PHYSICS SSC–I
SECTION – A (Marks 12)
Time allowed: 15 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. All parts carry one mark.

1.   If the number of vernier scale divisions is 20 and minimum main scale division is 1 mm, then Least count of vernier calipers is:
   A.   0.5 mm   ○   B.   0.05 mm   ○
   B.   0.01 mm   ○   C.   0.005 mm   ○

2.   Thermometer is used to measure:
   A.   Internal energy   ○   B.   Total energy   ○
   C.   Heat   ○   D.   Temperature   ○

3.   Which one of the following is a unit of momentum?
   A.   Nm   ○   B.   Ns   ○
   C. Nm^{-1} ○   D. Ns^{-1} ○

4.   In speed-time graph, graphic line inclined to time axis with positive slope, shows:
   A.   Uniform Velocity   ○   B.   Uniform Acceleration   ○
   C.   Variable Acceleration ○   D.   Negative Acceleration   ○

5.   A body of mass 1500g is dropped from 20m high tower. It will reach the ground in:
   A.   6.5 seconds   ○   B.   5.0 seconds   ○
   C.   3.5 seconds   ○   D.   2.0 seconds   ○

6.   A boy is pulling a box with a force of 50N which makes an angle of 60^0 with the ground. Its perpendicular components are:
   A.   4.33N, 25N   ○   B.   25N, 43.3N   ○
   C.   28.3N, 40N   ○   D.   15.5N, 35.5N ○

7.   Which one of the following is **NOT** true for couple acting on a steering wheel?
   A. $\Sigma F = 0$ ○   B. $\Sigma \tau = 0$ ○
   C. $\Sigma \tau \neq 0$ ○   D. $\Sigma a = 0$ ○

8. The mathematical form of an orbital velocity for a satellite revolving close to the Earth such that R>>h is:

A. $V_0 = \sqrt{g_h(R+h)}$ ○   B. $V_0 = \sqrt{GR}$ ○

C. $V_0 = \sqrt{Gh}$ ○   D. $V_0 = \sqrt{Rh}$ ○

9. One horse power is equal to:

A. 74.6 W ○   B. 7.46×10^6 W ○

C. 746 W ○   D. 3.609 MW ○

10. Hydraulic press is an application of:

A. Archimedes' Principle ○   B. Pascal's Law ○

C. Principle of flotation ○   D. Newton's Law ○

11. What will be the value of coefficient of volume thermal expansion β for a solid for which coefficient of linear thermal expansion α has value of $4 \times 10^{-5} K^{-1}$?

A. $12 \times 10^{-5} K^{-1}$ ○   B. $6 \times 10^{-5} K^{-1}$ ○

C. $4 \times 10^{-10} K^{-1}$ ○   D. $8 \times 10^{-5} K^{-1}$ ○

12. Land breeze and sea breeze are the result of:

A. Conduction ○   B. Convection ○

C. Radiation ○   D. Insulation ○

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Time allowed: 2.45 hours   Total Marks: 53

Note: Answer any eleven 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 33)

Q.2   Attempt any **ELEVEN** parts from the following. All parts carry equal marks.

$(11 \times 3 = 33)$

i.   Differentiate between base physical quantities and derived physical quantities.
ii.   Sketch a speed time graph, depicting uniform acceleration and find distance from this graph.
iii. Define momentum, write its formula and unit.
iv.   What will happen to a person sitting inside a bus when a bus turns a corner to the left suddenly?
v.   How does an artificial satellite keep on moving around the Earth?
vi.   Define Torque. Write it's formula and unit.
vii. Why the height of a racing car is kept as low as possible?
viii. How does gravitational acceleration varies with altitude?
ix.   A force of 100N acts on a body of mass 20kg. The force accelerates the body from rest until it attains a velocity of 20ms^{-1}. Through what distance the force acts?
x.   Why are fossil fuels called non-renewable form of energy?
xi.   State Hook's Law and write its mathematical form.
xii. What makes a sucker to be pressed on a smooth wall?
xiii. Describe latent heat of fusion and latent heat of vaporization.
xiv. How is evaporation used to produce cooling in a refrigeration process?
xv.   How is much heat lost in an hour through a glass window measuring 2.0m by 2.5m when inside temperature is 30^{0}C and that of outside is 5^{0}C, the thickness of the glass is 0.8cm and the value of thermal conductivity for glass is 0.8Wm^{-1}K^{-1}?

