PHYSICS

Class XI

Sample Paper—1

Max. Marks: 50   **Time Allowed: 90 minutes**

General Instructions:

(i) This question paper consists of 40 questions in 4 sections.

(ii) Section A consists of 10 Objective type questions carrying 1 mark each.

(iii) Section B consists of 10 Fill in the blanks type questions carrying 1 mark each.

(iv) Section C consists of 10 True or False statement type questions carrying 1 mark each.

(v) Section D consists of 10 Short answer type questions carrying 2 marks each.

Section A

Select and write one most appropriate option out of the four options given for each of the questions 1–10.

1. A metal cube of length 10.0 mm at 0°C (273 K) is heated to 200°C (473 K). Given : its coefficient of linear expansion is 2×10^{-5} K^{-1}. The per cent change of its volume is

(*a*) 0.1   (*b*) 0.2

(*c*) 0.4   (*d*) 1.2.

2. Which of following quantities must be determined so that the thermal capacity of a body may be calculated, when the specific heat of body is known?

(*a*) Emissivity   (*b*) Latent heat

(*c*) Mass   (*d*) Temperature.

3. The density of water at 20°C is 998 kg m^{-3} and at 40°C, it is 992 kg m^{-3}. The coefficient of cubical expansion of water is nearest to

   (a) $2 \times 10^{-4}/°C$ (b) $4 \times 10^{-4}/°C$

   (c) $6 \times 10^{-4}/°C$ (d) $3 \times 10^{-4}/°C$.

4. A tuning fork of frequency 512 Hz makes 4 beats per second with the vibrating string of a piano. The beat frequency decreases to 2 beats per second when the tension in the piano string is slightly increased. The frequency of the piano string before increasing the tension was

   (a) 510 Hz   (b) 514 Hz

   (c) 516 Hz   (d) 508 Hz.

5. A transverse wave is represented by $y = A \sin (\omega t - kx)$.

   For what value of the wavelength is the wave velocity equal to the maximum particle velocity?

   (a) $\dfrac{\pi A}{2}$ (b) πA

   (c) $2\pi A$ (d) A.

6. Two strings A and B are slightly out-tune and produce beats of frequency 5 Hz. Increasing the tension in B reduces the beat frequency to 3 Hz. If the frequency of string A is 450 Hz, calculate the frequency of string B.

   (a) 460 Hz   (b) 455 Hz

   (c) 445 Hz   (d) 440 Hz.

7. The energy whose presence makes the surrounding objects visible is:

   (a) heat   (b) sound

   (c) light   (d) electrical.

8. Medium through which light is fully passed, is called

   (a) transparent   (b) opaque

   (c) transluscent   (d) alloy.

9. Medium through which light cannot pass, is called

   (a) transparent   (b) opaque

   (c) transluscent   (d) alloy.

10. Medium through which light is partially passed, is called

    (a) transparent   (b) opaque

    (c) transluscent   (d) opaque transparent.

Section B

Fill in the blanks with a suitable word for each of the questions 11–20.

11. A piece of ice (heat capacity = 2100 J kg^{-1} °C^{-1} and latent heat = 3.36 × 10^5 J kg^{-1}) of mass m gram is at – 5°C at atmospheric pressure. It is given 420 J of heat so that the ice starts melting. Finally when the ice-water mixture is in equilibrium, it is found that 1 g of ice has melted. Assuming there is no other heat exchange in the process, the value of m is _____ .

12. Certain amount of heat is given to 100 g of copper to increase its temperature by 21°C. If the same amount of heat is given to 50 g of water, then the rise in its temperature is _____ .

13. A thin copper rod rotates about an axis passing through its end and perpendicular to its length with an angular speed ω_0. The temperature of the copper rod is increased by 100°C. If the coefficient of linear expansion of copper is 2 × 10^{-5}/°C, the percentage change in the angular speed of the rod is _____ .

14. A train moving towards a hill at a speed of 72 km h^{-1} sounds a whistle of frequency 500 Hz. A wind is blowing from the hill at a speed of 36 km h^{-1}. If the speed of sound in air is 340 m s^{-1}, the frequency heard by a man on the hill is_____ .

15. When two sound sources of the same amplitude but of slightly different frequencies n_1 and n_2 are sounded simultaneously, the sound one hears has a frequency equal to _____ .

16. A travelling wave represented by $y = A \sin(\omega t - kx)$ is superimposed on another wave represented by $y = A \sin(\omega t + kx)$. The resultant is _____ .

17. _____ nature of light is used in our everyday life.

18. Light passes partially through _____ medium.

19. When two converging rays become incident on a convex mirror, the image formed is _____ .

20. Height of an inverted real image has a _____ sign.

Section C

State whether the following statements are true or false for each of the questions 21–30.

21. Temperature is a relative measure, or indication, of hotness or coldness.

22. According to Dulong and Petit's law, the molar specific heat of every solid *must* come out to be equal to 16 cal.

23. The specific heat of a gas may have any positive or negative value ranging from zero to 100°.

24. Convection is the process in which heat is transferred from one point to another by the actual motion of matter.

25. The Earth's atmosphere is richer in infrared radiaton.

26. Trough is the position of maximum displacement in the positive direction.

27. Photons have only energy and no rest mass and no charge.

28. The bouncing back of light rays from a surface is called refraction.

29. Solar eclipse occurs when the moon passes between the sun and the earth.

30. Silver metal is the bad reflector of light.

Section D

Answer each of the questions 31–40.

31. Is the bulb of a thermometer made of diathermic or adiabatic wall?

32. Why does a metal bar appear hotter than a wooden bar at the same temperature? Equivalently it also appears cooler than wooden bar if they are both colder than room temperature.

33. What is the range of frequency of audible sound?

34. Why does sound travel faster in iron than in air?

35. Which is a converging mirror: a convex or a concave?

36. Find out the increase in moment of inertia I of a uniform rod (coefficient of linear expansion α) about its perpendicular bisector when its temperature is slightly increased by ΔT.

37. During summers in India, one of the common practice to keep cool is to make ice balls of crushed ice, dip it in flavoured sugar syrup and sip it. For this a stick is inserted into crushed ice and is squeezed in the palm to make it into the ball. Equivalently in winter in those areas where it snows, people make snow balls and throw around. Explain the formation of ball out of crushed ice or snow in the light of P-T diagram of water.

38. A tuning fork of unknown frequency gives 4 beats with a tuning fork of frequency 310 Hz. It gives the same number of beats on filing. Find the unknown frequency.

39. The string of a violin emits a note of 540 Hz at its correct tension. The string is bit taut and produces 4 beats per second with a tuning fork of frequency 540 Hz. Find the frequency of the note emitted by this taut string.

40. What is a mirror formula? Is it same for a convex and concave mirrors?