

B.Sc. DEGREE EXAMINATION NOVEMBER 2018
BRANCH III - PHYSICS
FIRST SEMESTER

COURSE : MAJOR – CORE

PAPER : PROPERTIES OF MATTER AND ATOMIC PHYSICS

TIME : 3 HOURS

MAX. MARKS : 100

SECTION – A

ANSWER ALL QUESTIONS:

(30 x 1 = 30)

I. CHOOSE THE CORRECT ANSWERS:

- When an elastic material with young's modulus Y is subjected to stretching stress S , elastic energy stored per unit volume of the material is
 - $Y S/2$
 - $S^2 Y/2$
 - $S^2/2Y$
 - $S/2Y$
- The unit of surface tension is _____.
 - N/m
 - N/m^2
 - N/m^3
 - Nm
- While young's modulus 'E' relate to change in length and bulk modulus 'K' relate to change in volume, modulus of rigidity 'G' relate to change in
 - weight
 - density
 - shape
 - temperature
- The angle of contact between pure water and pure glass is
 - 0°
 - 45°
 - 90°
 - 135°
- The wettability of a surface by a liquid depends primarily on
 - Surface tension
 - Density
 - Angle of contact between the surface and the liquid
 - Viscosity
- When the angle of contact between a solid and liquid is 90° , then
 - cohesive force is greater than adhesive force
 - cohesive force is lesser than adhesive force
 - cohesive force is equal to adhesive force
 - cohesive force is very much greater than adhesive force
- A fluid is in streamline flow across a horizontal pipe of variable area of cross section. For this which of the following statement is correct?
 - The velocity is minimum at the narrowest part of the pipe and the pressure is minimum at the widest part of the pipe.
 - The velocity is maximum at the narrowest part of the pipe and the pressure is maximum at the widest part of the pipe.
 - Velocity and pressure both are maximum at the narrowest part of the pipe.
 - Velocity and pressure both are maximum at the widest part of the pipe.

8. The viscosity of a fluid in motion is 1 Poise. What will be its viscosity(in Poise) when the fluid is at rest?
 a. 0 b. 0.5 c. 1 d. 2
9. Photo electric emission occurs only when the incident light has more than a certain minimum
 a. Power b. Wavelength c. Intensity d. Frequency
10. The term for a particular atomic state is $4D_{5/2}$ then the value of L is
 a. 1 b. 2 c. 3 d. 5
11. The Balmer lines emitted by hydrogen atoms placed in an
 a. Electric field b. Magnetic field
 c. Both electric and magnetic field d. None of the above
12. The work function of a surface of a photosensitive material is 6.2 eV. The wavelength of incident radiation for which the stopping potential is 5V lies in the
 a. Ultraviolet region b. Visible region
 c. IR region d. X-ray region
13. When the energy of the incident radiation is increased by 20%, the kinetic energy of the photoelectrons emitted from the metal surface increased from 0.5 to 0.8 eV, The work function of metal is
 a. 0.65 eV b. 1.0 eV c. 1.3 eV d. 1.5 eV
14. The principle of Stern and Gerlach experiment is based on the behavior of magnetic dipole in
 a. uniform magnetic field b. non - uniform magnetic field
 c. uniform electric field d. non - uniform electric field
15. The experimental value of Bohr magneton is
 a. $9.27 \times 10^{-24} \text{ JT}^{-1}$ b. $9.27 \times 10^{24} \text{ JT}^{-1}$
 c. $1/9.27 \times 10^{-24} \text{ JT}^{-1}$ d. $1/9.27 \times 10^{24} \text{ JT}^{-1}$

II. FILL IN THE BLANKS:

16. The ratio of change in length (l) to original length (L) is called _____
17. The total work done in twisting the wire through an angle θ , $W =$ _____
18. The potential energy per unit area of the surface film is called its _____
19. _____ is one of the application of photoelectric effect.
20. The Landé g-factor is _____

III. STATE WHETHER TRUE OR FALSE:

21. Restoring force per unit area is called stress.
22. The velocity of the liquid increases with temperature.
23. Surface tension of an unassociated liquid is decrease with rise of temperature.
24. The Stark-shift for the ground state ($n=1$) of hydrogen is zero.
25. Moseley law states that the frequency is inversely proportional to square of atomic number.

IV. ANSWER BRIEFLY:

26. Define bulk modulus. Write its unit.
27. What is surface tension?
28. Define the term critical velocity.
29. Write Einstein photo electric equation.
30. What is Paschen-Back effect?

SECTION – B**ANSWER ANY FIVE QUESTIONS:****(5 x 5 = 25)**

31. Obtain an expression for the depression at the free end of a thin light beam clamped horizontally at one end and loaded at the other.
32. A wire 3cm long and 30 mm in diameter elongates 1.32×10^{-3} m when stretched by a force of 0.6kg weight find (a) Young's modulus and (b) the energy stored up in the wire.
33. Calculate the work done in spraying a spherical drop of water of 10^{-3} m radius into million droplets, all of the same size, the surface tension of water being $72 \times 10^{-3} \text{ Nm}^{-1}$.
34. A water drop of radius 10^{-5} m is falling through air. Find the terminal velocity. Neglect the density of air. (η for air = $18 \times 10^{-6} \text{ Nsm}^{-2}$).
35. Water is conveyed through a horizontal tube 0.08 m in diameter and 4000 m in length at the rate of 20 liters per second. Assuming only one viscous resistance. Calculate the pressure required to maintain the flow. $\eta = 0.001$ SI unit.
36. Find the magnetic moment, in Bohr magneton of an atom in the 3P_2 state.
37. Explain Aston's mass spectrograph.

SECTION – C**ANSWER ANY THREE QUESTIONS:****(3 x 15 = 45)**

38. Derive an expression for the bending of a bar supported at the two ends and loaded in the middle. Describe an experiment to determine E by bending.
39. Describe Quincke's method of finding surface tension and also obtain the formula for angle of contact. Discuss its experiment.
40. Derive Poiseuille's formula for rate of flow of liquid through a capillary tube and explain the two corrections applied in the poiseuille's equation.
41. Explain in brief Compton Effect on the basis of quantum hypothesis .What is its physical significance? Deduce the mathematical expression for Compton shift produced in scattering.
42. Explain the normal Zeeman Effect and anomalous Zeeman Effect
