INDIAN SCHOOL MUSCAT

SAMPLE PAPER

CLASS XI

PHYSICS (042)

Time allowed: 3 hours | Max. Marks: 70

General Instructions:

1. All questions are compulsory. There are 37 questions in all.
2. This question paper has four sections: Section A, Section B, Section C and Section D.
3. Section A contains twenty questions of one mark each, Section B contains seven questions of two marks each, Section C contains seven questions of three marks each, and Section D contains three questions of five marks each.
4. There is no overall choice. However, internal choices have been provided in two questions of one mark each, two questions of two marks, one question of three marks and three questions of five marks weightage. You have to attempt only one of the choices in such questions.
5. You may use the following values of physical constants where ever necessary.

Acceleration due to gravity g = 10 m/s^2

Density of water = 1000 kg/m^3

Gravitational constant G = 6.67 x 10^{-11} Nm^2/kg^2

Mass of earth = 6 x 10^{24} kg

SECTION A

Directions (Q1-Q10) Select the most appropriate option from those given below each question

1 The following forces are short range forces 1
(a) electromagnetic force and weak nuclear force (b) strong nuclear force and weak nuclear force (c) gravitational force and weak nuclear force (d) electromagnetic force and gravitational force

2 The distance travelled by a body, falling freely from rest in one, two and three seconds are in the ratio (a) 1 : 2 : 3 (b) 1 : 3 : 5 (c) 1 : 4 : 9 (d) 9 : 4 : 1 1

3 A car travels a from a town A to B with uniform speed 60km/h and returns with a speed 90km/h the average speed is (a) 72km/h (b) 75km/h (c) 90km/h (d)150 km/h 1

4 Two objects are dropped from different heights h_1 and h_2 respectively the ratio of velocity 1

with which they strike the ground is
(a) h_1/h_2 (b) $(h_1/h_2)^{1/2}$ (c) $(h_1/h_2)^2$ (d) $1/2(h_1/h_2)$

5 A gun fires two bullets with same velocity at 60° and 30° with horizontal. The bullets strike at the same horizontal distance. The ratio of maximum height for the two bullets is in the ratio 1
(a) 2 : 1 (b) 3 : 1 (c) 4 : 1 (d) 1 : 1

6 For a particle revolving in a circular path, the acceleration of the particle is 1
(a) along the tangent
(b) along the radius
(c) along the circumference of the circle
(d) Zero

7 A stone is dropped from the window of a train moving along a horizontal straight track, the path of the stone as observed by an observer on ground is 1
(a) Straight line
(b) Parabola
(c) Circular
(d) Hyperbola

(OR)

An object is thrown along a direction inclined at an angle 45° with the horizontal. The horizontal range of the object is
(a) vertical height
(b) twice the vertical height
(c) thrice the vertical height
(d) four times the vertical height

8 A cyclist of mass m is taking a circular turn of radius R on a frictional level road with a velocity v. Inorder that the cyclist does not skid, 1
(a) $(mv^2/2) > \mu mg$
(b) $(mv^2/r) > \mu mg$
(c) $(mv^2/r) < \mu mg$
(d) $(v/r) = \mu$

9 When three forces acting at a point are in equilibrium 1
(a) each force is equal to the vector sum of the other two forces.
(b) each force is greater than the sum of the other two forces.
(c) each force is greater than the difference of the other two forces.
(d) each force is to product of the other two forces.

10 Newton's first law of motion gives the concept of (a) energy (b) work (c) momentum (d) Inertia 1

Directions (Q11 –Q15) Fill in the blanks with appropriate answer.

