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Answer Sheet No._____

Sign. of Candidate _____

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PHYSICS HSSC–I

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. **Do not use lead pencil.**

Q.1 Fill the relevant bubble for each part. Each part carries one mark.

1. Which one of the following is a dimensionless quantity?
   A. Stress ◯ B. Energy ◯
   C. Surface tension ◯ D. Strain ◯

2. If a body moves towards Earth under the effect of gravity, neglecting air resistance, its motion is called:
   A. Free fall ◯ B. Gravitational ◯
   C. Parabolic ◯ D. Uniform ◯

3. Which one of the following quantities never change for collision of two bodies in an isolated system?
   A. momentum of each body ◯
   B. K.E of each body ◯
   C. total momentum of the system ◯
   D. total K.E of the system ◯

4. A stone is thrown to perform projectile motion, which one of the following is true for vertical acceleration of stone:
   A. Zero ◯
   B. Constant ◯
   C. Maximum at highest point ◯
   D. Maximum at point of projection ◯

5. Which one of the following is **NOT** unit of work?
   A. Joule ◯ B. Kg.m / s ◯
   C. N.m ◯ D. Ws ◯

6. Increase in the speed of sound in the air per degree rise in temperature is:
   A. 61 ms^{-1} ◯ B. 61 cms^{-1} ◯
   C. 0.61 cms^{-1} ◯ D. 6.1 ms^{-1} ◯

7. For a simple harmonic oscillator, a $= -\omega^2 x$, its frequency is:

A. $2\pi\,\omega$ ◯ B. $\frac{2\pi}{\omega}$ ◯

C. $\frac{\omega}{2\pi}$ ◯ D. $\frac{1}{\omega}$ ◯

8. The expression for orbital velocity is:

A. $v = \sqrt{MGR}$ ◯ B. $v = \sqrt{\frac{GM}{R}}$ ◯

C. $v = \sqrt{\frac{GR}{M}}$ ◯ D. $v = \sqrt{\frac{2GM}{R}}$ ◯

9. Maximum drag force on a falling sphere is 9.8 N, its weight will be:

A. 1 N ◯ B. 9.8 N ◯

C. 19.8 N ◯ D. 4.9 N ◯

10. When length of a simple pendulum is doubled, the ratio of old to new time period will be:

A. 2:1 ◯ B. 1:1 ◯

C. 1:2 ◯ D. $1:\sqrt{2}$ ◯

11. The Stoke's law is valid for:

A. All objects ◯

B. Spherical objects falling at high speed ◯

C. Spherical objects falling at slow speed ◯

D. Cubical objects ◯

12. The locus of all points in a medium having the same phase of vibration is called:

A. Crest ◯ B. Trough ◯

C. Wavelength ◯ D. Wave front ◯

13. Which one is the form of the first law of thermodynamics for isothermal expansion process?

A. Q = W ◯ B. Q = – W ◯

C. W = –ΔU ◯ D. W =ΔU ◯

14. The process in which no heat energy enters or leaves the system is called:

A. Adiabatic process ◯ B. Isothermal process ◯

C. Isobaric process ◯ D. Isochoric process ◯

15. A stone is moving with uniform speed in a vertical circle by mean of a string, the tension in the string will be maximum:

A. At the highest point ◯ B. At the lowest point ◯

C. At horizontal level ◯ D. At every point ◯

16. The moment of inertia of a thin rod of mass "M" and length "L" about its center is:

A. $\frac{1}{2}ML^2$ ◯ B. $\frac{2}{5}ML^2$ ◯

C. $\frac{1}{12}ML^2$ ◯ D. ML^2 ◯

17. If two tuning forks of frequencies f_1 and f_2 are sounded together such that $f_2 > f_1$ then the number of beats per second is:

A. $f_2 - f_1$ ◯ B. $f_2 + f_1$ ◯

C. $f_1 - f_2$ ◯ D. $f_1 + 2f_2$ ◯

Federal Board HSSC-I Examination
Physics Model Question Paper
(Curriculum 2006)

Time allowed: 2.35 hours Total Marks: 68

Note: Answer any fourteen parts from Section 'B' and attempt any two questions from Section 'C' on the separately provided answer book. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q.2 Attempt any **FOURTEEN** parts. All parts carry equal marks. (14 × 3 = 42)

i. List applications of moment due to a force.

