

**B. Sc. DEGREE END SEMESTER EXAMINATION - OCT. 2020 : FEBRUARY 2021****SEMESTER 1 : COMPLEMENTARY PHYSICS FOR B SC MATHEMATICS****COURSE : 19U1CPPHY1 : PROPERTIES OF MATTER AND ERROR ANALYSIS***(Common for Regular - 2020 & Improvement / Supplementary - 2019 Admission)*

Time : Three Hours

Max. Marks: 60

**PART A****Answer any 8 (2 marks each)**

1. Give the expression for the depression of the free end of a cantilever. Explain the symbols?
2. What are the disadvantages of using Cantilever bridges such as those employed in Kochin Metro?
3. How can a rigid body be deformed? Mention the different types of deformation?
4. What is meant by least count error?
5. Write down the relative error in  $P(\alpha)$  if  $P = \cos(\alpha)$
6. Write down the expression for a normal distribution function, express the terms involved.
7. State the equation of continuity in a flow of an incompressible fluid.
8. Name any 2 forms of energy possessed by a liquid undergoing a streamline flow through a pipe.
9. Define surface tension in terms of work done in increasing the surface area.
10. To make antiseptic ointment work effectively on the wounds what should be nature of its surface tension (low or high). Give valid reasons.

**(2 x 8 = 16)****PART B****Answer any 6 (4 marks each)**

11. A circular disc of mass 1 kg and radius 0.1 m is suspended horizontally by a wire of length 0.6 m and radius  $5 \times 10^{-4}$  m. The period of torsional oscillations is 3.9 sec. Find the modulus of the rigidity of the wire.
12. Briefly explain the dynamical method for determining the rigidity modulus of a rod.
13. The period of torsional oscillations of a heavy circular disc suspended at the end of a wire is 4 sec. Find the period, if the length of the wire is reduced to half the original value.
14. A car travels at a speed of  $(85 \pm 5)$  km/hr for  $t = (4.2 \pm 0.1)$  hr. Calculate the relative error in the distance travelled.
15. If the original uncertainties are independent and random evaluate (a)  $(5.6 \pm 0.7) + (3.70 \pm 0.03)$  (b)  $(5.6 \pm 0.7) + (1.9 \pm 0.3)$
16. A student studying properties of a resistor, measure the current flowing through the resistor and voltage across it as  $I = (2.10 \pm 0.03)$  Ampere and  $V = (2.05 \pm 0.02)$  volts. What should be the value of Resistance (answer with uncertainty)?
17. If the pressure inside a drop of liquid 4mm in radius at room temperature is  $1.015 \times 10^5$  Pa. Calculate the surface tension of liquid at the room temperature.

**(4 x 6 = 24)****PART C****Answer any 2 (10 marks each)**

18. Describe with theory the torsion pendulum method of determining the rigidity modulus of the material of a wire.
19. With the support of necessary theory, explain the dynamical method for the determination of Rigidity modulus of the material of the wire.
20. Discuss the rules adopted in calculating the error when the numbers with errors are (a) multiplied (b) divided (c) raised to some power. Find the value  $(20 \pm 2) / [(5.0 \pm 0.4) - (3.0 \pm 0.2)]$

**(10 x 2 = 20)**