B. Sc. DEGREE (C.B.C.S.) EXAMINATION, NOVEMBER 2022

(2022 Admissions (regular) 2021 Admissions (Improvement / Supplementary), 2020, 2019,

2018, Admissions Supplementary)

SEMESTER I - COMPLEMENTARY COURSE 2 (PHYSICS) (For MATHEMATICS)

PH1C01B18 - PROPERTIES OF MATTER AND ERROR ANALYSIS

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

Part A

I. Answer any Ten questions. Each question carries 1 marks   **(10x1=10)**

1. Define Young's modulus .

2. Glass is more elastic than rubber. Justify this statement.

3. Differentiate between torsion rigidity and modulus of rigidity.

4. Give a brief note on I-section girders.

5. Explain the term plane of bending and axis of bending.

6. Describe the effect of temperature and viscosity on the surface tension of a liquid.

7. Define critical velocity. Give its significance.

8. Discuss the methods to reduce errors in physical measurements.

9. Explain the term spurious errors.

10. Explain the rules to round off the uncertain digits in a number.

11. Calculate the percentage error in heat loss if error in current, resistance and time are 4%, 2% and 2% respectively.

12. A resistor has marking as $"47\Omega, 10\%"$, estimate the true value of resistor.

Part B

II. Answer any Six questions. Each question carries 5 marks   **(6x5=30)**

13. Two identical wires of steel and copper are stretched by the same weight in turn. Calculate the ratio of the extensions produced in the wire. Young's modulus for steel and Cu are 2 x 10^{11} N/m^2 and 1.2 x 10^{11} N/m^2 respectively.

14. A steel wire of radius 2 mm is bent to form a circle of radius 25 cm. Calculate the bending moment if Young's modulus is 100 x 10^9 N/m^2

15. Explain with suitable theory how small insects can walk on the surface of water. Also explain why condensation is not possible for dust free air.

16. If the excess pressure inside a soap bubble of radius 10^{-2} m is balanced by that due to a column of oil 2×10^{-3} m high, calculate the surface tension of solution. Density of oil is 800 kgm^{-3}.

17. A square plate of 15 cm side moves parallel to another plate with a velocity of 20cm/s in water. Find their separation if the viscous force is 0.0022 and coefficient of viscosity of water is 0.06Ns/m^2.

18. Calculate the percentage error in $z = a^3 c b^2 d^3$, if the percentage errors in a,b,c and d are 1%, 1%,1% and 3% respectively.

19. A bus travels at a speed of $v = 125 \pm 5 \, km/h$ for $t = 2.5 \pm 0.05 \, hours$. Calculate the relative error in the distance travelled.

20. To find the period of a pendulum, a student measures the time period taken for one complete oscillation. Another student measures the time taken for 20 oscillations and divides the result with 20 to get the period. Who will measure the period accurately? Explain why?

21. State the number of significant figures and also identify them in the following data

   a) 0.0005   b) 12.650 kg   c) 2.65 x 10 ^{32} kg   d) 6.098070 N   e) 100.0020 m

Part C

III. Answer any Two questions. Each question carries 10 marks (2x10=20)

22. Describe the three different types of strains. Construct an equation for work done per unit volume when a body undergoes each type of strain.

23. Deduce the expression for the elevation at the midpoint of a beam subjected to uniform bending.

24. Discuss with detailed theory, the Poiseuille's method for determination of viscosity of a liquid. Mention its limitations.

25. Discuss how we express combination of errors in various mathematical operations.