11 The moment of inertia of a disc having mass M and radius R, about an axis passing through Its centre and perpendicular to its plane is …… 1

12 ……. among the following volume , pressure ,density , temperature of a thermodynamic system is extensive variable. 1

13 Motion in vertical circle is ---------- circular motion 1

14 Thick steel ropes are made by braiding a number of thin steel wires to increase---------- and ……. 1

15	The value of stress above which a material changes from elastic to plastic nature is ----------	1
16	Melting of ice quickly by the application of pressure and quick refreezing on removal of pressure is called ----------	1
17	The moment of inertia of a body does not depend on which one of the following the angular velocity of the body ,the mass of the body ,the axis of rotation of the body , the distribution of mass in the body?	1
18	Draw the indicator diagram for isobaric process .	1
19	What is Doppler effect ?	1
20	Two sound waves of frequencies 5000 Hz and 500 Hz are produced by two sources which of them will travel faster in air?	1

SECTION B

21	State any two differences between accuracy and precision.	2
22	Give reason a) mountain roads are generally winding upwards. b) a sail boat cannot move by placing a huge fan working in front of the sails.	2
23	Define impulse and derive relation between impulse and linear momentum (OR) Derive expression for acceleration of an object moving down an inclined plane .	2
24	A molecule in a gas container hits a horizontal wall with speed 200 m s^{-1} and angle 30° with the normal, and rebounds with the same speed. Is momentum conserved in the collision ? Is the collision elastic or in elastic? Justify.	2
25	At what height from the surface of earth the acceleration due to gravity would become 64% of its value on the surface of earth? Take radius of earth to be 6400km. (OR) The height of orbit of an artificial satellite of mass 500kg from the surface of earth of radius 6400km is 270km. Calculate its total energy , kinetic energy and potential energy .	2
26	Give reason a) Invar steel is used to make pendulums of the clocks b) pressure cookers are necessary for cooking at high altitudes .	2
27	State and verify Avagadro's law.	2

SECTION C

28	a)Draw position time graph for two objects whose relative velocity is zero. b) Derive the relation $v^2-u^2 =2aS$ for a point object in uniform acceleration by drawing a v-t graph.	3

29 Show that the path of an oblique projectile is a parabola . 3

(OR)

Define centripetal acceleration and derive an expression for the centripetal acceleration of an object in uniform circular motion.

30 a) Define torque in terms of angular momentum 3

b) Give reason

i) handles are fitted closer to the edges /rims of grinding stones.

ii) planets move faster when they are closer to the Sun

31 State and verify law of periods for planetary motion. 3

32 a) State the zeroth law of thermodynamics. 3

b) State any two differences between adiabatic and isothermal processes.

c) Can the efficiency of a heat be equal to unity or 100%? Justify .

33 a)State theorem of equi partition of energy . 3

b)Derive expression for C_p, C_v and Υ for a mono atomic gas .

34 a)Why distant sound is heard clearly during winter?

b)Mention one use of beats.

c) State two differences between progressive waves and stationary waves.

SECTION D

35 a)With neat diagrams explain the head on elastic collision between two objects and derive expression of their velocities after collision. 5

b) State two differences between conservative and non conservative forces.

(OR)

a)With a neat diagram explain the motion of an object connected to a string in a vertical circle, and derive expressions for velocity and tension at the top and bottom of the circle.

b) Find the ratio of kinetic energy at any particle at a height R from the bottom of the circle and a particle at the bottom of the circle.

36 a) Define terminal velocity and derive an expression for the terminal velocity of a spherical object falling through a highly viscous liquid. 5

b) State two differences between viscous force and the frictional force.

c) Define coefficient of viscosity of a fluid.

(OR)

a)State and verify Bernoulli's theorem.

b) State two differences between streamlined and turbulent motion of a fluid.

c) Why is not safe to stand closer to the railway track on the platform when a fast moving train approaches the station?

37 a)Show that oscillations of a simple pendulum are SHM. Derive an expression for the time period of oscillation of simple pendulum. 5

b) The equation of a particle executing SHM is $y = 5\sin(100\pi t + \frac{\pi}{3})$. Calculate (i) amplitude (ii) time period (iii) maximum velocity or velocity amplitude (iv) epoch or initial phase of the particle . (y is in m and t is in second)

(OR)

a)Derive expression for the total energy of a particle in SHM.

b) At what displacement from mean position the kinetic energy of an oscillator is equal to potential energy.

c) Draw a graph to show variation of total energy , kinetic energy, and potential energy of an oscillator with displacement from mean positions .