

B.Sc. DEGREE EXAMINATION NOVEMBER 2007
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:

1. Reverberation of sound in a room is due to _____ of sound taking place at various surfaces present within the room.
a) multiple reflection b) refraction c) absorption d) dispersion
2. The Galilean coordinate transformation is valid only in the limit when
a) u is much smaller than c b) u is equal to c
c) u is greater than c d) none of these
3. Poisson's ratio of a material is given by, σ is equal to
a) $\frac{2n}{q} - 1$ b) $1 - \frac{2n}{q}$ c) $\frac{2q}{n} - 1$ d) $\frac{q}{2n} - 1$
4. If C be the couple per unit twist, then the workdone in twisting a wire through an angle θ is
a) $2C\theta^2$ b) $\frac{2}{C}\theta^2$ c) $\frac{1}{2C}\theta^2$ d) $\frac{C}{2}\theta^2$
5. The dimensions of surface tension is
a) MT^2 b) MT^{-2} c) $M^{-2}T$ d) $M^{-1}T^{-1}$
6. The critical velocity of a liquid of density ρ and coefficient of viscosity η flowing through a tube of diameter D is equal to
a) $\frac{R\rho}{\eta D}$ b) $\frac{\rho D}{R\eta}$ c) $\frac{R\eta}{\rho D}$ d) $\frac{RD}{\rho\eta}$
(where R is the Reynold's number)
7. If the total energy of a particle is twice its rest energy, then the speed of the particle is
a) $\sqrt{3}c$ b) $\frac{c}{2}$ c) $2c$ d) $\frac{\sqrt{3}}{2}c$

8. Formation of Newton rings is due to the phenomenon of
a) interference b) diffraction c) polarization d) reflection
9. Reverberation time is
a) directly proportional to the volume of the auditorium
b) inversely proportional to the volume of the auditorium
c) directly proportional to the area of the walls and the ceilings of the auditorium
d) directly proportional to the total absorption and transmission through open surfaces.
10. According to the equation of continuity, which of the following is a constant
a) av b) a/v c) a^2v d) v/a
11. According to Hooke's law
a) stress is directly proportional to strain
b) stress is inversely proportional to strain
c) stress is independent of strain
d) stress is equal to strain
12. A nicol prism eliminates either the ordinary ray or extraordinary ray by
a) reflection b) absorption
c) refraction d) total internal reflection
13. Plano-Convex lenses are used in optical instruments in order to reduce
a) Chromatic aberration b) Spherical aberration
c) Coma and astigmatism d) both chromatic and spherical aberrations.
14. To have the achromatic combination of two lenses
a) both the lenses should be convex
b) both the lenses should be concave
c) one of the lenses should be convex and the other concave
d) both the lenses should be plano convex.
15. A path difference of $\lambda/4$ between light waves emitted from 2 sources corresponds to a phase difference of
a) $\pi/4$ b) $\pi/2$ c) 2π d) $3\pi/4$

II FILL IN THE BLANKS

16. Two sources of same frequency, phase and amplitude are called _____ sources.
17. Einstein's mass energy relation states that $E =$ _____.
18. The velocity below which the motion of a liquid is orderly is called _____ velocity.

19. Glass is _____ (more/less) elastic than rubber.
20. The bending of light beam round the corners of an obstacle is called _____.

III STATE WHETHER TRUE / FALSE

21. According to the theory of relativity, the length of a rod in motion is less than its rest length.
22. Decibel is a dimensionless quantity.
23. The time period of a compound pendulum is minimum when the points of suspension and oscillation are equidistant from the centre of gravity.
24. The phenomenon of double refraction is observed when light enters the crystal along the optic axis.
25. The colours observed in a thin film of oil on the surface of water is due to the phenomenon of total internal reflection.

IV ANSWER THE FOLLOWING

26. Define moment of inertia.
27. List the factors that affect the acoustics of buildings.
28. To prevent breeding of mosquitoes, oil is sprayed on the surface of water in pools and ponds – explain why?
29. State Brewster's law.
30. What is a Cantilever?

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2004-05 & thereafter)

SUBJECT CODE : PH/AC/GP32

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BRANCH IV - CHEMISTRY
THIRD SEMESTER

COURSE : ALLIED – CORE
PAPER : GENERAL PHYSICS – I
TIME : 2 HOURS. MAX. MARKS : 70

SECTION – B

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

1. A hall of volume 5500 m^3 is found to have a reverberation time of 2.3 secs. The sound absorbing surface of the hall has an area of 750 m^2 . Calculate the average absorption coefficient.
2. A liquid drop of radius R breaks up into 125 small drops. Calculate the change in energy.
3. A bar of length 1m, breadth 3cm and thickness 5mm is supported at its two ends and loaded in the middle. The depression observed in the middle is $1.96 \times 10^{-3} \text{ m}$ when a load of 0.1kg is placed. Calculate the young's modulus of the material of the beam.
4. A rod 2m long is moving along its length with a velocity $0.6c$. Calculate its length as it appears to an observer a) on the earth b) moving with the rod itself
5. Green light of wavelength 5100 \AA from a narrow slit is incident on a double slit. If the overall separation of 10 fringes on a screen 200 cm away is 2cm, find the slit separation.
6. What is the highest order spectrum which may be seen with monochromatic light of wavelength 6000 \AA by means of a diffraction grating with 5000 lines/cm.
7. Calculate the work done in twisting a steel wire of radius 10^{-3} m and length 0.25m through an angle of 45° , given $n = 8 \times 10^{10} \text{ N/m}^2$.

SECTION - C

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

1. a) Prove that the axial chromatic aberration in a lens is equal to ωf where ω is the dispersive power of the material of the lens for blue and red rays of light and f is the focal length for the mean yellow rays of light. (7)
b) Derive the condition for the achromatism of two thin lenses separated by a finite distance. (13)

2. State the postulates of special theory of relativity. Derive Lorentz transformation equations. (2+18)
3. Discuss the theory of plane diffraction grating, Describe in detail how you would use a transmission grating to determine the wavelength of light. (10+10)
4. a) Derive an expression for the time period of oscillation of a compound pendulum . (10)
b) Explain how acceleration due to gravity may be determined experimentally in the laboratory. (10)
