

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86**  
**(For candidates admitted during the academic year 2019–2020 and thereafter)**

**B.Sc. DEGREE EXAMINATION, NOVEMBER 2023**  
**BRANCH IV- CHEMISTRY**  
**THIRD SEMESTER**

**COURSE : ALLIED CORE**  
**PAPER : PHYSICS FOR CHEMISTRY – I**  
**SUBJECT CODE : 19PH/AC/PC33**  
**TIME : 3 HOURS**

**MAX.MARKS: 100**

**SECTION – A**

**ANSWER ALL QUESTIONS**

**25 MARKS**

**CHOOSE THE CORRECT ANSWER:**

**(10 X 1 =10)**

1. The unit for moment of inertia is  
(a) Kg                      (b) kg-m                      (c) kg-m<sup>2</sup>                      (d) kg/m
2. Identify the correct expression among the following  
(a) Young's Modulus = Strain/Stress  
(b) Lateral Strain = Poisson's ratio × Longitudinal strain  
(c) Young's Modulus = Strain × Stress  
(d) Lateral Strain = Poisson's ration / Longitudinal strain
3. The rise of liquid in a capillary tube is due to  
(a) Viscosity              (b) Osmosis              (c) Diffusion              (d) Surface tension
4. Surface tension can be expressed in  
(a) J/m<sup>2</sup>                      (b) N/m                      (c) N                      (d) m/N
5. In the compound pendulum the moment of inertia of the rigid body about the axis of rotation is equal to  
(a) mk                      (b) mk<sup>2</sup>                      (c) mkg                      (d) ml<sup>2</sup>
6. The unit for twisting torque is  
(a) N                      (b) Nm                      (c) Nm<sup>2</sup>                      (d) N<sup>2</sup>
7. Length contraction happens only  
(a) perpendicular to direction of motion  
(b) inclined at an angle with the direction of motion  
(c) parallel to the direction of motion  
(d) both perpendicular and along the direction of motion.
8. Mass – energy relation is  
(a) E = mc                      (b) E = mch                      (c) E = mc<sup>2</sup>                      (d) E = m<sup>2</sup>c
9. Which one of the following does not show any interference pattern?  
(a) Soap bubble                      (b) Excessively thin film  
(c) A thick film                      (d) Wedge shaped film.
10. Which of the following phenomenon cannot convert ordinary, unpolarized light to partially polarized light or plane polarized light.  
(a) reflection              (b) diffraction              (c) double reflection              (d) dispersion

**FILL IN THE BLANKS:**

**(5 X 1 = 5)**

11. The value of  $Ak^2$  for a beam of circular cross section is \_\_\_\_\_.
12. When the temperature of a liquid is raised, the coefficient of viscosity \_\_\_\_\_
13. Expression for moment of inertia of a body about an axis at a distance 'a' from the centre of gravity is given by \_\_\_\_\_
14. Frame of reference moving with constant velocity is called \_\_\_\_\_
15. Plane of polarization can be defined as \_\_\_\_\_

**ANSWER BRIEFLY:****(5 X 2 = 10)**

16. Define three moduli of elasticity.
17. Distinguish between streamline flow and turbulent flow.
18. Define moment of inertia.
19. State the fundamental postulates of special theory of relativity.
20. What is meant by polarization?

**SECTION - B****ANSWER ANY FIVE QUESTIONS:****(5 X 6=30)**

21. A wire of length 2 m and cross-sectional area  $10^{-4} \text{ m}^2$  is stretched by a load 102 kg. The wire is stretched by 0.1 cm. Calculate longitudinal stress, longitudinal strain and Young's modulus of the material of wire.
22. By dipping a U-shaped wire in a soap solution, a film is formed between it and a light sliding wire resting on it. The sliding wire supports a weight of 0.01 N when its length is 20 cm. Find the surface tension of the liquid.
23. A ring whose diameter is 1m, oscillates simple harmonically in a vertical plane about a nail fixed at its circumference. Find the time period of compound pendulum.
24. Calculate the energy equivalent of 0.5 g of a substance. (speed of light (c)= $3 \times 10^8 \text{ m/s}$ )
25. A certain polarizer has a refractive index of 1.33. Find the polarization angle and angle of refraction?
26. Explain the working of Nicol prism as a polarizer and analyzer.
27. Explain in brief about Twin paradox.

**SECTION - C****ANSWER ANY THREE QUESTIONS:****(3 X 15 = 45)**

28. Determine the acceleration due to gravity (g) by means of a compound pendulum.
29. Deduce Einstein mass – energy relation  $E = mc^2$  and give the physical significance of the relation.
30. Derive an expression for depression at the loaded end of the cantilever.
31. Describe drop weight method to determine surface tension and interfacial surface tension of water and kerosene.
32. Explain with theory, how Newton's rings can be used to determine the wavelength of a mono chromatic source.

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