ii. Show that the equation $v = \sqrt{\frac{TxL}{M}}$ is dimensionally consistent, where v = speed of transverse wave in a stretched string, T= tension in a stretched string, L = length of string and M = mass of string.

iii. How are the cranes able to lift very heavy load without toppling?

iv. Find the angle between two forces of equal magnitude such that the magnitude of their resultant is equal to either of them.

v. Show that the rate of change of momentum is equal to the applied force.

vi. When a driver applies brake suddenly then why does the upper part of the passenger get jerk or move in the forward direction?

vii. Calculate the orbital radius from the centre of the Earth for a Geostationary satellite.

viii. A motorcar is traveling at a speed of $30ms^{-1}$. If the wheel has a diameter of 1.5m, find its angular speed in rad s^{-1} and rev s^{-1}?

ix. Is it possible for a person to distinguish between a raw egg and a hard-boiled egg by spinning each on a table?

x. When a tractor moves with uniform velocity, its larger wheel rotates slowly than its smaller wheel. Why?

xi. What is the function of shock absorber in a car?

xii. (a) For what values of the angle 'θ' between two vectors their scalar product is positive?
(b) For what values of the angle 'θ' between two vectors their scalar product is negative?

xiii. What is the power of an airplane of mass 3000kg, if on a runway it is capable of attaining a speed of $80ms^{-1}$ from rest in 4.0 seconds?

xiv. A source of sound and an observer are moving away from each other. What happens to the apparent pitch heard by the observer?

xv. Why are Polaroid sunglasses better than ordinary sunglasses?

xvi. In Young's double slit experiment the second order maximum occurs at $\theta = 25°$ when the slits are illuminated by light of the wavelength 650nm. Determine the slit separation.

xvii. Why is it not possible to see interference where light beams from head lamps of a car overlap?

xviii. Why do bowlers shine one side of a cricket ball?

xix. Why can efficiency of a thermodynamic system never be 100%?

xx. What length of an open pipe will produce a frequency of 1200Hz as its first overtone on a day when speed of sound is $340ms^{-1}$.

SECTION – C (Marks 26)

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

Q.3 a. Define the molar heat capacity at constant pressure 'C_P' and molar heat capacity at constant volume 'C_v' for a gas. Prove that $C_P - C_v = R$ **(02+04)**

b. 25200J of heat is supplied to the system while the system does 6000J of work. Calculate the change in internal energy of the system. **(04)**

c. Why is it not possible to obtain diffraction of x-rays by Young's double slit experiments? **(03)**

Q.4 a. Define Simple Harmonic Motion (SHM). Show that motion of a simple pendulum is SHM. Also derive an expression for its time period "T". **(02+04)**

b. What should be the length of simple pendulum whose time period is one second? What is its frequency? **(03)**

c. Identify the factors on which speed of sound in air depends. **(04)**

Q.5 a. Using equations of uniformly accelerated motion, determine height, range and time of flight for a projectile. **(02+02+02)**

b. Water flows through a pipe of 1 cm diameter with 1 ms^{-1} speed. What should be the diameter of the nozzle if water is ejecting at an average speed of 2.1 ms^{-1}. **(04)**

c. Why does smoke rise faster in a chimney on a windy day **(03)**

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PHYSICS HSSC-1
MODEL QUESTION PAPER SLOs
(Curriculum 2006)

SECTION-A

Q.1 Choose the correct answer A/B/C/D by filling the relevant bubble for each question.

1. Check the homogeneity of physical equations by using dimensionality and base units.
2. Distinguish between positive and negative acceleration, uniform and variable acceleration.
3. Describe that while momentum of a system is always conserved in interaction between bodies some change in K.E. usually takes place.
4. Communicate the ideas of a projectile in the absence of air resistance that. (i) Horizontal component (VH) of velocity is constant. (ii) Acceleration is in the vertical direction and is the same as that of a vertically free falling object. (iii) The horizontal motion and vertical motion are independent of each other.
5. Describe the concept of work in terms of the product of force F and displacement d in the direction of force (Work as scalar product of F and d).
6. Identify the factors on which speed of sound in air depends
7. Identify and use the equation; $a = -\omega 2 x$ as the defining equation of SHM.
8. Define the term orbital velocity and derive relationship between orbital velocity, the gravitational constant, mass and the radius of the orbit.
9. Describe that real fluids are viscous fluids.
10. analyze the motion of a simple pendulum is SHM
11. Describe that viscous forces in a fluid cause a retarding force on an object moving through it.
12. State Huygen's principle and use to construct wavefront.
13. Explain that first law of thermodynamics expresses the conservation of energy.
14. Explain that first law of thermodynamics expresses the conservation of energy.
15. describe situations in which the centripetal acceleration is caused by a tension force
16. define moment of inertia of a body
17. Describe the phenomenon of formation of beats due to interference of non-coherent sources.

