

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 2017
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:

- The ratio between the volume stress to the volume strain is known as
 (a) Rigidity modulus (b) young's modulus
 (c) bulk modulus (d) poisson's ratio
- Work done in uniform bending is given by $1/2 \times EAK^2/R \times 1/R$ where EAK^2/R is called
 (a) bending filament (b) bending axis
 (c) bending moment (d) bending force
- Torque per unit twist θ is given by
 (a) $c = \pi Ga^4/2L$ (b) $c = \pi Ga^2/2L$
 (c) $c = \pi G(b^4 - a^4)/2L$ (d) $c = \pi G(a^4 - b^4)/2L$
- The dimension of viscosity is given by
 (a) $ML^{-1}T^{-1}$ (b) MLT^{-1} (c) ML^2T^{-1} (d) $ML^{-1}T^2$
- Surface tension is ----- when $\theta = (\theta_c - d)$ ie., at a temperature a little below the critical temperature
 (a) -1 (b) 1 (c) 0 (d) ∞
- A sphere with the molecule as centre and the range of molecular attraction as radius is called _____ of the molecules
 (a) molecular range (b) sphere of influence
 (c) surface area (d) surface energy
- The moment of inertia I is given by
 (a) $I = \sum mr^2$ (b) $I = \sum mr^4$ (c) $I = \sum mr$ (d) $I = \sum mr^3$
- The point O where the axis of rotation meets the vertical plane through the centre of gravity G of the rigid body is called
 (a) centre of suspension (b) centre of oscillation
 (c) centre of percussion (d) moment of inertia.
- The expression for time period of compound pendulum is given by
 (a) $T = 2\pi \sqrt{k^2 - h^2 / hg}$ (b) $T = 2\pi \sqrt{k^2 + h^2 / hg}$
 (c) $T = 2\pi \sqrt{k^4 + h^4 / hg}$ (d) $T = 2\pi \sqrt{k^3 + h^3 / hg}$
- In Lorentz transformation equations, the relation between x and x' is
 (a) $x' = x - vt / \sqrt{1 - v^2/c^2}$ (b) $x' = x + vt / \sqrt{1 - v^2/c^2}$
 (c) $x' = x - vt / \sqrt{1 + v^2/c^2}$ (d) $x' = x - ct / \sqrt{1 - v^2/c^2}$

11. In length contraction , for an observer when a body at rest appears to be a square , then it appears as _____ for an observer in motion .
 (a) rectangle (b) triangle (c) parallelogram (d) trapezium.
12. According to the postulate of special theory of relativity , the velocity of light in free space is
 (a) -1 (b) 1 (c) zero (d) constant .
13. The intensity of the resultant wave in destructive interference is
 (a) 0 (b) 1 (c) -1 (d) ∞
14. In diffraction pattern , the width of the central maximum is propotional to the ---- of the light
 (a) amplitude (b) wavelength (c) intensity (d) distance
15. Nicol prism is made from _____ crystal
 (a) graphite (b) silicate (c) calcite (d) magnicite

STATE WHETHER TRUE OR FALSE :

16. Within the elastic limit, the stress is directly propotional to strain.
17. Force of attraction between molecules of different substances are known as adhesive forces.
18. State whether the centre of suspension and centre of oscillation are interchangeable .
19. Unaccelerated reference frames in non uniform motion of translation relative to one another are called inertial frames.
20. In diffraction pattern using white light ,the central maximum is white in colour.

FILL IN THE BLANKS:

21. In bending of beams , there is a filament which neither elongates nor compressed , such a filament is called -----.
22. The turbulent motion is also known as -----.
23. A compound pendulum is a rigid body capable of rotation about a horizontal axis under -----
24. A system of coordinate axes which defines the position of a particle in two or three dimensional space is called -----
25. A stationary bright band of light is observed at points of ----- interference .

ANSWER BRIEFLY:

26. Define Poisson's ratio.
27. Define coefficient of viscosity.
28. Define moment of inertia.
29. Define time dilation.
30. State Brewster's law

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

31. A uniform rectangular bar 1m long , 0.04 m broad and 0.005 m thick is supported on its flat surface symmetrically on two knife edges 0.6 m apart. When the loads of 0.2 kg are hung from the ends , the elevation of the bar above its normal position is found to be 0.0023 m . Find the Young's modulus of the material of the bar.
32. Calculate the horizontal force required to move a metal plate of area 2m^2 with a velocity of 4.5 m/s when it rests on a layer of oil $2 \times 10^{-3}\text{m}$ thick. Coefficient of viscosity of oil = 2Ns/m^2 .
33. A uniform square lamina of side 24 cm oscillates in a vertical plane about a horizontal axis perpendicular to the plane of the lamina and within its boundary. Calculate the minimum time period of oscillation.
34. Derive Einstein's mass – energy relation $E = mc^2$.
35. A clock in a spaceship emits signals at intervals of 2 second as observed by an astronaut in the spaceship. If the spaceship travels with a speed of $3.5 \times 10^7 \text{ m/s}$, what is the interval between successive signals as seen by an observer at the control centre on the ground.
36. Explain how a Nicolprism works as an Polarizer and Analyser .
37. A parallel beam of light is incident perpendicular on a plane transmission grating which has 9000 lines/cm for the second order spectrum . Calculate the wavelength of light used.

SECTION C**Answer any three questions:****(3×15=45)**

38. Find an expression for depression at the middle of a bar subjected to non uniform bending. Describe an experiment to determine Young's modulus of a bar by non uniform bending method.
39. Explain the theory and experiment of drop weight method to determine (i) surface tension of a liquid (ii) interfacial surface tension between water and kerosene .
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 length contraction.
42. Give with necessary theory, Newton's ring method for the determination of the wavelength of monochromatic source of light.
