

Reg. No

Name

B Sc DEGREE END SEMESTER EXAMINATION - OCTOBER 2019
SEMESTER 1 : BSC MATHEMATICS
COURSE : 19U1CPPHY1 : PROPERTIES OF MATTER AND ERROR ANALYSIS
(For Regular - 2019 Admission)

Time : Three Hours

Max. Marks: 60

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

1. What is meant by strain produced in a body?
2. What is the relation between linear strain and volume strain?
3. What are the advantages of using Cantilever bridges such as those employed in Kochin Metro?
4. Distinguish between accuracy and precision.
5. Explain the rule for combining errors in case of a calculation involving quotient ($f=x/y$)
6. What is the importance of standard deviation in the case of reporting errors.
7. Differentiate between cohesive and adhesive force.
8. Define the term "Surface Tension". Give its unit.
9. Washing clothes can be more effective by using warm water. True or False. Give reasons.
10. Name the forms of energy possessed by a liquid undergoing a streamline flow through a pipe.

(2 x 8 = 16)

Section B**Answer any 6 (4 marks each)**

11. A beam of width 0.026 m and thickness 0.005 m is supported horizontally on knife edges 0.7 m apart. It is loaded with weights 0.15 kg each from its ends which project 0.10 m beyond the knife edges. If the centre of the beam is thereby elevated by 0.003 m, calculate the Young's modulus of its material
12. Briefly explain the statical method for determining the rigidity modulus of a rod.
13. A rigid rod 1 m long is fixed horizontally at one end and loaded at the other by a mass 0.5 kg. Calculate the depression of a point distant 0.25 m from the free end. Diameter of the rod is 0.02 m. Y of the material of the rod is $9 \times 10^9 \text{ N/m}^2$.
14. Rewrite the following measurement in most appropriate form $x = (5.7324 \times 10^{-7} \pm 3 \times 10^{-9}) \text{ m}$
15. $P(x,y,z,t)$ is given as $P = x^3 y^2 / (2t)$. If the percentage error in the measurement of x , y , z and t are 1%, 2%, 4% and 2%. What is the percentage error in P ?
16. A student studying properties of a resistor, measure the current flowing through the resistor and voltage across it as $I = (1.10 \pm 0.03) \text{ Ampere}$ and $V = (1.05 \pm 0.02) \text{ volts}$. What should be the value of Power delivered to the resistor (answer with uncertainty)?
17. Water sits in a large open jug at a height of 0.2m above the spigot. With what velocity will the water leave the spigot when the spigot is opened?
18. Calculate the energy released when 10 drops of water of radius 0.5 mm coalesce to form a single drop. Given surface tension of water as 0.072 N/m.

(4 x 6 = 24)

Section C**Answer any 2 (10 marks each)**

19. Derive the expression for bending moment. Use it to arrive at the equation for the depression at the end of a cantilever.
20. Obtain an expression for the depression of the midpoing of a beam loaded at the centre. Hence arrive at the expression for Y of a bar of rectangular cros section.
21. Discuss the rules adopted in calculating the error when the numbers with errors are (a) added (b) divided (c) raised to some power. Find the value $(12 \pm 1) + [(25 \pm 3) \times (10 \pm 1)]$
22. Obtain the expression for obtaining excess pressure inside a liquid drop and soap bubble.

(10 x 2 = 20)