

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
END SEMESTER ONLINE EXAMINATION-November 2021

CLASS: II B.Sc. CHEMISTRY
CODE: 19PH/AC/PC33

MAX MARKS:100
TIME:180 MINS.

PHYSICS FOR CHEMISTRY– I
SECTION – A

ANSWER ALL QUESTIONS:

CHOOSE THE CORRECT ANSWER:

(8 x 1 = 8)

- 1.The effect of temperature on the value of modulus of elasticity for various substances in general is
 - a) remain same
 - b) it increases with increase in temperature
 - c) decreases with rise in temperature
 - d) increases
- 2.A spiral spring is stretched by a weight attached to it. The strain will be
 - a) elastic
 - b) bulk
 - c) shear
 - d) tensile
- 3.Streamline motion is that motion in which there is.....exists.
 - a) only longitudinal velocity gradient
 - b) only radial velocity gradient
 - c) longitudinal as well as radial velocity gradient
 - d) neither longitudinal nor radial velocity gradient
- 4.If a drop of oil is placed on the surface of water, which of the following statements is correct
 - a) it will remain as a sphere
 - b) it will spread as a thin layer
 - c) it will be partly as spherical droplets and partly as thin film
 - d) it will flood a distorted drop on water surface
- 5.If a gymnast, sitting on a rotating stool with his arms outstretched suddenly lowers his Arms, his-----
 - a) angular velocity decreases
 - b) moment of inertia decreases
 - c) angular velocity stays constant
 - d) moment of inertia increases
- 6.Choose the incorrect statement concerning the theory of relativity
 - a) It proves the existence of the ether
 - b) velocity of light is independent of motion of observer
 - c) there is variation of mass with velocity
 - d) time is relative
- 7.Polaroid sun glasses decrease glare on a sunny day because they
 - a) block a portion of light

- b) have a special color
- c) completely absorb the light
- d) refract the light

8. 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

II. FILL IN THE BLANKS:

(5 x 1 = 5)

9. The Young's modulus (Y), Modulus of rigidity (η) and Bulk modulus (K) are related as _____
10. A value of surface tension of 50 dynes/cm is equal to _____ N/m.
11. The radius of gyration of a body rotating about a fixed axis is _____
12. The apparent life time of unstable particle is _____ when these particles are in motion (relative to the laboratory) at relativistic speed than when they decay while at rest in laboratory.
13. Newton's rings illustrate the phenomena of _____

III. ANSWER BRIEFLY:

(7 x 3 = 21)

14. What do you mean by bending moment of a beam?
15. Define three moduli of elasticity.
16. What is the effect of temperature on the viscosity of a liquid?
17. Briefly explain the centre of suspension and the centre of oscillation.
18. State the fundamental postulates of special theory of relativity.
19. Mention the conditions for sustained interference of light waves.
20. State and briefly explain Malus law.

SECTION – B

ANSWER ANY FOUR QUESTIONS:

(4 x 9 = 36)

21. Volumes of two cylindrical rods are $10^{-6}\pi \text{ m}^3$ and its length is 1m. It is clamped at one of its ends. Calculate the couple required to twist the other end by 90° and 18° . The rigidity modulus of the first and second rods are $\eta_1 = 2.8 \times 10^{10} \text{ N/m}^2$ and $\eta_2 = 8 \times 10^{10} \text{ N/m}^2$ respectively. Compare and discuss your result for the two different twists.
22. 50 drops of water falling down a tube of diameter 2mm are collected under coconut oil of specific gravity 0.8 and castor oil of specific gravity 0.96 respectively. Calculate the interfacial tension between water and coconut oil and water and castor oil if the water collected weights 12.35gm and 14.5gm respectively.

23. What do you understand by compound pendulum? Derive an expression for the period of oscillation for compound pendulum and also acceleration due to gravity.
24. An electron of rest mass $9.1 \times 10^{-31} \text{ kg}$ is moving with a speed $0.99c$. What is its total energy? Find the ratio of Newtonian K.E to the relativistic kinetic energy. $c = 3 \times 10^8 \text{ m/sec}$
25. Describe the construction and working of a Nicol prism and explain its usage as a polarizer and analyzer.

SECTION – C

ANSWER ANY ONE QUESTION

(1 x 30 = 30)

26.
 - a) Obtain an expression for the depression at the free end of a thin light beam clamped horizontally at one end and loaded at the other. Explain an experimental method used to find the Young's modulus of a cantilever. (15)
 - b) Describe drop weight method to determine the surface tension of water and interfacial surface tension of water and kerosene. (15)
27.
 - a) Deduce Einstein mass - energy relation $E = mc^2$, considering the variation of mass with velocity. Give two physical examples of Einstein's mass - energy equivalence (15).
 - b). Describe the theory of plane transmission diffraction grating. Explain the determination of wavelength of light using plane transmissions grating by normal incidence method. (15)