No. of printed pages:3

INDIAN SCHOOL SOHAR
FINAL EXAMINATION
PHYSICS – THEORY

CLASS: XI **MARKS:70**
DATE:24 /2/2015 **TIME:3hrs**

General Instructions:
1. All questions are compulsory.
2. There are 26 questions in all .Questions 1 to 5 carry one mark each, questions 6 to 10 carry two marks each, questions 11 to 22 carry three marks each. Question 23 is a value based question carrying four marks and questions 24 to 26 carry five marks each.
3. There is no overall choice. However, internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks each.
4. You have to attempt only one of the given choices in such questions.
5. Use of calculator is not permitted.

SECTION-A

1. Name the basic forces in nature. Arrange them in order of their increasing strength. (1)

2. A force F=a+bx acts on a particle in the x-direction, where a and b are constants. Find the work done by this force during the displacement from x=0 to x=d. (1)

3. Define torque . Mention its units. (1)

4. At what height from the surface of the earth,will the value of g reduce by 36% from the value at the surface ? Radius of the earth=6400km. (1)

5. The pressure of a medium is changed from 1.01×10^5 Pa to 1.0165×10^5 Pa and change in volume is 10%, keeping temperature constant. Find the bulk modulus of the medium. (1)

SECTION-B

6. Deduce the dimensional formula for (i) surface tension (ii) coefficient of viscosity. (2)

7. Define and explain the terms (i) average acceleration (ii) instantaneous acceleration. Also mention their formula. (2)

8. An aeroplane takes off at angle of 30^0 to the horizontal. If the component of its velocity along the horizontal is 250 km/h, what is the actual velocity? Also find the vertical component of the velocity. (2)

9. State Newton's second law of motion. Hence deduce the equation for force. (2)

10.The constituent waves of a stationary wave have amplitude, frequency and velocity as 8cm,30 Hz and 180cm/s respectively. Write down the equation of the stationary wave.

OR

10. Stationary waves are set up by the superposition of two waves given by

$y_1=0.05 \sin(5\pi t-x)$ and $y_1=0.05 \sin(5\pi t+x)$ where x and y are in metres and t in seconds. Find the displacement of a particle situated at a distance x=1m. (2)

SECTION-C

11. Describe the phase relationship between displacement, velocity and acceleration with the help of graphical representation. (3)

12. The displacement (in meter) of a particle moving along x-axis is given by $x=18t+5t^2$. Calculate: (i) the instantaneous velocity at t=2s,(ii) average velocity between t=2s and t=3s,(iii) instantaneous acceleration. (3)

13. A projectile is fired horizontally with a velocity u. Show that its trajectory is a parabola. Also obtain an expression for its time of flight. (3)

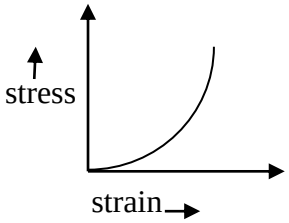
14. (a) Define impulse of a force. Mention its unit and formula.
(b) While launching a rocket of mass 2×10^4 kg, a force of 5×10^5 N is applied for 20s. Calculate the velocity attained by the rocket at the end of 20s. (3)

15. Show that the total energy of the stretched spring remains conserved when released. Find the expression for the maximum speed. Represent the conservation of energy graphically. (3)

16.(a) Mention the conditions to be satisfied for the body to be in equilibrium.
(b) Find (i) the radius of gyration and (ii) the moment of inertia of a rod of mass 100g and length 100cm about an axis passing through its centre and perpendicular to the length. (3)

17.(a) Derive an expression for acceleration due to gravity on the surface of the earth.
(b) Where will a body weigh more, 1km above the surface of earth or 1km below the surface of the earth? Justify your answer. (3)

18.(a) A stress - strain curve is shown below. Identify the material and write a note on the same. (b) A wire stretches by a certain amount under a load. If the load and the radius both are increased to four times, find the stretch caused in the wire. (3)



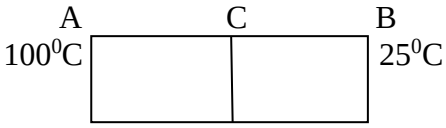
19. State and prove Pascal's law of transmission of fluid pressure. What is the pressure on a swimmer 10m below the surface of a lake? (3)

20.(a) What is laminar flow of a liquid? (b) Derive the equation of continuity for the incompressible non – viscous fluid having a steady flow through a pipe.

OR

20. Derive an expression for speed of efflux. Hence state the Toricelli's law. (3)

21.(a) Obtain an expression for heat conduction through a substance and hence coefficient of thermal conductivity. (b) Two identical rods AC and CB made of two different metals having thermal conductivities in the ratio 2:3 are kept in contact with each other at the end C as shown in figure. A is at 100^0C and B is at 25^0C. Calculate the temperature at the junction C.



(3)

22. Explain the phenomenon of (i) regelation (ii) anomalous behaviour of water with help of graph. (3)

SECTION-D

23. A fast moving train collided against a stationary train. Moving train was damaged very badly and the passengers were injured very seriously. This accident took place near the village of Robin. When he came to know about the accident he started shouting. Villagers gathered on the sight of accident. Robin immediately informed the nearby police station on telephone. He started helping the villagers to evacuate the injured persons from the train. The injured passengers were shifted to nearby hospital for treatment.
(i) Why was fast moving train damaged very badly?
(ii) What are the value displayed by Robin? (4)

SECTION-E

24.(a) What are beats. Obtain the expression for beat frequency for maximum and minimum amplitude. (b) Obtain an expression for energy of simple harmonic oscillator.

OR

24.(a) What are damped oscillations. Obtain the expression for the amplitude of damped oscillation. (b) Obtain an expression for the time period of simple pendulum. (5)

25.(a) Derive an expression for the capillary rise in a capillary tube.
(b) A liquid rises to a height of 7 cm in a capillary tube of radius 0.1 mm. The density of the liquid is 0.8×10^3kg/m^3.If the angle of contact between the liquid and the surface of the tube be zero, calculate the surface tension of the liquid. Given g = 10 m/s^2.

OR

25.(a)Describe a venturimeter and obtain an expression for its working.
(b) An iron ball of radius 0.3 cm falls through a column of oil of density 0.94g/cm^3. It is found to attain a terminal velocity of o.5cm/s. Determine the viscosity of the oil. Given that density of iron is 7.8g/cm^3. (5)

26.(a)Derive an expression for the escape velocity of a body.
(b) A simple pendulum has a time period T_1 when on the earth's surface, and T_2 when taken to a height R above the earth's surface, where R is the radius of the earth. What is the value of T_2/ T_1?

OR

26. (a)Determine an expression for kinetic energy of a rotating body.
(b) A solid sphere is rolling on a frictionless plane surface about its axis of symmetry. Find the rotational energy and the ratio of its rotational energy to its total energy. (5)