

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86**  
**(For candidates admitted during the academic year 2015–16 and thereafter)**  
**SUBJECT CODE: 15PH/AC/PH33**  
**B.Sc. DEGREE EXAMINATION, NOVEMBER 2018**  
**BRANCH IV- CHEMISTRY**  
**THIRD SEMESTER**

**COURSE : ALLIED CORE**  
**PAPER : PHYSICS – I**  
**TIME : 3 HOURS**

**MAX.MARKS: 100**

**SECTION – A**

**Answer all questions**

**(30 x 1 = 30)**

**CHOOSE THE CORRECT ANSWER:**

1. The ratio between the lateral strain and the longitudinal strain is known as  
a) Rigidity modulus    b) young's modulus    c) bulk modulus    d) poisson's ratio
2. The depression of the loaded end of the cantilever is given by  
a)  $y = WI^3/3EAK^2$     b)  $y = - WI^3/3EAK^2$     c)  $y = WI^2/3EAK^3$     d)  $y = - WI^2/3EAK^3$
3. When a body is fixed at one end and twisted about its axis by means of a torque at the other end , the body is said to be under -----  
a) tension    b) torsion    c) stress    d) strain
4. The unit of surface tension is given by  
a)  $N/m^2$     b)  $N/m^3$     c)  $N/m$     d)  $Nm^2$
5. In critical velocity of a liquid  $v_c = k \eta / \rho r$  , k is called  
a) acceleration due to gravity    b) radius of gyration    c) Reynolds number    d) velocity gradient
6. When the temperature is increased in liquids , the viscosity of liquids will -----  
a) increase    b) decrease    c) remain same    d) become zero
7. If an additional weight is attached to the centre of oscillation of a pendulum, then the period of oscillation is  
a) dependent on the weight attached    b) neither alters nor depends on the weight  
c) remains unaltered    d) decreases
8. The minimum time period of oscillation of a compound pendulum is given by  
a)  $T = 2\pi \sqrt{l/g}$     b)  $T = - 2\pi \sqrt{l/g}$     c)  $T = 2\pi \sqrt{g/l}$     d)  $T = - 2\pi \sqrt{g/l}$
9. A system consisting of a rigid body free to oscillate under gravity about a fixed horizontal axis is known as  
a) Torsional pendulum    b) compound pendulum  
c) simple pendulum    d) bifilar pendulum.
10. In Lorentz transformation equations, the length contraction is given by  
a)  $l = l_0 \sqrt{1 - v^2/c^2}$     b)  $l = l_0 \sqrt{1 + v^2/c^2}$   
c)  $l = l_0 \sqrt{1 - c^2/v^2}$     d)  $l = l_0 \sqrt{1 + c^2/v^2}$

11. In Twin paradox, when one of the twin returns back to the earth after a long space journey , he will find himself ----- in age than the twin who stayed behind the earth.  
 a) elder                      b) younger                      c) no change                      d) similar.
12. The Einstein's mass energy equivalence is given by  
 a)  $E = mc^2$                       b)  $E = - mc^2$                       c)  $E = m_0c^2$                       d)  $E = mc^2 - m_0c^2$
13. In interference , the relation between the path and phase difference is given by  
 a) phase difference =  $2\pi/\lambda$  x path difference                      b) path difference =  $2\pi/\lambda$  x phase difference  
 c) phase difference =  $\lambda/2\pi$  x path difference                      d) path difference =  $\lambda/2\pi$  x phase difference
14. The phenomenon of bending of light waves around corners and their spreading into the geometrical shadow of an object is called  
 a) Interference                      b) Diffraction                      c) Polarization                      d) Total internal reflection
15. The action of Nicol prism is based on the phenomenon of  
 a) Reflection                      b) Double refraction                      c) Refraction                      d) Double reflection

**STATE WHETHER TRUE OR FALSE :**

16. Young's modulus is defined as the ratio of longitudinal stress to the longitudinal strain.
17. A liquid motion is called streamline motion when the velocity at every point in the liquid changes both in its magnitude and direction.
18. If 'O' is the centre of suspension and 'G' is the centre of gravity of the body then the point 'O<sub>1</sub>' on OG produced such that  $OO_1 = k^2/h$  is called the centre of oscillation of the body.
19. According to the postulate of special theory of Relativity, the velocity of light in free space is constant.
20. In Fraunhofer diffraction, the source and the screen are at finite distances from the aperture.

**FILL IN THE BLANKS:**

21. A \_\_\_\_\_ is a beam fixed horizontally at one end and loaded at the end.
22. Surface tension is that property of liquid owing to which they tend to acquire \_\_\_\_\_ surface area.
23. \_\_\_\_\_ is a branch of mechanics which deals with the motion of bodies under the action of given forces.
24. In Lorentz -length contraction , there is no contraction in a direction \_\_\_\_\_ to the direction of motion.
25. Crystals which possess only one optic axis are called \_\_\_\_\_ crystals.

**ANSWER BRIEFLY:**

26. Explain the term bending moment.
27. Define Surface tension.
28. Define centre of suspension.
29. State the differences between interference and diffraction.
30. State the postulates of special theory of relativity.

**SECTION B****Answer any five questions:****(5x5=25)**

31. In an experiment a rod of diameter 0.0126 m was supported on two- knife edges, placed 0.7 m apart. On applying a load of 0.9 kg exactly midway between the knife edges, the depression on the middle point was observed to be 0.00025 m. Calculate the Young's modulus of the material of the rod.
32. 100 drops of water falling down a tube of external diameter 3.5 mm are collected under coconut oil of specific gravity 0.8. Calculate the interfacial tension between water and oil if the water collected weighs 12.35 gm.
33. A thin uniform bar of length 1.2 metres oscillates about an axis passing through one end perpendicular to its length at a distance 0.6 m from the centre of gravity. Find the time period of oscillation .
34. Derive an expression for Lorentz length contraction.
35. How fast would a rocket have to go relative to an observer for its length to be contracted to 99% of its length at rest?
36. What is polarisation ? Explain polarisation by reflection.
37. Newton's rings are observed in reflected light of  $\lambda = 5.9 \times 10^{-5}$  cm. The diameter of the 10<sup>th</sup> dark ring is 0.5 cm. Find the radius of curvature of the lens and the thickness of the air film.

**SECTION C****Answer any three questions:****(3x15=45)**

38. Find an expression for the elevation subjected to uniform bending of a beam supported symmetrically on two knife edges. Also describe an experiment to determine Young's modulus of a beam by uniform bending method.
39. Define coefficient of viscosity .State the differences between streamline and turbulent flow. Also determine an expression for the critical velocity of a liquid.
40. Derive an expression for the time period of oscillation of a compound pendulum. Also explain how will you determine the acceleration due to gravity 'g' using compound pendulum.
41. Derive Lorentz transformation equations. Using these equations explain Time dilation.
42. Give the theory of a plane transmission grating and describe how it is used to determine the wavelength of light.

\*\*\*\*\*

