



PHYSICS HSSC-I
SECTION – A (Marks 17)

Time allowed: 25 Minutes

Version Number	1	8	3	8
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Note: Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

- 1) For an ideal gas, the internal energy is directly proportional to:
A. Volume B. Density C. Pressure D. Temperature
- 2) Thermal pollution is an inevitable consequence of:
A. First law of thermodynamics B. Newton's third law
C. 2nd law of thermodynamics D. Pascal's law
- 3) The Prefix one peta is:
A. 10^9 B. 10^8 C. 10^{15} D. 10^{12}
- 4) Counter clockwise Torque is:
A. Zero B. Infinite C. Negative D. Positive
- 5) If $\vec{A} = a\hat{i}$ and $\vec{B} = a\hat{j}$ then:
A. $\vec{A} \cdot \vec{B} = -a$ B. $\vec{A} \cdot \vec{B} = 0$ C. $\vec{A} \cdot \vec{B} = a$ D. $\vec{A} \cdot \vec{B} = a^2$
- 6) The motion and rest are:
A. Discrete B. Random C. Absolute D. Relative
- 7) The fuel consumed by a typical rocket to provide enough upward thrust to overcome gravity is:
A. 10000 kg hr^{-1} B. 10000 kg s^{-1} C. 10000 gs^{-1} D. $10000 \text{ kg min}^{-1}$
- 8) When the angle between force and displacement is greater than 90° , the work done is:
A. Negative B. Positive C. Maximum D. Zero
- 9) Which of the following is non-conservative force?
A. Electric force B. Elastic spring force
C. Gravitational force D. Normal force
- 10) SI unit of angular momentum is:
A. Nm B. Radian C. Ns D. Js
- 11) Bernoulli's equation is based on the law of conservation of:
A. Charge B. Momentum C. Mass D. Energy
- 12) If radius of the droplet is doubled, the terminal velocity increases:
A. Four times B. Eight times C. Two times D. Three times
- 13) Tuning of a radio is an example of:
A. Musical resonance B. Magnetic resonance
C. Mechanical resonance D. Electrical resonance
- 14) If a transverse wave, travelling in a rarer medium, is reflected from a denser medium, it undergoes a path difference of:
A. $\frac{\lambda}{2}$ B. λ C. $\frac{\lambda}{8}$ D. $\frac{\lambda}{4}$
- 15) A diffraction grating has 5000 lines per cm. Its grating element is:
A. $2 \times 10^{-3} \text{ cm}$ B. $0.2 \times 10^{-3} \text{ cm}$ C. $200 \times 10^{-3} \text{ cm}$ D. $20 \times 10^{-3} \text{ cm}$
- 16) For light of wavelength λ through a lens of diameter D , the resolving power is given by:
A. $1.22 \frac{D}{\lambda}$ B. $\frac{\lambda}{1.22D}$ C. $1.22 \frac{\lambda}{D}$ D. $\frac{D}{1.22\lambda}$
- 17) The Bragg equation is given as:
A. $2d \sin \theta = n\lambda$ B. $2n \sin \theta = d\lambda$ C. $d \sin \theta = n\lambda$ D. $n \sin \theta = d\lambda$



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PHYSICS HSSC-I

Time allowed: 2:35 Hours

Total Marks Sections B, C and D: 68

NOTE: Answer any seven parts each from section B and C and any two questions from section D 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 21) (Chapters 1 to 6)

Q. 2 Answer any SEVEN parts. All parts carry equal marks. (7 x3 = 21)

- (i) Show that the expression $v_f = v_i + at$ is dimensionally correct, where v_i is the velocity at $t = 0$ and v_f is the velocity at time t .
- (ii) Give the drawbacks to use the period of pendulum as a time standard.
- (iii) If one of the rectangular components of vector is not zero. Can its magnitude be zero? Explain briefly.
- (iv) Define unit vector and find the unit vector in the direction of vector $\vec{A} = 4\hat{i} + 3\hat{j}$.
- (v) Can the velocity of an object reverse the direction when acceleration is constant? If so, give an example.
- (vi) Find the angle of projection of projectile for which its maximum height and horizontal range are equal.
- (vii) An object has 1J of P.E. What does it mean?
- (viii) A girl drops a cup from a certain height, which breaks. What energy changes are involved?
- (ix) What is meant by angular momentum? Show that $L_o = mvr$.
- (x) A person is standing near a fast moving train. Is there any danger that he will fall towards it? Explain briefly.

