Version No.			

ROLL NUMBER						

Answer Sheet No._____

Sign. of Candidate_____

Sign. of Invigilator_____

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) The percentage error in the measurement of mass and speed are 2% and 3% respectively. How much will be the maximum percentage error in the estimation of K.E obtained?

A. 1% B. 4%
C. 5% D. 8%

(2) A person first displaces 10 units towards North. After second displacement he is 7 units towards North. His 2nd displacement was:

A. 3 units towards West B. 3 units towards South
C. 3 units towards North D. 3 units towards East

(3) For a projectile, if g = 10ms^{-2} the ratio of maximum height reached to square of flight time will be:

A. 5 : 1 B. 5 : 2
C. 5 : 4 D. 10 : 1

(4) What is the product of $(\hat{i} \times \hat{j}).\hat{k}$ equal to:

A. $-\hat{k}$ B. 1
C. -1 D. $+\hat{k}$

(5) When a force is applied on a body, which one of the following physical quantity will **NOT** change?

A. Mass B. Velocity
C. Position D. Acceleration

6. K.E of a body is increased by 300%. What is the percentage increase in momentum?

A. 100% B. 200%
C. 300% D. 400%

(7) When the speed of your car doubles, by what factor does its kinetic energy increase?

A. $\sqrt{2}$ B. 2
C. 4 D. 8

(8) 1° is equal to:

A. 0.01745 rad B. 57 rad
C. 0.1745 rad D. 2.9 rad

(9) The value of *g* at a height equal to the radius of earth from its surface is given as:

A. $g_h = g$ B. $g_h = \frac{g}{4}$
C. $g_h = \frac{g}{9}$ D. $g_h = \frac{g}{2}$

(10) The lift of an aeroplane is based on the principle of_____.

A. Torricelli's theorem B. Equation of continuity
C. Benoulli's theorem D. Stokes theorem

(11) If length of second pendulum is *L*, then the length of pendulum having a period of 1s will be:

A. $\frac{L}{2}$ B. 2L
C. 4L D. $\frac{L}{4}$

(12) Which one of the following factor does not change during resonance?

A. Amplitude B. Velocity
C. Acceleration D. Time period

(13) A stretched string 4m long and it has 4 loops of stationary waves, then the wave length is:

A. 4m B. 3m
C. 2m D. 1m

(14) A sound source is moving towards stationary listener with $\frac{1}{10^{th}}$ of the speed of sound. The ratio of apparent to real frequency is:

A. $\frac{11}{10}$ B. $[\frac{11}{10}]^2$
C. $[\frac{9}{10}]^2$ D. $\frac{10}{9}$

(15) Signal from a remote control to the device operated by it travels with the speed of:

A. Sound B. Light
C. Ultrasonic D. Supersonics

(16) Light of wavelength λ is incident normally on a diffraction grating for which the split spacing is equal to 3λ. What is the sine of the angle $[\sin(\theta)]$ between the second order maximum and the normal?

A. $\frac{1}{6}$ B. $\frac{1}{3}$
C. $\frac{2}{3}$ D. 1

(17) Formation of clouds in atmosphere is due to_____process.

A. isothermal B. isochoric
C. isobaric D. adiabatic

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

Time allowed: 2.35 hours Total Marks: 68

Note: Answer all parts from Section 'B' and all questions from Section 'C' on the **E-sheet**. Write your answers on the allotted/given spaces.

SECTION – B (Marks 42)

Q.2 Attempt all parts from the following. All parts carry equal marks. (14×3 = 42)

i. Under what circumstances the *x*-component of a force is double of its *y*-component?

OR

Calculate the angle between two vectors for which magnitude of dot and cross product is same.

ii. The human pulse and the swing of a pendulum are possible time units. Why are they **NOT** often used? Give two reasons. (1.5+1.5)

OR

Does the dimension analysis give any information about constant of proportionality that may appear in algebraic expression? Explain

iii. Enlist three main causes of errors in measurement. (1+1+1)

OR

State first and second conditions of equilibrium. (1.5+1.5)

iv. If $m_2 = 2m_1$ and $v_2 = \frac{v_1}{2} v_2$ then for elastic collision in one dimension, calculate velocities after collision.

