STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2019–2020 and thereafter)
SUBJECT CODE: 19PH/AC/PC33

B.Sc. DEGREE EXAMINATION, NOVEMBER 2022
BRANCH IV- CHEMISTRY
THIRD SEMESTER

COURSE : ALLIED CORE
PAPER : PHYSICS FOR CHEMISTRY – I
TIME : 3 HOURS **MAX.MARKS: 100**

SECTION – A

ANSWER ALL QUESTIONS **25 MARKS**

CHOOSE THE CORRECT ANSWER: **(10 X 1 =10)**

1. Identify the correct expression among the following
   a) Young's Modulus = strain/stress
   b) Lateral Strain = Poisson's ratio x Longitudinal strain
   c) Young's Modulus = strain X stress
   d) Lateral Strain = Poisson's ratio/Longitudinal strain

2. Young's modulus of a perfectly rigid body is
   a) unity
   b) negative
   c)infinity
   d) zero

3. The rise of a capillary tube is due to
   a)Viscosity
   b) Osmosis
   c) Diffussion
   d) Surface tension

4. Factors affecting surface tension are _____
   a) temperature
   b) impurities
   c) pressure
   d) all the above

5. Which one of the following motions is not a linear simple harmonic motion?
   (a) Motion of a simple pendulum for small oscillation.
   (b) Motion of a magnet suspended by a string
   (c) Motion of the needle of a sewing machine.
   (d) Vertical motion of a body tied to a spring.

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6. Which of the following shape of the body can be considered as compound pendulum?
   a) Cylindrical b) Cubical
   c) Cuboidal d) Any rigid body

7. Length contraction happens only
   a) perpendicular to direction of motion
   b) along the direction of motion
   c) parallel to direction of motion
   d) both perpendicular and along the direction of motion

8. In Relativistic case, as the velocity of the particle approaches the speed of light, the Kinetic energy approaches
   a) Zero
   b) Kinetic Energy as in Non-Relativistic case
   c) Rest Energy
   d) Infinite

9. Which 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. What changes are observed in a diffraction pattern if the whole apparatus is immersed in water?
   a) The Wavelength of light increases
   b) Width of central maximum increases
   c) Width of central maximum decreases
   d) Frequency of light decreases

FILL IN THE BLANKS: **(5 X 1 = 5)**

11. Strain is a _____Quantity.
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 center of gravity is given by _____
14. The basic theorem/principle used to obtain mass-energy relation is _____
15. A linearly polarized wave is always a ____ wave.

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

16. Define modulus of elasticity
17. Define Turbulent flow.
18. What is dynamics? Give Example.
19. Define inertial frame of reference.
20. Define Brewster law.

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SECTION - B

ANSWER ANY FIVE QUESTIONS: (5 X 6=30)

21. A nylon string has a diameter of 2 mm, pulled by a force of 100 N. Determine the stress.
22. What is interfacial surface tension. Derive an expression for interfacial surface tension.
23. A metal plate of area $2.5\times10^{-4}m^2$ is placed on a 0.25×10^{-3}m thick layer of castor oil. If a force of 2.5 N is needed to move the plate with a velocity $3\times10^{-2}ms^{-1}$, calculate the coefficient of viscosity of castor oil.
24. A ring whose diameter is 1 meter, oscillates simple harmonically in a vertical plane about a nail fixed at its circumference. Find the time period of compound pendulum.
25. Explain in brief Twin paradox.
26. A particle travels at 1.90×10^{8}m/s and lives 2.1×10^{8}s when at rest relative to an observer. How long does the particle live as viewed in the laboratory?
27. A certain polarizer has a refractive index of 1.33. Find the polarization angle and angle of refraction?

SECTION - C

ANSWER ANY THREE QUESTIONS: (3 X 15 = 45)

28. Give the theory and experimental method for determining the rigidity modulus of a wire using torsional pendulum.
29. a. Discuss the effect of temperature on viscosity
    b. Define critical velocity. Obtain an expression for critical velocity
30. Determine the acceleration due to gravity (g) by means of a compound pendulum.
31. Derive an expression for Einstein mass and energy.
32. Explain Nicol prism as a polariser and analyser in detail.

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