SUBJECT CODE : PH/MC/PA14

B.Sc. DEGREE EXAMINATION NOVEMBER 2009
BRANCH III - PHYSICS
FIRST SEMESTER

REG. No._____

COURSE   :   **MAJOR – CORE**
PAPER   :   **PROPERTIES OF MATTER AND ATOMIC PHYSICS**
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 ANSWERS:

1. Hooke's law is within elastic limit
   a) Stress / strain = E   b) Strain/ Stress = E
   c) Rigidity modulus/bulk modulus=E   d) Force/Area=E

2. What is the dimension of strain?
   a) $ML^{-1}T^{-2}$ b) $ML^{-2}T^{-2}$ c) MLT^{-2} d) NIL

3. The ratio of lateral strain to longitudinal strain is
   a) Young's modulus   b) Bulk modulus
   c) Poisson's ratio   d) Rigidity modulus

4. What is the unit of coefficient of viscosity?
   a) N/m^2 b) N/m^2/unit vel. gadient   c) N/m   d) Kg/s

5. Excess pressure inside a liquid drop is
   a) T/r   b) 2T/r   c) 3T/r   d) 4T/r

6. Angle of contact of glass with mercury is
   a) 140°   b) 0°   c) 90°   d) 45°

7. Adhesive force is between the
   a) same molecules   b) different molecules
   c) same charges   d) different charges

8. The dimensional formula for surface tension is
   a) MLT^{-2} b) MT^{-2} c) $M^{-1}L^{-1}T^{-1}$ d) $ML^{-1}T^{-1}$

9. The flow of liquid above and below the critical velocity is
   a) streamline flow   b) turbulent flow
   c) streamline & turbulent flow   d) turbulent & streamline flow

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10. Artificial rain is sometime brought about in the saturated cloud by injecting solid
    a) CO_2 b) SO_2 c) Nacl   d) Na_2CO_3

11. Canal rays are also called
    a) α - rays   b)β - rays   c) γ - rays   d) positive rays

12. Einstein's photo electric equation is
    a) $h\nu = h\nu_o$ b) $h\nu = h\nu_o + \frac{1}{2} m v^2$
    c) $\frac{1}{2} m v^2 = h\nu$ d) $\frac{1}{2} m v^2 = h\nu_o$

13. The fundamental postulates of vector atom model is
    a) spatial quantization
    b) spinning of electron
    c) spatial quantization and spinning of electron
    d) the angular momentum of quantized orbit is $nh/2\pi$

14. Normal energy state of the Hydrogen atom is
    a) $13.6/ n^2$ eV   b) $-13.6/ n^2$ eV
    c) $n^2/ 13.6$ eV   d) $-n^2/ 13.6$ eV

15. Compton's change in wave length is
    a) $d\lambda = h^2 (1 – \cos \theta) /m_o c$ b) $d\lambda = h^2 (1 – \cos \theta) /m_o c^2$
    c) $d\lambda = h^2 (1 – \cos \theta) /m_o^2 c^2$ d) $d\lambda = h (1 – \cos \theta) /m_o c$

II   FILL IN THE BLANKS:

16. Mass number is _____

17. Moseley's law is ─────────────────

18. Bragg's law is ─────────────────

19. Increase in temperature will _____ the S.T. of liquid.

20. Splitting of spectral lines under the magnetic field is _____

III   STATE WHETHER TRUE OR FALSE:

21. The angular momentum of Bohr's quantized orbit is $nh/2\pi$.

22. In a highly viscous liquid, the velocity of a body is non uniform after it attains terminal velocity.

23. No two electrons in an atom exists in the same quantum state.

24. The Newton's viscous flow law is $F = - \eta A \, dv/dt$.

25. The Reynold's no. determines the nature of flow whether turbulent or steam line flow of a Liquid through a narrow tube.

IV   ANSWER BRIEFLY:

26. What is bending moment?

27. What is Compton effect ?

28. What is Bohr Magneton ?

29. Why rain drops or dew drops assume spherical shape ?

30. What is Stark effect?

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

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COURSE   :   MAJOR – CORE
PAPER   :   PROPERTIES OF MATTER AND ATOMIC PHYSICS
TIME   :   2 ½ HOURS   MAX. MARKS : 70

SECTION – B

ANSWER ANY FIVE QUESTIONS: (5 x 5 = 25)

1. Calculate the value of σ for the material, given Young's Modulus,

    $q = 12.25$ x 10^{10} N / m ^{2}. Rigidity modulus, n = 4.55 x 10^{10} N / m ^{2}.

2. Calculate the work done in stretching a uniform metal wire of area of cross section

    10^{-6} m ^{2} and length 1.5 m through 4 x 10^{-3} m. Given q= 2 x 10^{11} N / m ^{2}.

3. Calculate the work done in spraying spherical drop of water of 10^{-3} m radius into

    million droplets all of the of the same size, the S.T. of water is 72 x 10^{-3} N / m .

4. Water flows through a horizontal tube of length 0.2 m and internal radius 8.1 x 10^{-4}

    m. Under a constant head of the liquid 0.2 m height. In 12 minutes   8.64 x 10^{-4} m^3 of

    liquid comes from the tube. Calculate the coefficient of viscosity of water. Density of

    water = 1000 kg/ m^3 and g = 9.8 m/s^2 .

5.   The spacing between principal planes of Nacl crystal is 2.82A. It is found that first

    order Bragg reflection occurs at an angle of 10°. What is the wave length of X- rays?

6. State the laws of photo electric effect.

7. Explain excitation and ionization potential with an example.

SECTION – C

ANSWER ANY THREE QUESTIONS: (3 x 15 = 45)

8. Define Rigidity modulus. Describe with necessary theory, how would you determine

    the rigidity modulus of a wire experimentally by using Torsional pendulum.

9. Define surface tension. Describe Jaegar's method of studying surface tension of water

    with temperature.

10. Define the coefficient of viscosity. Derive Poiseuille's formula for the rate of flow of liquid through a capillary tube. Describe laboratory method for determining co efficient of viscosity of a liquid at room temperature.

11. What is mass spectrograph? Describe the construction, working and theory of a Dempster mass spectrograph.

12. What is Zeeman Effect? Describe the experimental arrangement for studying the Zeeman Effect.

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