OR

Calculate the angle of projection for which range of projectile becomes four times than height of projectile.

v. Why does a diver change its body position before and after diving in the pool? Explain.

OR

Earth satellite is a gravity free system. Explain with reason.

vi. How is a venturi duct used in the carburetor of a car engine?

OR

Why fog droplets appear to be suspended in air?

vii. During S.H.M, in a mass-spring system, calculate the displacement at which K.E. becomes equal to P.E.

OR

Calculate the fundamental frequency of air column in closed organ pipe.

viii. 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.

OR

How large must a heating duct be if air moving 5 ms^{-1} along it can replenished in the air in a room of 200 m^3 volume every 1 hour? Assume the air density remains constant.

ix. Calculate the temperature at which speed of sound becomes double of its speed at 0°C.

OR

Explain why sound travels faster in warm air than in cold air.

x. A thin oil film on the surface of water shows different colors. Why?

OR

A diffraction grating has 5000 lines per centimeter. Calculate its grating element in meter.

xi. A beam of X-rays of wavelength 0.3 nm is incident on a crystal and gives a first order maximum when the glancing angle is 9°. Find the atomic spacing.

OR

Calculate the wavelength of light used when 2000 fringes are observed by moving the mirror of Michelson interferometer by 0.5 mm.

xii. Can we realize an ideal simple pendulum? Explain with reasons.

OR

Why is a rifle barrel 'rifled'?

xiii. Explain why adiabatic curve is steeper than isothermal curve?

OR

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

xiv. What is meant by conservative field? Give two examples. (1+1+1)

OR

What is biomass? How energy is obtained from biomass? (1+2)

SECTION – C (Marks 26)

Note: Attempt all questions. Marks of each question are given within brackets**.**

Q.3 What is absolute P.E? Derive a mathematical expression for it using diagram. (1+6)

OR

What is the First Law of Thermodynamics? Explain it in detail. (1+6)

Q.4 Show that $C_p - C_v = R$. (6)

OR

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}. (6)

Q.5 State Doppler's effect. Also derive mathematical expressions when apparent frequency of wave decreases than the real frequency. (1+2+2+2)

OR

Define Simple Harmonic Motion (SHM). Show that motion of a simple pendulum is SHM. Also derive an expression for its time period "T". (1+4+2)

Q.6 A spherical ball of weight 80 N and radius 40 cm is to be lifted over a 10 cm step. How much minimum force is required to lift it on step if force is applied at half of the radius of sphere from center? (6)

OR

Define polarization of light. What is the necessary condition for polarization of light by reflection? Derive relation for Brewster's law. (1+1+4=6)

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PHYSICS HSSC-I

Student Learning Outcomes Alignment Chart

(Curriculum 2006)

SECTION-A

Q.1

(1) Assess the uncertainty in a derived quantity by simple addition of actual, fractional or percentage uncertainties.

(2) Determine the sum of vectors using Head-to-Tail rule.

(3) Evaluate using equations of uniformly accelerated motion that for a given initial velocity of frictionless projectile

1. How higher does it go?
2. How long will it remain in air?

(4) Describe scalar and vector product of two vectors in terms of angle between them.

(5) Apply Newton's laws to explain the motion of objects in a variety of context.

(6) Utilize work-energy theorem in a resistive medium to solve problems.

(7) Utilize work-energy theorem in a resistive medium to solve problems.

(8) Solve problems by using $S = r\theta$ and $v = r\omega$.

(9) Define the term orbital velocity and derive relationship between orbital velocity, the gravitational constant, mass and the radius of the orbit.

(10) Interpret and apply Bernoulli's effect in daily life, in the filter pump, venturi meter, in atomizers, flow of air over an airfoil and in blood physics.

(11) Analyze the motion of a simple pendulum is SHM and calculate its time period.

(12) Describe qualitatively the factors which determine the frequency response and sharpness of the resonance.

(13) Describe modes of vibration of strings.

(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) Explain that Doppler effect is also applicable to electromagnetic waves.

(16) Describe the use of diffraction grating to determine the wavelength of light and carry out calculations using $d \sin\theta = m\lambda$

(17) Describe the first law of thermodynamics expressed in terms of the change in internal energy, the heating of the system and work done on the system.

