Half-yearly Common Exam., December - 2017

XI - Standard]   **PHYSICS**   [Time : 2.30 Hrs

(Maximum Marks : 70)

Section -A

Answer all the questions, Choose and write the correct answer :-   15 × 1 = 15

1. The range of strong nuclear force is about
   a) $10^{-15} m$ b) $10^{15} m$ c) $10^{-10} m$ d) $10^{10} m$

2. The triple point temperature of water is
   a) $273.16 K$ b) $-273.16 K$ c) $273 K$ d) $273°C$

3. The range of a projectile is maximum when the angle of projection is -------.
   a) 60°   b) 35°   c) 90°   d) 45°

4. The algebraic sum of the moments about any point must be equal to -------
   a) unity   b) zero   c) maximum   d) always one

5. In neutral equilibrium, ------- energy does not change.
   a) kinetic   b) potential   c) both   d) heat

6. Work done by the couple, W= ----------.
   a) t/θ b) $\theta\tau$ c) θ/τ d) θ

7. Which of the following objects do not belong to the solar system ?
   a) Comets   b) Nebulae   c) Asteroids   d) Planets

8. The weight of a body at Earth's surface is W. At a depth half way to the centre of the Earth, it will be
   a) W b) $W/2$ c) $W/4$ d) $W/8$

9. Two wires of the same radii and material have their lengths in the ratio 1 : 2. If these are stretched by the same force, the strains produced in the two wires will be in the ratio
   a) 1 : 4   b) 1 : 2   c) 2 : 1   d) 1 : 1

10. An object entering Earth's atmosphere at a high velocity catches fire due to
    a) viscosity of air   b) heat content of atmosphere   c) pressure of certain gases
    d) high force of g

11. The time period of a simple pendulum is independent of the ------- and material of the bob   a) time period   b) frequency   c) velocity   d) mass

12. Electromagnetic oscillations in tank circuit is an example for ------- oscillations
    a) free   b) forced   c) maintained   d) damped

13. Sound of frequency 256 Hz passes through a medium. The maximum displacement is 0.1 m. The maximum velocity is equal to
    a) $60\pi \, ms^{-1}$ b) $51.2\pi \, ms^{-1}$ c) $256 \, ms^{-1}$ d) $512 \, ms^{-1}$

14. Which of the following does not affect the velocity of sound ?
    a) temperature of the gas   b) pressure of the gas   c) mass of the gas
    d) specific heat capacities of the gas

15. A block of ice in a room at normal temperature
    a) does not radiate   b) radiates less but absorbs more
    c) radiates more than it absorbs   d) radiates as mch as it absorbs

[P.T.O.

Part - II

Answer any 6 questions in which question No. 23 is compulsory : $6 \times 2 = 12$

16. Draw Ferry's black body.

17. Sound travels faster on rainy days. Why ?

18. Define time period.

19. How do insects run on the surface of water ?

20. State Kepler's first law of planetary motion.

21. Give any two examples for vector quantity.

22. State Newton's third laws of motion.

23. A cat is able to land on its feet after a fall. Which principle of physics is being used? Explain.

24. What is meant by light year ?

Part - III

Answer any 6 questions in which question No. 33 is compulsory : $6 \times 3 = 18$

25. Give any three postulates of kinetic theory of gases.

26. What are degrees of freedom ?

27. What is meant by end correction ?

28. Obtain an equation for the SHM of a particle whose amplitude is 0.05 m and frequency 25 Hz. The initial phase is $\pi/3$.

29. Determine the velocity for air flowing through a tube of 10^{-2} m radius. For air $\rho = 1.3 \, kg \, m^{-3}$ and $\eta = 187 \times 10^{-7} \, N \, s \, m^{-2}$.

30. State the universal law of gravitation.

31. What are the different types of equilibrium ?

32. What are the limitations of dimensional analysis ?

33. Two equal forces are acting at a point with an angle of $60°$ between them. If the resultant force is equal to $20\sqrt{3}N$, find the magnituded of each force.

Part - IV

$5 \times 5 = 25$

Answer all the questions :

34. Derive Meyer's relation. (or)

State and prove law of conservation of linear momentum.

35. Describe the working of carnot engine and derive its efficiency. (or)

State and explain parallelogram law of vectors.

36. Derive Newton - Laplace formula for the velocity of sound in gases. (or)

What is escape speed ? Obtain an expression for it.

37. Show that the oscillations of a simple pendulum are simple harmonic. Hence deduce the expression for the time period. (or)

State and prove parallel axes theorem and perpendicular axes theorem.

38. State and prove Bernoulli's theorem. (or)

Give the rules and conventions followed while writing SI units.