QP CODE: 18103641

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Reg No : .....

Name : .....

B.Sc.DEGREE(CBCS)EXAMINATION, DECEMBER 2018

First Semester

Complementary Course - PH1CMT01 - PHYSICS-PROPERTIES OF MATTER & ERROR ANALYSIS

(Common toB.Sc Mathematics Model I, B.Sc Statistics Model I)

2018 Admission only

2E1B10FE

Maximum Marks: 60 **Time: 3 Hours**

Part A

Answer any **ten** questions.

Each question carries **1** mark.

1. What is shearing strain?
2. What do you mean by compressibility of materials?
3. Why bending of the beam in cantilever structure is called non uniform bending?
4. Small insects can walk on the surface of water. Why?
5. What is the effect of impurities on surface tension?
6. State Newton's law of viscous force in a streamline flow
7. Why does a larger raindrop fall faster than a smaller one?
8. Distinguish between the measurements 5.0 and 5.00.
9. What do you mean by spurios response rejection in a measurement?
10. What are the sources of istrumental error?
11. Find the number of significant figures in 0.0005
12. What do you mean by standard deviation?

(10×1=10)

Part B

Answer any **six** questions.

Each question carries **5** marks.

13. One end of a rope of length 5 m and diameter 8 mm hanging from an iron bar, where the other end is fixed. A weight of 100 N is attached to the free end. Then what will be the elongation of the rope. Young's modulus of the material is $2x10^{11}$ N/m^2

14. Explain the static torsion method to find the rigidity modulus of a metal rod.

15. With the help of figures, distinguish between uniform and non-uniform bending.

16. Calculate the loss of energy when 27 drops of water each of radius 0.6 mm coalesce to form a single drop. Surface tension of water is 72×10^{-3} N/m.

17. Describe Brownian motion in detail.

18. The mass of a small piece of wire is measured using a physical balance and the following readings are obtained. 0.083 g, 0.081 g, 0.084g, 0.085 g, 0.084g, and 0.087g. What is the mass of the wire with its percentage uncertainity?

19. In an experiment the values of two resistances are measured to be $R_1 = (5.0 \pm 0.2)\ \Omega$ and $R_2 = (10.0 \pm 0.1)\ \Omega$.
Find the value of total resistances in series and parallel with limits of percentage error.

20. Calculate the focal length of a spherical mirror from the following data. Object distance $u = (50.1 \pm 0.5)$ cm, image distance $v = (20.1 \pm 0.2)$ cm. ($f = uv/u+v$)

21. Calculate the percentage error in specific resistance $\rho = \pi r^2 R/L$ where $r = (0.26 \pm 0.02)$ cm, $L = (156.0 \pm 0.1)$ cm and $R = (64 \pm 2)\ \Omega$

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **10** marks.

22. Explain the term rigidity modulus of the material. Derive an expression for the couple required to twist a cylindrical rod of circular cross section through an angle θ at one end, the other end being kept fixed, and hence deduce an expression for the rigidity modulus of the rod.

23. Derive Poiseuille's formula for the streamline flow of a liquid through a capillary tube. What are the corrections to be applied to Poiseuille's formula?

24. Derive Bernoulli's equation for streamline flow of a liquid. Modify the relation for the flow of a liquid through a horizontal pipe of varying cross section.

25. a)Explain how errors are estimated and reported. b)What do you mean by random errors and systematic errors? How can they be reduced?

(2×10=20)