cons\ tan t \frac{M\ ass}{D\ ensity}$
- (viii) To monitor the blood flow, ultrasonic waves of _____ frequency are used.
 A. $5MHz \rightarrow 10MHz$ B. $25MHz \rightarrow 30MHz$
 C. $9MHz \rightarrow 90MHz$ D. $20MHz \rightarrow 200MHz$

DO NOT WRITE ANYTHING HERE

(ix) To determine the interplaner space, equation used is _____

- | | |
|---|--------------------------------|
| A. $d \sin \theta = n\lambda$ | B. $2d \sin \theta = n\lambda$ |
| C. $\frac{d \sin \theta}{2} = n\lambda$ | D. $\sin \theta = n\lambda$ |

(x) One dyne is equal to _____

- | | |
|----------------|----------------|
| A. $10^3 N$ | B. $10^5 N$ |
| C. $10^{-5} N$ | D. $10^{-3} N$ |

(xi) If $\vec{A} = 4\hat{i} + 3\hat{j}$ then its unit vector will be _____

- | | |
|------------------------------------|------------------------------------|
| A. $\frac{2\hat{i} + 3\hat{j}}{6}$ | B. $\frac{6}{2\hat{i} + 3\hat{j}}$ |
| C. $\frac{4\hat{i} + 3\hat{j}}{5}$ | D. $\frac{5}{4\hat{i} + 3\hat{j}}$ |

(xii) The slope of Velocity-Time graph at any instant represents _____

- | | |
|-------------------------------|-------------------------|
| A. Gravity | B. Average acceleration |
| C. Instantaneous acceleration | D. Velocity |

(xiii) Thermal pollution is an inevitable consequence of the _____

- | | |
|--|--|
| A. 1 st law of thermodynamics | B. 2 nd law of thermodynamics |
| C. 2 nd law of motion | D. 1 st law of motion |

(xiv) The efficiency of a heat engine can be increased by increasing the temperature of _____

- | | |
|------------------|-------------------|
| A. Engine | B. Cold reservoir |
| C. Hot reservoir | D. None of these |

(xv) An organ pipe is 50 m long, with one end closed. Its fundamental frequency will be _____

- | | |
|-----------|-----------|
| A. 250 Hz | B. 330 Hz |
| C. 360 Hz | D. 350 Hz |

(xvi) In a multimode step index fibre, density of the optical material decreases from _____

- | | |
|------------------|-----------------|
| A. Edges to core | B. Core → edges |
| C. Even | D. Multiple |

(xvii) Glass-air boundary acts as a/an _____

- | | |
|-----------|----------|
| A. Mirror | B. Glass |
| C. Water | D. Air |

For Examiner's use only:

Total Marks:

17

Marks Obtained:



PHYSICS HSSC-I

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

NOTE: Sections B and C comprise pages 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) Specific heat of gas at constant pressure is greater than specific heat at constant volume. Why?
- (ii) Relate work done of a moving particle with its energy.
- (iii) Why is the 1st law of motion also titled as the law of Inertia?
- (iv) Pair the physical quantities having the same dimension:

a. Acceleration	b. Force	c. Work done
d. Rate of change of mom	e. Kinetic Energy	f. Gravity
- (v) Two masses m_1 and m_2 are attached to a compressed spring at rest. What will be the ratio of their final velocity?
- (vi) Relate how orbital speed of a satellite depends on its radius.
- (vii) Define Radian.
- (viii) The magnitude of dot-product and cross product of two vectors is $6\sqrt{3}$ and 6, respectively. Find the angle between the vectors.
- (ix) Give any three examples of non-conventional energy sources.
- (x) Find the angle between $\vec{A} = 5\hat{i} + \hat{j}$ and $\vec{B} = 2\hat{i} + 4\hat{j}$
- (xi) Why would it be advantageous to use Blue light for a compound microscope?
- (xii) In optical fibre system, how can the time difference of different dispersions be reduced?
- (xiii) What are the conditions used, while calculating time period of a simple pendulum?
- (xiv) Write an expression that harmonics are integral multiple of fundamental note, for stationary waves.
- (xv) Compare expression of $a = -\omega^2 x$ with the rate of change in velocity.
- (xvi) State the direction of the following vectors in simple situation:
 - a. Angular momentum
 - b. Angular velocity
- (xvii) Define Torr.
- (xviii) Certain globular particle has a density of 1246 kg m^{-3} . It falls through pure water ($\eta = 8.0 \times 10^{-4} \text{ Nm}^{-2}\text{s}$) with a terminal speed of 3.0 cm h^{-1} . Find the radius of the particle.
- (xix) The diameter and length of a metallic cylinder is 1.22 cm and 5.35 cm, respectively. What will be the volume of the cylinder?

