ANANDALAYA
PERIODIC TEST - 2
Class : XI

Subject: Physics   M.M: 40
Date : 18/12/2019   Time: 2 Hours

General Instructions
1. All questions are compulsory. There are 20 questions in all.
2. This question paper has four sections: Section A, Section B, Section C, and Section D.
3. Section A contains ten objective questions of one mark each, Section B contains four questions of two marks each, Section C contains four questions of three marks each and Section D contains two questions of five marks each.
4. There is no overall choice. However, internal choices have been provided in one question of three marks and one question of five marks. You have to attempt only one of the choices in such questions.
5. Use may use log table if necessary.

SECTION A
Directions (Q1-Q5) Select the most appropriate option from those given below each question.

1. Which is the correct relation between escape velocity V_e and orbital velocity V_o?   (1)
    (a) $V_e = 2V_o$ (b) $V_e = \sqrt{2}\, V_o$
    (c) $V_o = 2V_e$ (d) $V_o = \sqrt{2}\, V_e$

2. Two different types of rubber are found to have the stress-strain curves as shown in the figure. Which of the two rubber materials would you choose for a car tyre?

    (a) A   (b) Both of them

    (c) B   (d) None of them
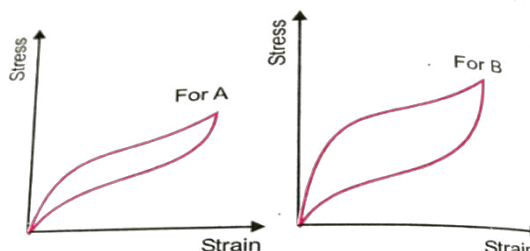
3. As per Wien's displacement law, the wavelength corresponding to maximum intensity is   (1)
    _____ to the temperature of a body.in Kelvin.

    (a) directly proportional   (b) equal   (c) inversely proportional   (d) opposite

4. The variation of acceleration due to gravity as one moves away from earth's centre is givn by   (1)
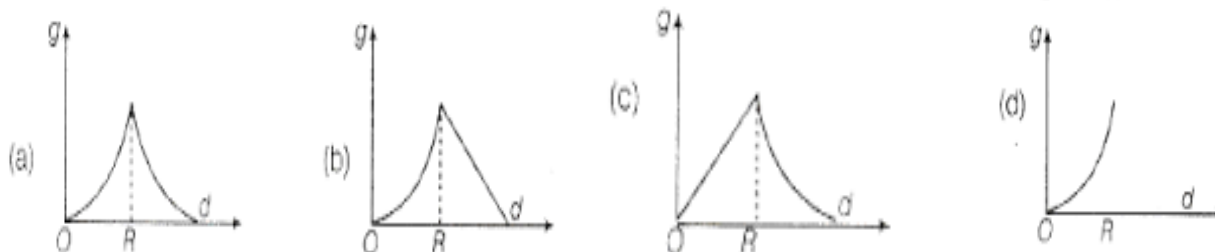
5. Water flows steadily through a cylindrical pipe. At some point of time the pipe becomes   (1)
    narrow and the cross section is halved; the speed of water is
    (a) reduced to to zero   (b) decreased by a factor of 2
    (c) increased by a factor of 2   (d) unchanged

6. When Reynold's number is above 2000, the flow of liquid becomes ____. Fill in the Blank.   (1)

7. A wire is cut to half of its original length. The elongation of the wire under a given load (1) become _____. Fill in the Blank.

Directions (Q8 –Q10) Answer the following.

8. What is the gravitational potential energy of a body at infinity? (1)

9. Why do we prefer mercury in barometer? (1)

10. Compute the fractional change in volume of a glass slab, when subjected to a hydraulic (1) pressure of 10 atm. Given bulk modulus of glass = 37×10^9 Pa and 1 atm = 1.013×10^5 Pa.

SECTION B

11. State Kepler's laws of planetary motion. (2)

12. At what height above the surface of the earth will the acceleration due to gravity be 25% of its (2) value on the surface of the earth? Assume that the radius of the earth is 6400 km.

13. Why do we use (a) 'I' shaped beams or columns and (b) braided steel wires in bridges? (2)

14. A U-tube contains water and methylated spirit separated by mercury. The mercury columns in (2) the two arms are in level with 10.0 cm of water in one arm and 12.5 cm of spirit in the other. What is the specific gravity of spirit?

SECTION C

15. A hole is drilled in a copper sheet. The diameter of the hole is 4.24 cm at 27.0 °C. What is the (3) change in the diameter of the hole when the sheet is heated to 227 °C? Coefficient of linear expansion of copper = $1.70 \times 10^{-5}\ K^{-1.}$

16. (a) Obtain the orbital velocity and time period of a satellite placed at an altitude 'h' from earth surface.
    (b) A satellite revolving around a planet in a circular orbit of radius r has orbital velocity 4km/s. What is the orbital velocity of another satellite revolving around the same planet in an orbit of radius 2r?

17. State Newton's law of cooling. Derive mathematical expression for it. (3)

OR

On what factors does the rate of heat conduction in a metallic rod in the steady state depend? Write the necessary expression and hence define the coefficient of thermal conductivity.

18. Calculate the excess of pressure inside (a) a drop of liquid of radius 0.2cm and (b) a soap (3) bubble of radius 0.3cm. Given that surface tension of liquid is 24 dyne/cm.

SECTION D

19. (a) Draw stress versus strain graph for a loaded wire. Explain the terms elastic limit, (5) permanent set and tensile strength.
    (b) Differentiate ductile and brittle materials on the basis of stress-strain graph.

20. (a) State and prove Bernoulli's theorem. (5)
    (b) Show that Bernoulli equation is same as the equation due to Pascal's law in the presence of gravity if a liquid is at rest.

OR

(a) What is the phenomenon of capillarity?
(b) Derive an expression for the rise of liquid in a capillary tube.
(c) What will happen if the length of the capillary tube is smaller than the height to which the liquid rises?