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INDIAN SCHOOL SOHAR
FINAL EXAM- 2017
PHYSICS – THEORY

CLASS: XI **MARKS: 70**
DATE:23/2/2017 **TIME: 3Hrs**

General Instructions

All questions are compulsory.

1.There are 26 questions in total. 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 carrying four marks and questions 24 to26 carry five marks each.

2.There is no overall choice. However, internal choice has been provided in one question of two marks, one question of three marks and all questions of five marks. You have to attempt only one of the given choices in such questions.

3.Use of calculator is not permitted.

4.You may use the following physical constants wherever necessary

SECTION A

1. Mention the scientific principle for the technologies (i) Lasers (ii) Computers.

2. What is the angle of projection at which the 'h' (maximum) and range are equal.

3. What is the apparent weight felt by a person in an elevator, when it is accelerating
(i) upwards (ii) downwards.

4. Calculate the temperature whose value is the same on the celsius and Fahrenheit scale.

5. Mercury is used in thermometer. Mention any two reasons to justify.

SECTION B

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

OR

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

7. What are elastomers? Draw a stress-strain curve for the elastic tissue of aorta.

8. A drop of olive oil of radius 0.25 mm spreads into a circular film of radius 10 cm on the water surface. Estimate the molecular size of olive oil.

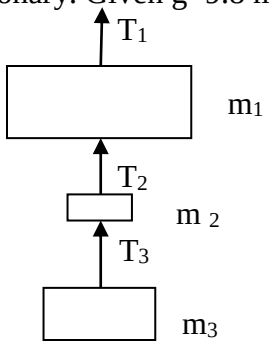
9. State Newton's second law of motion. Hence deduce the equation for force.

10. A bullet fired into a fixed target loses half of its velocity after penetrating 3 cm. How much further will it penetrate before coming to rest assuming that it faces constant resistance to motion?

SECTION C

11.(a) Write the expression for the path of flight of a projectile.
A ball of mass *m* is thrown vertically up. Another ball of mass *2m* is thrown at an angle θ with the vertical. Both of them remain in air for the same period of time. What is the ratio of the heights attained by the two balls ?

12. The masses m_1,m_2 and m_3 of the three bodies shown in figure are 5,2 and 3 kg respectively. Calculate the values of the tensions T_1, T_2 and T_3 when (i) the whole system is going upward with an acceleration of 2 m/s^2 and (ii) the whole system is stationary. Given g=9.8 m/s^2.



13. (a) Prove the work energy theorem for variable force. How can you determine the work done by a variable force graphically.

14. (i) Derive an expression for orbital velocity of a satellite.
(ii) A satellite revolves close to the surface of a planet. How is its orbital velocity related with velocity of escape from the planet. Justify.

15. What is modulus of elasticity? A copper wire of length 2.2 m and a steel wire of length 1.6m, both of diameter 3.0 mm, are connected end to end. When stretched by a load, the net elongation is found to be 0.70 mm. Obtain the load applied.

16. Define pressure . State and prove Pascal's law for fluid at rest.

OR

16. What is a mercury barometer. Mention its use and describe how can it be used.

17. What is the elastic potential energy stored in a spring?
The kinetic energy of a body decreases by 19%. What is the percentage decrease in its linear momentum?

18. Mention the factors on which moment of inertia depend.
What will be the duration of the day, if earth suddenly shrinks to 1/64 of its original volume, mass remaining the same?

19. Should the value of escape velocity be less or more on the surface of the moon as compared to Earth?
Show that the moon would depart for ever if its speed were increased by 42%.

20. What is the effect of pressure on the boiling point of a liquid? Explain it with the help of an activity.

21. a) The ratio of stress/strain remains constant for a small deformation. What would happen this ratio if, the deformation made is very large.
b) A sphere contracts in volume by 0.01% , when taken to the bottom of sea 1km deep. Find the bulk modulus of the material of the sphere. Density of sea water may be taken $10^3 kg/m^3$

22. Describe a Carnot cycle. Can you design a heat engine of 100% efficiency? Justify.

SECTION D

23. A fast moving train collided against a stationary strain. Moving train was damaged very badly and the passengers were injured 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. He started helping the villagers to evacuate the injured persons from the train. The injured passengers were shifted to the nearby hospital for treatment.
(i)Why was fast moving train damaged very badly?
(ii)What are the values displayed by Robin ?

SECTION E

24. Determine the frequency when source is stationary and the observer is moving . Discuss all the cases.
A rocket is moving at a speed of 200 ms^{-1} towards a stationary target. While moving, it emits a wave of frequency 1000 Hz. Some of the sound reaching the target gets reflected back to the rocket as an echo. Calculate (1) the frequency of the sound as detected by the target and (2) the frequency of the echo as detected by the rocket.

OR

24. Define beat frequency. Obtain an expression for it.
A wave travelling along a string is described by, $y(x,t) = 0.05\sin(8x-3t)$ in which the numerical constants are in SI units. Calculate (a) the amplitude ,(b) the wavelength, and (c) the period and frequency of the wave. Also, calculate the displacement of the wave at a distance x=20.0 cm and time t=20 s?

25. Define a SHM. Describe the method to show that a bob of a simple pendulum perform a SHM. Draw a graph to represent it.
The speed of a wave in a medium is 960 m/s. If 3600 waves are passing through a point in the medium in 1 minute, then calculate the wavelength.

OR

25. Explain the principal of superposition of two waves. Hence obtain a condition for maximum and minimum displacement after superposition of the waves.
Write the equation of a progressive wave propagating along the positive x-directon, whose amplitude is 5 cm, frequency 250 Hz and velocity 500m/s.

26. Show that average kinetic energy of molecule is proportional to the absolute temperature.
Derive and state the Dalton's law of partial pressures.

OR

26. Derive the expression for the work done in an adiabatic process.
Derive an expression for the speed of a travelling wave.