

INTERNATIONAL INDIAN SCHOOL - DAMMAM
MODEL EXAMINATION - JANUARY 2016
Subject – Physics

Class - XI

SET – A

Time: 3 hours

Max Marks: 70

General Instructions:

- a) All questions are compulsory.
- b) There is no overall choice. However an internal choice has been provided in one question of two marks, one question of three marks, all three questions of five marks.
- c) Question no 1 to 5 are very short answer type questions carrying 1 mark each.
- d) Question no 6 to 10 are short answer type questions carrying 2 marks each.
- e) Question no 11 to 22 are short answer type questions carrying 3 marks each.
- f) Question no 23 is a value based question carrying 4 mark.
- g) Question no 24 to 26 are long type questions carrying 5 marks each.
- h) Use of calculator is not permitted. However you may use log table if necessary.

1. What is percentage error in volume of a sphere, when error in measuring its radius is 3%?
2. Rain drops falling under gravity do not acquire very high velocity. Why?
3. Two wires are made of same metal. The length of the first wire is half that of the second wire and its diameter is doubled that of second wire. If equal loads are applied on both wires, find the ratio of increase in their lengths.
4. Draw position –time graph for an object moving with (i) zero acceleration and (ii) positive acceleration.
5. Why do we place handles at maximum distance from the hinges in a door?
6. Why is it easier to pull a body than to push it?
7. What are reversible and irreversible processes? Give examples of each
8. At what distance from the mean position is the Kinetic energy in simple harmonic oscillator equal to Potential energy?

9. Prove that the horizontal range is same when angle of projection is i) greater than 45° by certain value and ii) less than 45° by the same value.

OR

Two bodies are thrown with the same initial velocity at angles α and $(90-\alpha)$ with the horizontal. What will be the ratio of maximum height attain by them.

10. State law of equipartition of energy. Use this law to calculate the specific heats of monoatomic gases.
11. a) Define instantaneous velocity.
b) A particle moves along a straight line such that its displacement 'S' at any time 't' is given by $s = t^3 - 6t^2 + 3t + 4$ metres. Find the velocity, when the acceleration is zero.
12. a) Discuss the variation of 'g' with depth.
b) At what height from the surface of earth, the acceleration due to gravity is the same at a depth 160 Km below the surface of earth.
(Radius of earth = 6400 Km)
13. a) Show that the motion of a simple pendulum is simple harmonic.
b) What effect on the time period of simple pendulum when it taken to the moon?
14. A 10kw drilling machine is used to drill a bore in a small aluminium block of mass 8 Kg. How much is the rise in temperature of the block in 2.5 minutes, assuming 50% of power is used up in heating itself or lost to the surroundings.
(Specific heat of aluminium = $0.91 \text{ Jg}^{-1}\text{K}^{-1}$)
15. Establish a relation for the excess pressure on a drop of liquid of surface tension ' σ ', giving reason for its pressure.
16. State parallelogram law of vector addition. Find the magnitude and direction of the resultant of two given vector inclined at an angle θ .
17. a) Define orbital velocity.
b) Derive an expression for orbital velocity of an artificial satellite of mass 'm' moving in a circular orbit at a height 'h' above from earth's surface.

OR

- a) Obtain the expression for the escape velocity on earth.
b) Why is it that there is no atmosphere on the moon? Explain.

18. State and explain Work- Energy theorem.
19. State the law of conservation of momentum. Prove it by using second law of motion. Give two situations where the linear momentum remains constant.
20. What is meant by potential energy in a stretched wire? Find a relation for it and also determine the elastic potential energy per unit volume of the wire.
21. A disc of mass 5Kg and radius 50cm rolls on the ground at the rate of 10m/s. Calculate the K.E of the disc. (Given $I = \frac{1}{2}MR^2$)
22. The velocity (v) of water waves may depend upon their wave length (λ), the density of water (ρ) and the acceleration due to gravity (g).Find the relation between these quantities by the method of dimensions.
23. Sumesh went to big bazaar to purchase certain goods. There he has noticed an old lady struggling to carry the goods from one floor to the next. Then sumesh took her to the lift and showed her how to operate it. The old lady was very happy.
- a) What values the sumesh possess?
- b) An elevator can carry a maximum load of 1800 kg is moving up with a constant speed of 2m/s, the frictional force opposing the motion is 4000N. Determine the minimum power delivered by motor to the elevator in Watts.
- 24 a) Define angle of friction and coefficient of friction.
- b) A bullet of mass 0.01kg is fired horizontally into a 4kg wooden block at rest on a horizontal surface. The coefficient of kinetic friction between the block and the surface is 0.25. The bullet remains embedded in the block and the combination moves 20m before coming to rest. With what speed did the bullet strike the block?

OR

- a) What is meant by banking of roads? Obtain an expression for the maximum speed, which a vehicle can safely negotiate a curved road banked at an angle θ .
- b) Calculate the maximum speed with which a car can be driven safely along a curved road of radius 30m and banked at 30° with the horizontal.
Given, $g = 9.8\text{m/s}^2$.

25. a) What are beats?
b) Discuss graphical method of formation of beats.
c) Derive an expression for beat period and beat frequency.

OR

- a) Explain Doppler Effect in sound. Obtain expressions for apparent frequency of sound when source and listeners are i) approaching and ii) receding from each other.
b) If the frequency of a tuning fork is 400Hz and the velocity of sound in air is 320 m/s, find how far the sound travels when the fork executes 35 vibrations.
26. a) Write Clausius statements for second law of thermodynamics.
b) Explain briefly the working principle of a refrigerator with the help of a diagram and obtain an expression for its coefficient of performance.

OR

- a) State mathematically, first law of thermodynamics.
b) Define an adiabatic process. Derive an expression for work done during an adiabatic process.

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Class - XI

SET – B

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1. What is percentage error in density of a cube when its mass is uncertain by 3% and length of its edge is uncertain by 1%?
 2. It is advised not to stand near a running train. Why?
 3. A wire stretches a certain amount under a load. If the load and diameter are both increased to three times, find the stretch caused in the wire?
 4. There are two spheres of same mass and same radius, one is solid and other is hollow. Which of them has a larger moment of inertia about its diameter?
 5. Draw position-time graph for an object moving with (i) negative acceleration and (ii) zero acceleration.
 6. At what distance from the mean position is the Kinetic energy in simple harmonic oscillator equal to Potential energy?
 7. Prove that the horizontal range is same when angle of projection is i) greater than 45° by certain value and ii) less than 45° by the same value.

OR

Two bodies are thrown with the same initial velocity at angles α and $(90-\alpha)$ with the horizontal. What will be the ratio of maximum height attain by them.

8. State law of equipartition of energy. Use this law to calculate the specific heats of diatomic gases.
9. What are reversible and irreversible processes? Give examples of each
10. Explain why a horse cannot pull a cart and run in empty space.
11. Establish a relation for the excess pressure on a drop of liquid of surface tension ' σ ', giving reason for its pressure.
12. a) Define orbital velocity.
b) Derive an expression for orbital velocity of an artificial satellite of mass ' m ' moving in a circular orbit at a height ' h ' above from earth's surface.

OR

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