SECTION – C (Marks 21) (Chapters 7 to 11)

Q. 3 Answer any SEVEN parts. All parts carry equal marks. (7 x3 = 21)

- (i) Does the acceleration of a simple harmonic oscillator remain constant during its motion? Is the acceleration ever zero? Explain briefly.
- (ii) Define resonance and name any two phenomena in which resonance is involved.
- (iii) Why does sound travel faster in warm air than in cold air? Explain briefly.
- (iv) Define the terms crest, trough and node.
- (v) Define coherent sources. Under what conditions two sources of light behave as coherent sources?
- (vi) In a double slit experiment, the second order maximum occurs at $\theta = 0.025^\circ$. The wavelength is $650nm$. Find the slit separation.
- (vii) What do you understand by linear magnification and angular magnification? Write the equations as well.
- (viii) How is the light signal transmitted through the optic fibre?
- (ix) Show that $C_p - C_v = R$
- (x) Is it possible to convert internal energy into mechanical energy. Explain briefly with an example.

SECTION – D (Marks 26)

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

(13 x 2 = 26)

- Q. 4**
- a. Define scalar product and vector product. Write down two examples and four characteristics of each. (1+1+4)
 - b. Discuss conditions of equilibrium. (04)
 - c. Find the angle between two vectors $\vec{A} = 5\hat{i} + \hat{j}$ and $\vec{B} = 2\hat{i} + 4\hat{j}$ (03)
- Q. 5**
- a. What are stationary waves? How are stationary waves generated? Discuss stationary waves in a stretched string. (1+1+4)
 - b. What are applications of Doppler's Effect? Discuss briefly. (04)
 - c. An organ pipe has a length of 50cm. Find the frequency of fundamental note when it is open at both ends. (Speed of sound = 350ms^{-1}) (03)
- Q. 6**
- a. What is compound microscope? Discuss its working and find out its magnifying power. (1+2+3)
 - b. Discuss different types of optic fibre. (04)
 - c. A telescope is made of an objective of focal length 20cm and an eye piece of focal length 5cm. Find the angular magnification. (03)

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PHYSICS HSSC-I

SECTION – A (Marks 17)

Time allowed: 25 Minutes

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Note: Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

- 1) The efficiency of diesel engine is about:
A. 30% to 35% B. 25% to 30% C. 45% to 50% D. 35% to 40%
- 2) The entropy of universe always:
A. Increases and decreases simultaneously B. Remains constant
C. Increases D. Decreases
- 3) One year is equal to:
A. $3.15 \times 10^7 s$ B. $5.4 \times 10^4 s$ C. $1.41 \times 10^{17} s$ D. $8.6 \times 10^4 s$
- 4) SI unit of Torque is:
A. Ns B. JC^{-1} C. Js D. Nm
- 5) In case of unit vectors \hat{i}, \hat{j} and \hat{k} . Which of the following is valid?
A. $\hat{j} \times \hat{i} = 0$ B. $\hat{j} \times \hat{i} = 1$ C. $\hat{j} \times \hat{i} = -\hat{k}$ D. $\hat{j} \times \hat{i} = \hat{k}$
- 6) The change in position of a body from initial position to final position is called:
A. Displacement B. Acceleration C. Position vector D. Velocity
- 7) The notation delta (Δ) is used to represent a:
A. Small change B. Big change
C. Zero change D. Very small change
- 8) $1kWh$ is equal to:
A. $3.6 \times 10^6 J$ B. $3.6 \times 10^{-6} J$ C. $3.60 \times 10^9 J$ D. $3.6 \times 10^{-9} J$
- 9) If angle ' θ ' is greater than 90° , the work done is:
A. Maximum B. Positive C. Zero D. Negative
- 10) Moment of inertia of a thin rod about its length is:
A. $\frac{1}{12} mL^4$ B. $\frac{2}{5} mL^2$ C. $\frac{1}{12} mL^2$ D. $\frac{1}{12} mL^3$
- 11) The device used to measure the speed of liquid flow is called:
A. Speedometer B. Spectrometer C. Barometer D. Venturimeter
- 12) The dimensions of flow rate are:
A. $[L^{-1}T^{-3}]$ B. $[L^{-1}T^{-2}]$ C. $[L^2T^{-1}]$ D. $[L^2T^{-1}]$
- 13) For $1^\circ C$ rise in temperature, the speed of sound increases by:
A. $0.6ms^{-1}$ B. $0.06ms^{-1}$ C. $6ms^{-1}$ D. $6.1ms^{-1}$
- 14) To double the period of simple pendulum, its length must be:
A. Increased two times B. Increased four times
C. Decreased by $\frac{1}{3}$ D. Decreased by $\frac{1}{2}$
- 15) In Michelson's interferometer, a fringe is shifted, each time the mirror is displaced through:
A. λ B. $\frac{\lambda}{2}$ C. $\frac{\lambda}{8}$ D. $\frac{\lambda}{4}$
- 16) In normal adjustment, the length of astronomical telescope is:
A. $\frac{1}{f_o + f_e}$ B. $\frac{f_e}{f_o}$ C. $\frac{f_o}{f_e}$ D. $f_o + f_e$
- 17) Multimode step index fibre has a core of:
A. $50\mu m$ B. $1000\mu m$ C. $0.5\mu m$ D. $5\mu m$



