STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2008-09)

SUBJECT CODE : **PH/AC/PC13**

B.Sc. DEGREE EXAMINATION NOVEMBER 2008
BRANCH IV - CHEMISTRY
FIRST SEMESTER

REG. No._____

COURSE   :   **ALLIED – CORE**
PAPER   :   **PHYSICS FOR CHEMISTRY – 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:

1.   The basic unit of moment of Inertia is
    a) kgm^2 b) Kgm^{-2} c) kg^2m d) $Kg^{-2}m$.

2.   Which of the following is the correct relation, where C is the velocity of light in vacuum?
    a) $C + C = C$ b) $C – C = C$ c) both of the above   d) none

3.   Photographs of rapidly moving distant objects will
    a) not show Lorentz contraction   b) show Lorentz contraction
    c) Lorentz expansion   d) none of the above

4.   Special theory of relativity states that
    a) mass remains unaffected in any inertial frame
    b) velocity of light remains un affected in any inertial frame
    c) time remains some in all inertial frames
    d) none of these.

5.   Ultrasonics are
    a) basically sound waves but their wavelengths are small
    b) electromagnetic waves, whose frequencies are beyond the audible range
    c) waves travel with double the speed of sound
    d) none of these

6.   Piezo electric effect is
    a) reversible
    b) irreversible
    c) reversibility depends upon the temperature
    d) none of these

7. When a force is applied along the length of wire
    a) the wire elongates along the length and also elongates radially
    b) the wire contracts along the length and also contracts radially
    c) the wire contracts along the length but it elongates radially
    d) the wire elongates along the length but it contracts radially

8. The unit of Poisson's ratio is
    a) Nm^{-1} b) m   c) Pascal   d) No unit

9. As the temperature increases, the surface tension of the liquid
    a) increases   b) decreases
    c) remains unaffected   d) none of the above

10. Interference phenomean proves
    a) transverse nature of the wave   b) longitudinal nature of the wave
    c) wave nature of the wave   d) particle nature of the wave

11. In Newton's rings, the radii of the dark rings are proportional to
    a) square of the natural numbers   b) square root of the natural numbers
    c) cube of the natural numbers   d) cube root of the natural numbers

12. Compact disc shows colour in white light due to
    a) interference   b) diffraction   c) polarization   d) scattering

13. In the expression, $(a+b)Sin\theta = m\lambda$, (a + b) is called
    a) grating element   b) no. of ratings per unit length
    c) glancing angle   d) corresponding points

14. Brewster's Law is
    a) μ =Sin i / Sin r   b) $\mu = \tan C$ c) $\mu \tan i_p$ d) none

15. A plane perpendicular to the plane of vibration is called
    a) plane of polarization   b) optic axis
    c) plane of refraction   d) double refraction

II   FILL IN THE BLANKS:

16. Moment of inertia for a given body depends on _____.

17. In the expression, $I = mK^2$, where K = _____.

18. Disadvantage of piezo electric oscillator is _____.

19. Expression for equation of continuity is _____.

20. In Newton's rings, the fringes are in the form of _____.

III   STATE WHETHER TRUE OR FALSE:

21.   Large moment of Inertia helps in keeping the motion uniform.

22.   A rocket moving with the speed of light appears to be reduced to a point to a stationary observer.

23.   For observing interference effects waves must be incoherent.

24.   Polaroid glass window panes are used in trains and aeroplanes to increase the intensity of incoming rays of light.

25.   In interfacial surface tension, Hare's apparatus is used to find the average mass of each drop.

IV   ANSWER BRIEFLY:

26.   What is frame of reference?

27.   Mention one application of ultrasonic waves in industry.

28.   What is a beam?

29.   Define turbulent flow.

30.   Define optic axis.

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TIME   :   **2 HOURS**   MAX. MARKS : **70**

SECTION – B

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

1.   Obtain an expression for g using compound pendulum.

2.   A motor car is travelling at $30 mS^{-1}$ on a circular road of radius 500m. It is increasing its speed at the rate of $2 mS^{-2}$. What is its acceleration?

3.   Show that for values of V<<C, Lorentz transformation reduces to the Galilean transformation.

4.   What is the wavelength of ultrasonic wave of frequency 330KHz at 0°C. Given : velocity of sound at 0°C = $330 ms^{-1}$.

5.   100 drops of water falling down a tube of external diameter 3.5mm are collected under coconut oil of specific gravity 0.8. Calculate the interfacial surface tension between water and oil if the water collected weighs 12.35gm.

6.   In Newton's rings experiment, the diameter of the 15th ring was found to be 0.590cm and that of 5th ring was 0.336cm. If the radius of the convex lens is 100 cm, calculate the wavelength of light used.

7.   List the applications of ultrasonic waves in various fields.

SECTION – C

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

8.   State and explain the basic postulates of Einsteins special theory of relativity. Derive the Lorentz space-time transformation formulae. Discuss length contraction and time dilation.

9.   Explain piezo electric effect. Write an essay on the production of ultrasonic waves using piezo-electric oscillator.

10.   Explain Interfacial surface tension. Give an experiment to determine the interfacial surface tension between water and kerosene.

11. Describe Newton's rings experiment and explain how it is used to determine the wavelength of sodium light.

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