SECTION – C (Marks 20)

Note: Attempt any **TWO** questions. All questions carry equal marks.   **(2 × 10 = 20)**

Q.3   a.   Derive third equation of motion using speed time graph for a uniformly accelerated body.   **(2+4)**
          b.   How does friction play an important role in our daily life?   **(4)**

Q.4   a.   Define resolution of a force. How can a force making an angle θ with x-axis, be resolved into its perpendicular components?   **(2+4)**
          b.   Calculate mass of Earth using Newton's Law of gravitation.   **(4)**

Q.5   a.   State and explain Archimedes' Principle.   **(2+4)**
          b.   How much ice will melt by 5000J of heat? Latent heat of fusion of ice is 336000 Jkg^{-1}.   **(4)**

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PHYSICS SSC-I
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.   Describe the working of Vernier calipers and screw gauge for measuring length.
2.   List basic thermometric properties for a material to construct a thermometer
3.   Define momentum, force, inertia, friction, centripetal force
4.   Plot and interpret distance-time graph and speed-time graph
5.   Solve problems related to freely falling bodies using 10 ms^{-2} as the acceleration due to gravity
6.   Determine the magnitude and direction of a force from its perpendicular components
7.   Demonstrate the role of couple in steering wheels and pedals.
8.   Describe how artificial satellite keep on moving around the earth due to gravitational force
9.   Define unit of power in SI unit and conversion in hp.
10.   State that Hydraulic Press, Hydraulic Car lift and Hydraulic brakes operates on the principle that the fluid pressure is transmitted equally in all direction.
11.   Describe qualitatively the thermal expansion of solids (linear and volumetric expansion)
12.   State some examples of heat transfer by convection in everyday life

SECTION – B

Q.2   Attempt any ELEVEN parts from the following.
i.   Differentiate between base and derived physical quantities.
ii.   Plot and interpret distance-time graph and speed-time graph.
    Calculate the area under speed-time graph to determine the distance traveled by themoving body.
iii.   Define momentum, force, inertia, friction, centripetal force.
iv.   State what will happen to you while you are sitting inside a bus when the bus
    1.   start moving suddenly
    2.   stop moving suddenly
    3.   turns a corner to the left suddenly.
v.   Describe how artificial satellite keep on moving around the earth due to gravitational force.
vi.   Define moment of force or torque as moment = force x perpendicular distance from pivot to the line of action of force.
vii.   Explain effect of the position of the centre of mass on the stability of simple objects.
viii.   Explain that value of 'g' decreases with altitude from the surface of earth.
ix.   Calculate work done using equation
    Work = force x distance moved in the direction of force.

x. Describe the processes by which energy is converted from one form to another with reference to
    o fossil fuel energy
    o hydroelectric generation
    o solar energy
    o nuclear energy
    o geothermal energy
    o wind energy
    o biomass energy
xi. State Hooke's law and explain elastic limit.
xii. Explain that action of sucking through straw, dropper, syringe is due to atmospheric pressure.
xiii. Describe heat of fusion and heat of vaporization (as energy transfer without a change of temperature for change of state).
xiv. Describe the use of cooling caused by evaporation in refrigeration process without using harmful CFe.
xv. Solve problems based on thermal conductivity of solid conductors.

SECTION – C

Note: Attempt any **TWO** questions.

Q.3 a. Derive equations of motion for a body moving with a uniform acceleration in a straight line using graph.

   b. Describe advantages of friction in real world situations, as well as methods used to increase or reduce friction in these situations (e.g. advantageous of friction on the surface of car tyres (tyre tread), cycling, parachute, knots in string; disadvantages of, and methods of reducing friction between moving parts of industrial machines and on wheels spinning on axis).

Q.4 a. Describe how a force is resolved into its perpendicular components. Determine the magnitude and direction of a force from its perpendicular components

   b. Calculate mass of earth by using law of gravitation.

Q.5 a. State Archimedes principle. Determine the density of an object using Archimedes Principle.

   b. Solve numerical problems based on the mathematical relations learnt.

PHYSICS SSC-I
TABLE OF SPECIFICATION

Topics	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7	Unit-8	Unit-9	Total marks	Percentage
Knowledge Based	1-1(1) 2-i(3)	2-iii(3)	1-3(1)	2-vi(3) 4 a(2)		1-9(1)	2-xi(3) 5 a(6)	1-2(1)		24	27.6%
Understanding based		1-4 (1) 1-5(1) 2-ii (3) 3 a(6)	2-v(3)	1-6(1) 1-7(1) 4 a(4)	1-8(1) 2-viii(3) 4 b(4)	2-ix(3) 2-x(3)		2-xiii(3) 1-11(1) 2-xiv(3) 5 b(4)	2-xv(3)	48	55.2%
Application Based			2-iv(3) 3 b(4)	2-vii(3)			1-10(1) 2-xii(3)		1-12(1)	15	17.2%
Total marks for each Unit	04	14	11	14	08	07	13	12	04	87	100%

KEY:

1-1(1)
Question No-Part No. (Allocated Marks)