Time allowed: 2:35 Hours

Total Marks Sections B, C and D: 68

NOTE: Answer any seven parts each from section B and C and any two questions from section D 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 21)
(Chapters 1 to 6)

Q. 2 Answer any SEVEN parts. All parts carry equal marks.

(7 x 3 = 21)

- (i) Check the correctness of the relation $V = \sqrt{\frac{F \times l}{m}}$, where v is speed, F is tension in the string and m is mass.
- (ii) Why do we find it useful to have two units for amount of substance, the kilogram and mole? Discuss briefly.
- (iii) Name the three different conditions that could make $\vec{A}_1 \times \vec{A}_2 = 0$.
- (iv) Given that $\vec{A} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{B} = 3\hat{i} - 4\hat{k}$. Find the projection of \vec{A} on \vec{B} .
- (v) Define momentum and impulse and find their relation.
- (vi) Derive an expression for the range of a projectile.
- (vii) Calculate the work done in Kilo Joules in lifting a mass of 20kg at steady velocity through a vertical height of 20m.
- (viii) Define Power with its unit and show that $P = \vec{F} \cdot \vec{v}$.
- (ix) What is meant by moment of inertia? Discuss its significance briefly.
- (x) Explain briefly the working of a carburettor of a motorcar using Bernoulli's principle.

SECTION – C (Marks 21)
(Chapters 7 to 11)

Q. 3 Answer any SEVEN parts. All parts carry equal marks.

(7 x 3 = 21)

- (i) In relation to SHM explain briefly the equations:
a) $y = A \sin(\omega t + \phi)$ b) $a = -\omega^2 x$
- (ii) A simple pendulum is 50cm long. What will be its frequency of vibration at a place where $g = 9.8 \text{ ms}^{-2}$.
- (iii) How are beats useful in tuning a musical instrument?
- (iv) Why stars moving towards the earth show a blue shift and that are moving away show a red shift?
- (v) Can visible light give interference fringes? Explain briefly.
- (vi) Explain briefly whether the Young's Experiment is an experiment for studying interference or diffraction effect of light?
- (vii) A magnifying glass gives five times enlarged image at 25cm from the lens. Find by ray diagram the focal length of the lens.
- (viii) How is the power lost in optical fibre through dispersion? Explain briefly.
- (ix) Specific heat of a gas at constant pressure is greater than the specific heat at constant volume. Why?
- (x) What is the average translational K.E of molecules in a gas at 27 °C ?

SECTION – D (Marks 26)

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

(13 x 2 = 26)

- Q. 4**
- a. Define absolute gravitational P.E and derive its relation. **(1+5)**
 - b. What are non-conventional energy sources? Discuss any two. **(1+3)**
 - c. How large a force is required to accelerate an electron ($m = 9.1 \times 10^{-31} \text{ kg}$) from rest to speed of $2 \times 10^7 \text{ ms}^{-1}$ through 5 cm ? **(03)**
- Q. 5**
- a. Discuss SHM and uniform circular motion and derive an expression for displacement and acceleration in terms of ω . **(06)**
 - b. Discuss energy conservation in SHM. **(04)**
 - c. What should be the length of simple pendulums whose period is 1sec at a place where $g = 9.8 \text{ ms}^{-2}$. **(03)**
- Q. 6**
- a. What is Carnot engine? Discuss its working and find out efficiency of Carnot engine. **(1+4+1)**
 - b. Show that the pressure exerted by gas is directly proportional to the average translational K.E of the gas molecules. **(04)**
 - c. 336 J of energy is required to melt 1 g of ice at 0° C . What is the change in entropy of 30 g of water at 0° C as it is changed to ice at 0° C by a refrigerator? **(03)**

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