

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.

(For candidates admitted during the academic year 2004-05 & thereafter)

SUBJECT CODE : **PH/AC/GP32**

B.Sc. DEGREE EXAMINATION NOVEMBER 2008

BRANCH IV – CHEMISTRY

THIRD SEMESTER

REG. No. _____

COURSE : **ALLIED – CORE**
PAPER : **GENERAL PHYSICS – I**
TIME : **30 MINS.**

MAX. MARKS : 30

SECTION – A

TO BE ANSWERED IN THE QUESTION PAPER ITSELF

ANSWER ALL QUESTIONS:

(30 x 1 = 30)

I CHOOSE THE CORRECT ANSWER:

- The unit of moment of inertia is
a) $\text{kg}\cdot\text{m}^2$ b) $\text{kg}\cdot\text{m}$ c) $\text{N}\cdot\text{m}$ d) Kg/N
- In a nuclear reaction, if the mass decreases by one microgram, the energy release will be
a) $9 \times 10^{16} \text{ J}$ b) $9 \times 10^{-1} \text{ J}$ c) $9 \times 10^6 \text{ J}$ d) $9 \times 10^{10} \text{ J}$
- A building with good acoustics should have
a) multiple echoes b) lot of reflecting materials
c) large reverberation time d) minimal reverberation time
- 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
- Young's modulus
a) is dimensionless b) has unit N/m^2 c) N/m d) N
- If the volume of a wire remains constant during extension, then its Poisson ratio is
a) 1 b) zero c) infinity d) 0.5
- For a torsion pendulum, the period of oscillation T varies with length L as
a) $T^2 \propto \ell$ b) $T \propto \ell$ c) $T \propto \ell^2$ d) $T \propto 1/\ell$
- A disc has mass M and radius R . The moment of inertia about an axis perpendicular to the plane of the disc and passing through its centre will be
a) MR^2 b) $MR/2$ c) M^2R d) $MR^2/2$

9. A convex lens may not focus all the colours at the same point. This is called
 a) chromatic aberration b) spherical aberration
 c) astigmatism d) coma
10. Spherical aberration can be reduced by
 a) reducing the aperture b) enlarging the aperture
 c) using monochromatic light d) using a bigger lens
11. Constructive interference occurs, when the path difference in
 a) $\lambda/2$ b) zero c) $(2n+1)\lambda/2$ d) $n\lambda$
12. Fraunhofer diffraction corresponds to
 a) spherical wave front b) cylindrical wave front
 c) plane wave front d) elliptical wave front
13. For a source of wavelength λ , a grating with N rulings per metre can have maximum order of
 a) $m = N\lambda$ b) $m = 1/\lambda$ c) $m = N/\lambda$ d) $m = \lambda/N$
14. According to Brewster's law, if the polarizing angle for glass is 60° , then the refractive index of the glass is
 a) 1.732 b) 1.5 c) 1.33 d) 1.67
15. A Nicol prism can be used
 a) as a polariser but not as an analyzer
 b) as an analyzer but not as a polariser
 c) as a polariser as well as analyzer
 d) neither as a polariser nor as an analyser

II FILL IN THE BLANKS:

16. The depression at the free end of a cantilever is _____.
17. Surface tension can be defined as _____.
18. Angle of contact is defined as _____.
19. In the drop weight method, the surface tension can be expressed as $T =$ _____.
20. For a streamlined flow, the liquid velocity should be _____ (high/small).

III STATE WHETHER TRUE OR FALSE:

21. For a compound pendulum, the center of suspension and the center of oscillation are interchangeable.
22. The acoustics of a building is independent of the reverberation time.
23. Surface tension of a liquid increases with temperature.

24. Plane of polarization and plane of vibration are mutually perpendicular.
25. The refractive index of a double refracting crystal is same for all rays.

IV ANSWER BRIEFLY:

26. State the limitations of Newton's law.

27. Write a note on Newtonian relativity.

28. State the postulates of special theory of relativity.

29. What is twin paradox?

30. Mention any three uses of Polaroids.

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SECTION – B

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

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. Write down Sabine's reverberation formula and explain its application.
3. Discuss the bending of a beam, and derive an expression for the bending moment.
4. Derive an expression for excess pressure inside a curved liquid surface.
5. The first of the Newton's rings has a radius of 0.1mm. Calculate the radius of the 2nd and 3rd rings.
6. Calculate the angle of the first order maximum of a grating with 6×10^5 lines / metre for a source of wavelength 5893 \AA .
7. Explain the construction and working of a Nicol prism.

SECTION – C

ANSWER ANY TWO QUESTIONS: (2 x 20 = 40)

8. Explain the theory of a compound pendulum and derive an expression for its period of oscillation. Show how acceleration due to gravity and radius of gyration can be determined.
9. Derive Lorentz transformation equations and discuss length contraction and time dilation.
10. Obtain an expression for torque per unit twist of a torsion wire.
11. Give the theory of Young's double slit experiment and obtain an expression for fringe width.

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