SUBJECT CODE: 15PH/AC/PH33

B.Sc. DEGREE EXAMINATION, NOVEMBER 2019
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:

1. Stress is defined as the restoring force per unit
   (a) Volume   (b) torque   (c) area   (d) metre

2. In bending of beams , there is a filament which neither elongates nor compressed such a
   filament is called
   (a) neutral filament   (b) plane of bending (c) neutral axis   (d) cantilever.

3. The time period of oscillation of torsional pendulum is given by
   (a) $T= 2\pi \sqrt{\theta /I}$ (b) $T= 2\pi \sqrt{C/I}$ (c) $T= 2\pi \sqrt{I/\theta}$ (d) $T= 2\pi \sqrt{I/C}$

4 .The dimension of surface tension is given by
   (a) MT^{-2} (b) M^2T^{-3} (c) MT^{-1} (d) MLT^{-2}

5. Force of attraction between molecules of the same substances is called
    (a) molecular force   (b) cohesive force
   (c) adhesive force   (d)sphere of influence.

6. In viscosity , Reynold's number k is given by

   (a) $V_c\rho r/ \eta$ (b) $V_c \eta r/\rho$ (c) $V_c\rho\eta/r$ (d) $\eta r/ V_c\rho$

7. A compound pendulum is a rigid body capable of rotation about a horizontal axis under
   (a) tension   (b) torque per unit twist (c) gravity   (d) motion

8. In the expression of time period of compound pendulum $T = 2\pi \sqrt{k^2 + h^2 / hg}$, k is
   known as
   (a) radius of gyration   (b) centre of suspension
   (c) Reynolds number   (d) centre of oscillation.

9. If 'O' is the centre of suspension and 'G' is the centre of gravity of the body then the point
   'O$_1$' on OG produced such that $OO_1 = k^2 /h$ is called the _____ of the body
   (a) Centre of suspension   (b) centre of percussion
   (c) centre of oscillation   (d) acceleration due to gravity.

10. In Lorentz transformation equations, the measurement of _____ and _____ depend upon the
    frame of reference of the observer.
    (a) Position and time   (b) velocity and distance
    (c) acceleration and time   (d) position and velocity

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11. In time dilation ,a stationary clock measures a _____ time interval between events occurring in a moving frame of reference than does a clock in the moving frame.
    (a)   Shorter   (b) Longer   (c) same   (d) variable.

12. In Einstein mass energy relation, the total energy of the body is the sum of K.E(E_K) and ____

    (a) potential energy   (b) rest mass energy
    (c) change of momentum   (d) gravitational energy.

13. _____ is the phenomenon of superposition of two coherent waves in the region of superposition.
    (a) polarization   (b) total internal reflection
    (c) diffraction   (d) interference .

14. In Fraunhoffer diffraction , the source and screen are at _____ distance from the aperture.
    (a) Infinite   (b) finite   (c) same   (d) variable

15. In polarization, Brewster's law is given by
    (a) n= cosec i_p (b) n= sin i_p (c) n= cos i_p (d)) n= tan i_p

STATE WHETHER TRUE OR FALSE :
16. A cantilever is a beam fixed vertically at one end and loaded at the other end.
17. Surface tension is zero at the critical temperature.
18. The moment of inertia is given by $I = \sum mr^2$
19. Unaccelerated reference frames in non uniform motion of translation relative to one another are called inertial frames.
20. The intensity of the resultant wave in constructive interference is maximum.

FILL IN THE BLANKS:
21. The torque per unit twist c is given by _____
22. The unit of viscosity is given by _____
23. Centre of suspension and Centre of oscillation are _____
24. According to the postulate of special theory of Relativity, the velocity of light in free space is _____
25. An arrangement consisting of a large number of parallel slits of equal width and separated from one another by equal opaque spaces is called a _____

ANSWER BRIEFLY:
26. Define modulus of elasticity.
27. Define Critical velocity.
28. Define centre of oscillation.
29. Explain twin paradox.
30. State the uses of Polaroids.

SECTION - B

ANSWER ANY FIVE QUESTIONS: (5x5=25)

31. What torque must be applied to a wire one metre long, 10^{-3} metre in diameter in order to twist one end of it through 90^0, the other end remaining fixed ? The rigidity of the material of the wire is 2.8×10^{10} Nm^2.

32. Obtain an expression for bending moment of a beam.

33. Calculate the critical velocity with which water of coefficient of viscosity 0.001 Nsm^{-2} flows through a tube of radius 6×10^{-4} m without turbulence being produced. Reynold's number is 1000.

34. A thin uniform bar of length 1.2 metres and breadth 0.12 metres is made to swing in a vertical plane about an axis through a point A at a distance x from the centre of gravity. Find the value of x if the period of oscillation is a minimum.

35. A particle with a proper lifetime of 1 μs moves through the laboratory at 2.7×10^8 ms^{-1}. What is its lifetime as measured by observers in the laboratory.

36. What is the highest order spectrum which may be seen with monochromatic light of wavelength 600 nm by means of a diffraction grating with 5000 lines/cm.

37. Explain the phenomenon of polarization by double refraction.

SECTION - C

ANSWER ANY THREE QUESTIONS:

(3x15=45)

38. Derive an expression for the depression at the middle of a bar subjected to non uniform bending and also describe an experiment to determine Young's modulus of a bar by non uniform bending method.

39. Describe 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. With necessary theory , explain Newton's ring method for the determination of the wavelength of monochromatic source of light.

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