SECTION-B

Q.2 Attempt FOURTEN parts from following

1. List applications of torque or moment due to a force.
2. Check the homogeneity of physical equations by using dimensionality and base units.
3. Describe how cranes are able to lift heavy loads without toppling.
4. Determine sum of vectors using perpendicular components.
5. Describe the Newton's second law of motion as rate of change of momentum
6. Apply Newton's laws to explain the motion of objects in a variety of context.
7. Describe that communication satellites are usually put into orbit high above the equator and that they orbit the earth once a day so that they appear stationary when viewed from earth.
8. Solve problems by using $S = r\theta$ and $v = r\omega$.

9. Explain conservation of angular momentum as a universal law and describe examples of conservation of angular momentum.
10. Explain conservation of angular momentum as a universal law and describe examples of conservation of angular momentum.
11. Describe practical examples of damped oscillations with particular reference to the efforts of the degree of damping and the importance of critical damping in cases such as a car suspension system.
12. distinguish between positive, negative and zero work with suitable examples
13. Express power as scalar product of force and velocity
14. Explain the observed change in frequency of a mechanical wave coming from a moving object as it approaches and moves away (i.e. Doppler effect).
15. Identify and express that polarization is produced by a Polaroid.
16. Determine the wavelength of light using diffraction grating.
17. State the necessary conditions to observe interference of light.
18. Describe that the pressure difference can arise from different rates of flow of a fluid (Bernoulli effect).
19. Explain the working principle of Carnot's engine
20. Determine the wavelength of sound in air using stationary waves and calculate speed of sound.

SECTION-C

Q.3 (a) Define specific heat of gas. Apply first law of thermodynamics to derive $C_p - C_v = R$

(b) Apply first law of thermodynamics

(c) State the necessary conditions to observe interference of light.

Q.4 (a+b) analyze the motion of a simple pendulum is SHM and calculate its time period.

(c) Identify the factors on which speed of sound in air depends

Q.5 (a) Evaluate using equations of uniformly accelerated motion that for a given initial velocity of frictionless projectile. 1. How higher does it go? 2. How far would it go along the level land? 3. Where would it be after a given time? 4. How long will it remain in air?

(b) Describe equation of continuity Av = Constant, for the flow of an ideal and incompressible fluid and solve problems using it.

(c) Describe that the pressure difference can arise from different rates of flow of a fluid (Bernoulli Effect)

PHYSICS HSSC-I

Table of Specifications

Topics	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Marks	% age
Knowledge based		Q 2(i)3	Q 1(2)1 Q 1(3)1 Q 5(a)6	Q 1(5)1	Q 1(16)1 Q 1(8)1		Q 4(a)6	Q1(6)1 Q 4(c)4	Q 1(12)1	Q 3(a)6 Q1(13)1 Q 1(14)1	34	29.3%
Understanding based		Q 2(iv)3 Q 2(iii)3	Q 1(4)1 Q 2(v)3	Q 2(xii)3 Q2(xiii)3	Q 1(15)1 Q 2(vii)3 Q 2(viii)3	Q 1(9)1 Q 1(11)1 Q5(b)4	Q 2(xi)3 Q 4(b)3 Q 1(7)1	Q1(17)1 Q 2(xiv)3 Q 2(xx)3	Q2(xv)3 Q2(xvii)3 Q 3(c)3 Q 2(xvi)3	Q 2(xix)3 Q 3(b)4	62	53.4%
Application based	Q1(1)1 Q2(ii)3		Q 2(vi)3		Q 2(ix)3 Q 2(x)3	Q2(xviii)3 Q5(c)3	Q 1(10)1				20	17.2%
Total marks	4	9	15	7	15	12	14	12	13	15	116	100%

KEY:

1(1)(01)

Question No (Part No.) (Allocated Marks)