QP CODE: 24046283

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Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR/IMPROVEMENT/REAPPEARANCE EXAMINATIONS, DECEMBER 2024

First Semester

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

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

2017 Admission Onwards

55DD64CF

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. What are the dimensions of stress and its units in SI system?
2. Derive the expression for work done per unit volume for volume strain.
3. The value of rigidity modulus for the material of the same wire obtained by dynamical method will be higher than that obtained by statical method. Why?
4. A needle floats on clear water but sinks when some detergents are added to it. Explain why?
5. Why does a liquid move faster when it is hot?
6. Why does a larger raindrop fall faster than a smaller one?
7. Write down Poiseuille's equation and explain the symbols.
8. Why uncertainities are always added?
9. What are the sources of istrumental error?
10. Round off to four significant figures a) 36.789 b) 4.00066
11. What do you mean by standard deviation?
12. How will you determine the error in the measured value q of where q =a+b?

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

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

14. A uniform metal disc of radius 5 cm and mass 1kg is fixed symmetrically to the lower end of a torsion wire of length 100 cm and diameter 1.2 mm, the upper end of which is fixed. The time period of torsional oscillations is 6 s. Calculate the rigidity modulus of the material of the wire.

15. A wooden bar, 1 m long and 2 cm x 2 cm in section, rests horizontally and symmetrically on 2 knife edges 60 cm apart. When a weight of 2 kg is suspended from each end of the bar, the centre is elevated through a distance 0.102 m. Calculate the Young's modulus for the material of the bar.

16. Prove that surface tension is numerically equal to surface energy.

17. Describe Brownian motion in detail.

18. Differentiate between precision and accuracy.

19. The refractive index of water is found to have the values 1.29, 1.33, 1.34, 1.35, 1.32, 1.36, 1.30 and 1.33. Calculate the mean value, absolute error, the relative and the percentage error.

20. A student measures the acceleration due to gravity by measuring the time t for a stone to fall from a height h above the ground. He measured t as 1.6 ± 0.1 s and h as 12.5 ± 0.02m. What is the uncertainity in measurement of g?

21. A physical quantity x is calculated from the relation $x=a^3b^2/\sqrt{}$ (cd).Calculate the percentage error in x if a, b, c, d are measured respectively with an error of 1%, 3%, 4%and 2%.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. Explain the terms stress and strain. Determine the work done per unit volume when a body undergoes volume strain and longitudinal strain.

23. Explain surface tension. Discuss the molecular theory of surface tension.

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)