STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2015–16)

SUBJECT CODE: 15PH/AC/PH33

B.Sc. DEGREE EXAMINATION, NOVEMBER 2016
BRANCH IV- CHEMISTRY
THIRD SEMESTER

REG.NO ……..

COURSE : ALLIED CORE
PAPER : PHYSICS – I
TIME : 30 MINUTES **MAX.MARKS : 30**

Section- A
ANSWER ON THE QUESTION PAPER ITSELF
Answer all questions **(30 x 1 = 30)**

Choose the correct answer:

1. Modulus of elasticity is
   a) $\frac{stress}{strain}$ b) $\frac{strain}{stress}$ c) stress x strain

2. The bulk modulus is defined as
   a) ratio of linear stress to strain
   b) ratio of volume strain to volume stress
   c) ratio of volume stress to volume stress

3. Static torsion apparatus helps us to measure
   a) Bulk modulus b) young's modulus c) Rigidity modulus

4. Lorentz transformation equation for length contraction is_____
   (a) $L = \frac{lo}{\sqrt{1-\frac{v2}{c2}}}$ (b) $L = \sqrt{1-\frac{v2}{c2}}$ (c) $L = x_2 - x_1$ (d) $L = x_2^1 - x_1^1$ 5. 2.

5. The rest mass of an electron is $9.11x10^{-31}$kg
   a) $9.11x10^{-31}$ Kg b) $8.2x10^{-14}$ Kg c) $2.73x10^{-22}$ Kg d) $2.46x10^{-6}$ Kg

6. Einstein's mass energy relation is
   a) E = mc b) $E = mc^2$ c) $E = mc^3$ d) $E = m^2 / c$

7. The unit of moment of inertia is
   a) kg-m^2 b) kg-m c) N-m d) Kg/N

8. Radius of gyration of a rigid body of mass M and moment of inertia I is
   a) $\sqrt{\frac{I}{M}}$ b) I/M c) I^2/M d) N/M^2

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9. The value of g acceleration due to gravity is
   a) $9.6 m/s^2$ b) $9.8 m/s^2$ c) $9.4 m/s^2$ d) $9 m/s^2$

10. In Newton's ring experiment the angle of incidence on the glass plate is
    a) Zero b) 90^o c) 45^o

11. Canada balsam is
    a) a uni axial crystal b) a bio axial crystal c) transparent cement

12. According to Brewster's law, if the polarizing angle for glass is 60^o, then the refractive index of the glass is
    a) 1.732 b) 1.5 c) 1.33 d) 1.67

13. Constructive interference occurs, when the path difference is
    a) $\lambda/2$ b) zero c) $(2n+1)\lambda/2$ d) $n\lambda$

14. When some detergent is added to water, the surface tension of water
    a) increases b) decreases c) unaffected d) increases and then decreases

15. For a torsion pendulum, the period of oscillation T varies with length ℓ as
    a) $T^2 \alpha \ell$ b) $T \alpha \ell$ c) $T \alpha \ell^2$ d) $T \alpha 1/\ell$

Fill in the blanks:

16. Accelerated frames are called _____.
17. Moment of inertia is given by I =_____ where mass is m and K is radius of gyration.
18. For streamlined flow, the liquid velocity should be less than _____.
19. Diffraction explains _____nature of light.
20. _____crystal is used to construct Nicol prism.

State whether true or false:

21. The ordinary and extraordinary rays travel with the same velocity along optic axis.
22. The refractive index of a double refracting crystal is same for all rays.
23. When a beam is loaded at the centre, there will be a depression at the centre.
24. Adhesive force exists between molecules of the same type.
25. The length contraction becomes appreciable only when velocity of the body is equal to that of light.

Answer in a single line:

26. State the postulates of special theory of relativity.

27. What is time dilation?

28. Define critical velocity.

29. Mention any three uses of Polaroids.

30. What are coherent sources?

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Section B

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

1. A rod 1m moving along its length with velocity of 0.6c calculate its length as it appears to an observer a) on the earth and b) moving with the rod itself.
2. Explain surface tension with kinetic theory.
3. A one metre length bar of uniform area of cross section of breadth 1cm and thickness 0.5cm is supported horizontally at its ends and loaded at the middle, it is depressed through 1.99 mm, by a load of 100 gm. Calculate the Young's modulus of the material of the bar.
4. A parallel beam of light falls normally on a diffraction grating ruled $4x10^5$ lines/m and the second order image is diffracted 34^o from the normal. Calculate the wavelength of the light.
5. The polarising angle for water is 53^o 4' calculate its refractive index.
6. If 4Kg of a substance is fully converted into energy how much energy is produced? C= $3x10^8$m/s
7. Find the work done per unit volume in twisting a wire.

Section C

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

8. Explain the theory of a compound pendulum and derive an expression for its period of oscillation. How acceleration due to gravity and radius of gyration can be determined using compound pendulum?
9. Explain length contraction and time dilation with experimental evidence.
10. What is a beam? Derive an expression for the internal bending moment.

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11. a. Explain polarisation by reflection and refraction.

    b. In Newton's ring experiment the diameter of the 10^{th} dark ring due to a wavelength $6000A^0$ in air is 0.5cm. Find the radius of curvature of the lens.

12. How to determine wavelength of a given source of light by forming Newton's rings?

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