SECTION-B

Q.2

i. Represent a vector into two perpendicular components.

OR

Describe scalar product of two vectors in term of angle between them.

ii. Differentiate between precision and accuracy.

iii. Distinguish between systematic errors (including zero errors) and random errors.

iv. Solve different problems of elastic and inelastic collisions between two bodies in one dimension by using law of conservation of momentum.

OR

Evaluate using equations of uniformly accelerated motion that for a given initial velocity of frictionless projectile how far would it go along the level land?

v. Explain conservation of angular momentum as a universal law and describe examples ofconservation of angular momentum.

OR

Explain that the objects in orbiting satellites appear to be weightless.

vi. Interpret and apply Bernoulli's effect in daily life, in the filter pump, venturi meter, in atomizers,flow of air over an airfoil and in blood physics.

vii. Describe the interchange between K.E. and P.E. during SHM.

viii. Describe Young's double slit experiment and the evidence it provides to support thewave theory of light.

OR

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

ix. Identify the factors on which speed of sound in air depends.

OR

Explain that speed of sound depends on the medium's properties in which it propagates and describe Newton's formula for speed of waves.

x. Explain colour pattern due to interference in thin films.

xi. Describe the phenomena of diffraction of X-rays through crystals.

OR

Describe the parts and working of Michleson Interferometer and its uses.

xii. Analyze the motion of a simple pendulum is SHM and calculate its time period.

xiii. Explain that first law of thermodynamics expresses the conservation of energy.

OR

Describe the Newton's second law of motion as rate of change of momentum.

xiv. Differentiate conservative and non-conservative forces giving examples of each.

SECTION-C

Q.3 Define potential at a point as work done in bringing unit mass from infinity to that point.

OR

Describe the first law of thermodynamics expressed in terms of the change in internal energy, the heating of the system and work done on the system.

Q.4 Apply first law of thermodynamics to derive $Cp - Cv = R$.

OR

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

Q.5 Explain the observed change in frequency of a mechanical wave coming from amoving object as it approaches and moves away (i.e. Doppler effect).

OR

Analyze the motion of a simple pendulum is SHM and calculate its time period.

Q.6 Define potential at a point as work done in bringing unit mass from infinity to that point.

OR

Explain polarization as a phenomenon associated with transverse waves.

PHYSICS HSSC-I
(Restructured)
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	2(v)3	2(iii)3 2(iii)3OR		2(xiv)1 2(xiv)3 OR	1(8)1 2(vii)3 2(viii)3	1(10)1	1(12)1 2(vii)3OR 2 (xviii)3	1(15)1 2(xiv)3	2(xv)3	1(17)1 4(a)6	40	27.5%
Understanding based	1(1)1 2(ii)3 2(ii)3OR 2(xvii)3	1(2)1 1(4)1 2(i)3 2(xx)3	1(3)1 2(ii)3 2(iii)3 5(c)3	1(6)1 1(7)1 2(vi)3 Q(3)7	1(9)1 2(xii)3OR 5(a)6	2(vi)3 2(vi)3OR 2(x)3	1(11)1 2(xi)3 Q(5)7OR	1(13)1 2(vii)3 2(x)3 Q(5)7	2(xvi)3 3(c)3 6(OR) 6	2(xix)3 Q(3)7OR	71	49%
Application based		Q(6)6	1(5)1 2(iv)3	2(xiv)2	2(xii)3	2(ix)3 Q(4)6 OR	2(xii)3	1(14)1 2(xiii)3	1(16)1 2(x)3 Q(6)6	Q(4)6	34	23.5%
Total marks	13	18	14	17	17	16	11	12	19	14	145	100%

KEY:

1(1)(01)

Question No (Part No.) Allocated Marks

Note: (i) The policy of FBISE for knowledge based questions, understanding based questions and application based questions is approximately as follows:

a) 27.5% knowledge based.
b) 49% understanding based.
c) 23.5% application based.

(ii) The total marks specified for each unit/content in the table of specification is only related to this model question paper.

(iii) The level of difficulty of the paper is approximately as follows:

a) 40% easy
b) 40% moderate
c) 20% difficult