SECTION – C (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks. (2 x 13 = 26)

- Q. 3**
- a. Prove that during one dimension elastic motion relative speed of approach is equal to the relative speed of separation. 06
 - b. A foot-ball is thrown upward with an angle of 30° with respect to horizontal. To throw a 40 m pass, what must be the initial speed of the ball? 04
 - c. Define Impulse and show its relation to linear momentum. 03
- Q. 4**
- a. Derive Bernoulli's equation for fluid. 07
 - b. Water flows through a hose, whose internal diameter is 1 cm at a speed of 1ms^{-1} . 03
What should be the diameter of the nozzle if the water is to emerge at speed of 21ms^{-1} ?
 - c. In an orbiting space-station, would the blood pressure in major arteries of the legs be greater than the blood pressure in the major arteries of neck. 03
- Q. 5**
- a. During Young's Double Slit Experiment, explain how the interfringes distance also depends upon the wavelength of the light used. 07
 - b. Explain the colours spectrum on an oil film spreading over a wet footpath. 03
 - c. A light is incident normally on a grating which has 2500 lines/cm. Compute the wavelength of a spectral line for which the deviation of second order is 15.0° . 03

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Roll No.

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Answer Sheet No. _____

Sig. of Candidate. _____

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PHYSICS HSSC-I
SECTION – A (Marks 17)

Time allowed: 25 Minutes

NOTE: Section-A is compulsory and comprises page 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) The efficiency of an engine will be 100%, if the temperature of the cold reservoir is _____
- A. 100 K B. 0 K
C. 10 K D. 1 K
- (ii) Spring constant of a spring attached by the 4 kg mass, extended up to 0.16 m will be _____
- A. 145 kg - sec⁻² B. 245 kg - sec⁻²
C. 305 kg - sec⁻² D. 200 kg - sec⁻²
- (iii) A physical system undergoing forced vibrations is known as _____
- A. Simple harmonic motion B. Linear motion
C. Derived motion D. None of these
- (iv) Laplace expression for speed of sound is _____
- A. $v = \sqrt{\frac{\gamma p}{m}}$ B. $v = \sqrt{\frac{\gamma p}{\rho}}$
C. $v = \sqrt{\frac{m}{\rho}}$ D. None of these
- (v) Burning of 1 litre petrol gives us energy equal to _____
- A. 50,00,0000 J B. 500000 J
C. 50000 J D. 50 J
- (vi) A 100 kg motorcycle is moving around a curved path of radius 100 m, with velocity of 144 km/hr. The centripetal force should be _____
- A. 16000 N B. 76000 N
C. 260 N D. 377 N
- (vii) According to Torricelli Theorem, the speed of efflux is directly proportional to the _____
- A. Height of the fluid B. Pressure of the fluid
C. Volume of the fluid D. Temperature of the fluid
- (viii) A vector has components like $F_x = F_y$. It means that angle that \vec{F} makes is of _____
- A. 30° B. 60°
C. 45° D. 90°
- (ix) As Geostationary satellites are synchronized with the Earth rotation, their time period should be equal to _____
- A. 44 hrs B. 10 hrs
C. 24 hrs D. 24 mins

