Federal Board HSSC-I Examination
Physics Model Question Paper

SECTION – A

Time allowed: 25 minutes   Marks: 17

Note: Section-A is compulsory and comprises pages 1-3. 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 **Encircle the correct option i.e. A / B / C / D. All parts carry equal marks.**

i. Dimension formula for angular momentum is
   A. ML^2T^{-2} B. ML^2T^{-1}
   C. MLT^{-1} D. $M^0L^2T^{-2}$

ii. Which pair of the following pairs of physical quantities have the same dimensions?
   A. Work and power   B. Work and energy
   C. Force and power   D. Momentum and power

iii. The significant figures in 0.000365 are
   A. 2   B. 6
   C. 5   D. 3

iv. The minimum number of unequal force vectors whose sum can be zero are
   A. 1   B. 4
   C. 5   D. 2

v. Which feature of graph allows acceleration to be determined?
   A. Area under displacement time graph
   B. Area under velocity tome graph
   C. Slope of displacement time graph
   D. Slope of velocity time graph

vi. Which statement is true for projectile when it is at highest point of its path?
   A. Horizontal component of acceleration is zero
   C. Horizontal component of velocity is zero
   D. Kinetic energy of projectile is zero
   D. Momentum of projectile is zero

vii. A ball of mass 2 kg travelling at 8 m/s strikes a ball of mass 4 kg travelling at 2 m/s. After collision both balls move at the same velocity 'v'. What is magnitude of velocity 'v'?
   A. 4 m/s   B. 5 m/s
   C. 6 m/s   D. 7 m/s

viii.   The rotational and translational K.E of a hoop are related by
        A. $K.E_{rot} = K.E_{tran}$ B. $K.E_{rot} = \frac{1}{2} K.E_{tran}$
        C. $K.E_{rot} = 2 K.E_{tran}$ D. $K.E_{rot} = 1/4 K.E_{tran}$

ix.   If a body of mass 'm' is released in a vacuum just above surface of planet of mass 'M' and radius 'R', what would be its gravitational acceleration?
        A. GmM/R B. GmM/R^2
        C. GM/R D. GM/R^2

x.   Which statement about geostationary orbits is false?
        A.   It must be directly above equator
        B.   All satellites in a geostationary orbit must have same mass
        C.   The period of geostationary orbit must be 24 hours
        D.   There is only one possible radius for a geostationary orbit

xi.   Corner cycle consist of
        A.   One step   B.   Two steps
        C.   Three steps   D.   Four steps

xii.   Which quantity must be same for two bodies if they are to be in thermal equilibrium?
        A.   Internal energy   B.   P.E
        C.   Temperature   D.   Mass

xiii.   If a wave can be polarized it must be
        A.   An electromagnetic wave   B.   A longitudinal wave
        C.   A progressive wave   D.   A transverse wave

xiv.   When light from two lamps fall on screen no interference can be obtained. Why is this so
        A.   Lamps are not point sources
        B.   Lamps emit light of different magnitude
        C.   Light from lamps is not coherent
        D.   Light from lamps is white

xv.   An organ pipe of length ' l ' has one end closed but other end open. Wavelength of fundamental note is
        A.   Slightly smaller than 4l   B.   Slightly larger than 4l
        C.   Roughly equal to 3l/2   D.   Equal to 4l

xvi.   Image formed by compound microscope is:
A.   Real, inverted and enlarged
B.   Real, erect and enlarged
C.   Virtual, inverted and enlarged
D.   Virtual, erect and enlarged

xvii.   For molar heat capacities C_v and C_p

A. $C_v = C_p$ B. $C_v < C_p$
C. $C_v > C_p$ D. $C_v\, C_p = 1$

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Q. No.1: Total Marks: 17

Marks Obtained:

Page 3 of 3

Time allowed: 2.35 hours   Total Marks: 68

Note: Sections 'B' 'C' and 'D' comprise pages 1-2 and questions therein are to be answered 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   Attempt any SEVEN parts. All parts carry equal marks. $(7 \times 3 = 21)$
   i.   How can we find the total uncertainty in 'g' where the time period is $T = 2\pi \sqrt{l/g}$?
   ii.   Find the value of $(\mathbf{A} \times \mathbf{B})^2 + (\mathbf{A.B})^2$.
   iii.   Prove that the magnitude of cross product of **A** and **B** is the area of parallelogram having consecutive sides A and B.
   iv.   Draw displacement-time graph for cases when (a) velocity is constant, (b) velocity is uniformly increasing (c) velocity is variable.
   v.   A bullet of mass m is fired with velocity v from a gun of M, on which factors the recoil of gun shall depend?
   vi.   Prove that for angles of projection, which exceed or fall short of 45° by equal amounts, the ranges are equals.
   vii.   Define absolute potential energy. Which mass is closer to earth, one having potential energy -100 J or one with potential energy -10 J?
   viii. Which bullet shall be used to knock down a bear, rubber or lead?
   ix.   Define the orbital velocity of a satellite. Also obtain its expression.
   x.   Differentiate between laminar and turbulent flow. Also define AN ideal fluid.

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

Q.3   Attempt any SEVEN parts. All parts carry equal marks. $(7 \times 3 = 21)$
   i.   Can we realize an ideal simple pendulum?

   ii.   What is meant by phase angle, does it define the angle between maximum displacement and the driving force?

   iii.   Define the terms interference, beats and stationary waves.

   iv.   Is it possible for two identical waves, travelling in the same direction along a string, to give rise to stationary waves?

   v.   For which purposes the Michelson's interferometer is used?

   vi.   What is meant by optical rotation? Explain briefly   .

   vii.   An thin oil film spread over a wet foot path shows colours? Explain how?

   viii. Why would it be advantageous to use blue light with a compound microscope?

   ix.   Prove that flow of heat Q from a hot to cold body increases entropy of the system.

   x.   Would an Air Conditioner, placed on a table in a room, cool it?

SECTION – D (Marks 26)

Note: Attempt any **TWO** questions. All questions carry equal marks. $(2 \times 13 = 26)$

Q.4   a.   Describe base units, supplementary units and derived units with the help of
            examples.   (6)
      b.   How would the vectors of same magnitude have to be oriented, if they were to be
            combined to give the resultant equal to a vector of the same magnitude?   (4)
      c.   Can a body rotate about its centre of gravity under the action of its weight? (3)

Q.5   a.   Define projectile motion. Find a relation for   (6)
            (i)   Maximum height attained by it and
            (ii)   its time of flight.
      b.   A 1000kg automobile at the top of an incline plane 10 meter high and 100 m long
            is released and rolls down the hill. What is the speed at the bottom of the incline if
            the average retarding force on it due to friction is 480 N.   (4)
      c.   Differentiate between Newton's and Einstein's views on gravitation.   (3)

Q.6   a.   What was Newton's formula for speed of sound? Calculate the velocity of sound
            using it. How was it corrected by Laplace?   (6)
      b.   Amonochromatic light of wavelength 588nm is allowed to fall on half-silvered
            glass plate G_1 in the Michelson's interferometer. If M_1 is moved through
            0.233mm, how many fringes will be observed to shift?   (4)
      c.   Draw ray-diagram for working of a compound microscope. Also calculate
            expression for its magnification?   (3)

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