Code : 042

DELHI PUBLIC SCHOOL SURAT

PHYSICS

Roll No: | | | **Class: XI**

Marks: 70 ***Time Allowed: 3Hrs***

***Instructions*:**

1. Answer all questions.
2. Q.No.1 to 5 are very short answer questions and carry 1 mark each.
3. Q.No. 6 to 10 are short answer questions and carry 2 marks each.
4. Q.No. 11 to 22 are also short answer questions and carry 3 marks each.
5. Q.No. 23 may be value based carrying 4 marks each.
6. Q.No. 24 to 26 are also long answer questions and carry 5 marks each.
7. No overall choice is given.
8. Use of Calculators is not allowed. However if required use of Log tables is permitted.

1. State the principal of conservation of linear momentum? **[1]**

2. Draw position time graph for body A and body B having zero relative velocity. **[1]**

3. What is rotational analogue of force? **[1]**

4. State the Kelvin-Planck statement of the second law of thermodynamics. **[1]**

5. A simple harmonic motion has an amplitude A and time period T. what is the time taken to travel from x = A to x = A/ 2 ? **[1]**

6. Check the dimensional consistency of the following equation $v^2 - u^2 = 2as$ where symbols have their usual meaning. **[2]**

7. A man weighs 70kg. He stands on a weighting machine in a lift, which is moving **[2]**
(a) Upwards with a uniform speed of 10m/s.
(b) Downwards with a uniform acceleration of $5m/s^2$.
What would be the readings on the scale in each case.

8. State perpendicular axes theorem. **[2]**

9. State two differences between mass and weight**.** **[2]**

10. Molar volume is the volume occupied by 1 mole of any (ideal) gas at standard temperature and pressure (STP: 1 atmospheric pressure, $0\ ^0C$). Calculate the Molar volume. **[2]**

11. A bullet P is fired from a gun when the angle of elevation of the gun is 30°. Another bullet Q is fired from the gun when the angle of elevation is 60°. The vertical height attained in the second case is x times the vertical height attained in the first case. What is the value of x **[3]**

12. Two towns A and B are connected by a regular bus service with a bus leaving in either direction every T minutes. A man cycling with a speed of 20 km h^{-1} in the direction A to B notices that a bus goes past him every 18 min in the direction of his motion, and every 6 min in the opposite direction. What is the period T of the bus service and with what speed (assumed constant) do the buses ply on the road? **[3]**

13. (a) Why vehicles are provided with round tyres only and not any other shape?
(b) Mention two instances when friction between two surfaces is deliberately increased **[3]**

14. Prove that the second law is the real law of motion. **[3]**

15. Two bodies of unequal masses have same KE. Which one has greater linear momentum? **[3]**

16. Derive equation for loss of kinetic energy in case of a completely inelastic collision in one dimension? **[3]**

17. Obtain expression for KE of rolling motion. **[3]**

18. What do you understand by "Escape velocity"? Derive an expression for it. **[3]**

19. State and explain Torricelli's Theorem. **[3]**

20. The average depth of Indian ocean is about 3000 m. Calculate the fractional compression, $\Delta V / V$, of water at the bottom of the ocean, given that the bulk modulus of water is 2.2×10^9 N / m^2 .Take g = 10 m / s^2 **[3]**

21. State the law of equipartition of energy. Use this law to calculate specific heat of monoatomic gas. **[3]**

22. A particle executes SHM according to the equation $x = A \cos \omega t$.
Draw graphs to represent the displacement, velocity and acceleration of the particle. **[3]**

23. Sarah saw a baby of two years was trying to get into the dining table from the mother's hold where a jug of boiling water has been kept. The baby tried to jump and Sarah saw the baby jump and removed the jar aside.
a) Give reason: "Steam causes more severe burn than boiling water".
b) What values of Sarah are appreciable?
c) If at atmospheric pressure, 4 g of water having volume of 4.00 cm^3 becomes 6684 cm^3 of steam when boiled, then find the amount of heat added to the system? [L_v of water is 539cal/g at 1atm] **[4]**

24. Discuss briefly the banking of Roads. **[5]**

25. (a)Write the statement for Newton's law of cooling. **[5]**
Draw graph for ($T - T_0$) Versus t.
Draw graph for $\log_e (T - T_0)$ Versus t
(b) What is specific heat of a gas in an adiabatic process?
What is specific heat of a gas in an isothermal process?

26. Show that for small oscillations the motion of a simple pendulum is simple harmonic. Derive an expression for its time period by using oscillation principles. **[5]**

****************END OF THE EXAMINATION****************