DO NOT WRITE ANYTHING HERE

- (x) Unit of angular momentum in System International is _____
- A. $kg - m^{-3} - sec^{-1}$ B. $kg - m^{-1}$
C. $kg - m^2 - sec^{-1}$ D. None of these
- (xi) To calculate the speed of light which formula did Michelson use?
- A. $c = \sqrt{fd}$ B. $c = \frac{1}{16fd}$
C. $c = 16fd$ D. $c = \frac{1}{16}fd$
- (xii) Dimension of Power is _____
- A. ML^2T^{-2} B. $M^2L^2T^{-1}$
C. ML^2T^{-3} D. ML^3
- (xiii) In head to tail arrangement the sum of a closed polygon will be _____
- A. 1 B. Zero
C. -1 D. +2
- (xiv) Drag force between the layers of moving fluid _____
- A. Remains constant B. Decreases
C. Increases D. None of these
- (xv) Phenomenon that can be explained on the basis of Principle of superposition are _____ in number.
- A. 1 B. 2
C. 3 D. 4
- (xvi) The position at which stationary waves have maximum displacement from the mean position is called _____
- A. Node B. Anti-node
C. Displacement D. Mean position
- (xvii) For a normal adjustment, in a telescope, the magnifying power is _____
- A. $f_o \div f_e$ B. $f_e \div f_o$
C. $\frac{1}{f_o}$ D. $f_o + f_e$

For Examiner's use only:

Total Marks:

17

Marks Obtained:

— 1HA 1308 (ON) —



PHYSICS HSSC-I

20

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

NOTE: Sections B and C comprise pages 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)

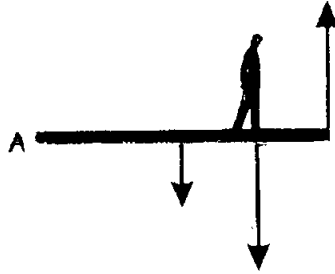
- (i) Explain why sound travels faster in warm air than in cold air.
- (ii) Apply the conditions of equilibrium on a paratrooper jumping from a helicopter.
- (iii) Name any three conditions that would make $\vec{A}_1 \times \vec{A}_2 = 0$
- (iv) Find the work done if the applied force $\vec{F} = 3\hat{i} + 2\hat{j}$ moves a block of mass m from point (2, -1) to point (6,4).
- (v) Why do we call gravitational field, a conservative one also?
- (vi) A brick of mass 2 kg is dropped from a height of 5m. What would be its velocity at a height of 3 m before hitting the ground?
- (vii) Give rotational analogue of the 2nd law of motion.
- (viii) Prove that 1 rad = 57.3°
- (ix) What is Critical velocity?
- (x) Relate the effect of wavelength and resolving power.
- (xi) Give the mathematical relation of law of conservation of mass for a flowing efflux.
- (xii) What happens when a jet plane flies faster than the speed of sound?
- (xiii) Find the fundamental notes for a pipe 1m long when:
 - a. Both the ends are closed
 - b. One end is open
- (xiv) Relate Doppler's Effect and frequency of light emitted from the stars.
- (xv) Distinguish between Un-polarized and Plane polarized light.
- (xvi) In a double slit experiment, the 2nd order maximum lies at $\theta = 0.25^\circ$. If the wavelength used is 650 nm then determine the slit separation.
- (xvii) Why do Gases have two specific heats?
- (xviii) Is it true that diesel engine does not need an ignition spark? If yes then why?
- (xix) Find the dimension of co-efficient of viscosity.

SECTION – C (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks.

(2 x 13 = 26)

- Q. 3**
- a. Explain turning effect of a body of mass m . 07
- b. A uniform beam of 200 N is supported horizontally. If the breaking tension of the rope is 400 N, how far can a man of weight 400 N walk from point A, on the beam as shown in the following diagram: 04



- c. Can a vector have a component greater than vector's magnitude? 02
- Q. 4**
- a. Evaluate the force needed to bend the normally straight path of the particle of mass m , into a circular path. 07
- b. Calculate the angular momentum of a star of mass $2.0 \times 10^{30} \text{ kg}$ and Radius $7.0 \times 10^5 \text{ km}$.
If it makes one complete rotation about its axis once in 20 days, what is its kinetic energy? 04
- c. What should be the minimum number of geostationary satellites, required to give full global coverage of T.V transmission. 02
- Q. 5**
- a. Using the equation of efficiency of an engine, explain that increase in the efficiency depends upon the temperature of hot reservoirs. 06
- b. State the postulates of kinetic theory of gases. 04
- c. Find the average speed of oxygen molecule in the air at S.T.P 03