

B.Sc. DEGREE EXAMINATION NOVEMBER 2012
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:

- Two wires of the same radii and material have their lengths in the ratio 1:2. If these are stretched by the same force, the strains produced in the two wires will be in the ratio
a. 1:2 b. 2:1 c. 1:1 d. 1:4
- The unit of stress is
a. N/m b. N/m² c. N²/m d. N/cm
- Choose the relation between the three moduli of elasticity
a. $\frac{9}{q} = \frac{3}{n} + \frac{1}{k}$ b. $\frac{9}{q} = \frac{3}{n} - \frac{1}{k}$ c. $\frac{3}{n} = \frac{9}{q} + \frac{1}{k}$ d. $\frac{1}{k} = \frac{9}{q} + \frac{3}{n}$
- For liquids the maximum distance upto which a molecule can exert force of attraction on another molecule is
a. 10³m b. 10⁻⁶ c. 10⁻⁵ d. 10⁻⁹m
- The angle of contact for mercury and glass is
a. about 140° b. about 40° c. about 240° d. about 80°
- The force required to separate two plates of glass of area 10⁻³m² each with a layer of water 10⁻⁶m thick. (Surface tension of water = 75 x 10⁻³ N/m)
a. 50 N b. 100 N c. 150 N d. 200 N
- Two hail stones whose radii are in the ratio of 1:2 fall from a height of 50 km. Their terminal velocities are in the ratio of
a. 1:9 b. 1:6 c. 4:1 d. 1:4
- Poiseuille's formula for the flow of a liquid through a capillary tube is
a. $\frac{\pi p a}{8 \eta l}$ b. $\frac{\pi p a^4}{8 \eta l}$ c. $\frac{\pi \eta a^4}{8 \pi d}$ d. $\frac{8 \eta l}{\pi p a^4}$
- Choose the correct statement
a. The viscosity of liquid is decreases with increase of temperature.
b. The viscosity of liquid is increases with increase of temperature
c. The viscosity of liquid is decreases with decrease of temperature
d. The viscosity of liquid is increases with increase of temperature

10. The work function of a photoelectric material is 3.3 eV. The threshold frequency will be equal to
 a. 4×10^{14} Hz b. 5×10^{20} Hz c. 8×10^{10} Hz d. 8×10^{14} Hz
11. The photoelectric effect can be explained on the basis of
 a. electromagnetic theory of light b. wave theory of light
 c. quantum theory of light d. corpuscular theory of light
12. Moseley's law has led to the discovery of new elements like
 a. hafnium (72) b. technetium (43) c. Shelenium d. All the above
13. The energy required to transfer the electrons in hydrogen atom from the ground state to the first excited state is
 a. 10.2 eV b. 1.02 eV c. 1.51 eV d. 12.09 eV
14. The value of the Bohr magnetron is
 a. $0.88 \times 10^{-24} \text{ JT}^{-1}$ b. $8.8 \times 10^{-24} \text{ JT}^{-1}$
 c. $88 \times 10^{-24} \text{ JT}^{-1}$ c. $8.8 \times 10^{-24} \text{ J}^{-1}\text{T}$
15. If the external magnetic field becomes greater than the internal fields then the internal motions will be very much perturbed and the atom exhibits is known as
 a. paschen – back effect b. Zeeman effect
 c. stark effect d. normal Zeeman effect

II **FILL IN THE BLANKS:**

16. When a body is fixed at one end and twisted about its axis by means of a torque at the other end, the body is said to be under _____.
17. The potential energy per unit area of the surface film is called its _____
18. Critical velocity of a liquid is the velocity below which the motion of the liquid is - _____ and above which the motion of the liquid becomes _____
19. In Aston's mass spectrograph, if Δm is the difference in mass that is distinguishable at a mean mass m , then $R = m/\Delta m$ is called the _____ of a spectrograph.
20. The experiment of _____ confirms the existence of space quantization.

III **STATE WHETHER TRUE OR FALSE:**

21. The work done in twisting the wire is stored up in the wire as kinetic energy.
22. Forces of attraction between molecules of different substances are known as adhesive force.
23. The significance of the Reynold's number is that its value determines the nature of flow of a liquid through a tube.
24. The specific charge for positive rays is much higher than for cathode ray particles.
25. The spinning electron behaves like a magnetic dipole.

IV ANSWER BRIEFLY:

- 26. Define elasticity.

- 27. Explain surface tension.

- 28. Explain stream line and turbulent flow.

- 29. State Moseley's law.

- 30. Explain normal Zeeman effect.

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STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2011-12 & thereafter)

SUBJECT CODE : 11PH/MC/PA14

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BRANCH III - PHYSICS
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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. A 50 kg mass is suspended from one end of a wire of length 4 m and diameter 3 mm whose other end is fixed. What will be the elongation of the wire?
(Given $q = 7 \times 10^{10} \text{ N/m}^2$)
2. What would be the pressure inside a small air bubble of 10^{-4} m radius, situated just below the surface of water?
(Given surface tension = $70 \times 10^{-3} \text{ Nm}^{-1}$, atmospheric pressure = $1.012 \times 10^5 \text{ Nm}^{-2}$)
3. Explain surface tension on the basis of Kinetic theory.
4. Water flows through a horizontal tube of length 0.2 m and internal radius $8.1 \times 10^{-4} \text{ m}$ under a constant head of the liquid 0.2 m high. In 12 minutes $8.64 \times 10^{-4} \text{ m}^3$ of liquid issues from the tube. Calculate the co-efficient of viscosity of water.
(The density of water = 1000 kg/m^3 and $g=9.81 \text{ ms}^{-2}$)
5. Lithium has a work function of 2.3eV. It is exposed to light of wavelength $4.8 \times 10^{-7} \text{ m}$. Find the maximum kinetic energy with which electron leaves the surface.
6. Write a brief notes on continuous and characteristic x-ray spectrum.
7. The experimental value of Bohr magnetron is $8.8 \times 10^{-24} \text{ SI units}$ and planck's constant $h = 6.63 \times 10^{-34} \text{ joule second}$. Calculate the e/m value of an electron.

SECTION – C

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

8. Describe with necessary theory how you would determine the rigidity modulus of a wire experimentally by using the torsion pendulum.
9. How will you determine the surface tension of a liquid by Jaeger's method? Mention advantages and drawbacks of the method.
10. Describe the rotating cylinder method of determining the viscosity of a liquid Deduce the necessary formula.
11. Describe with necessary theory Aston's mass spectrograph How is it used to determine masses of isotope.
12.
 - i. State and explain Zeeman effect
 - ii. What is stark effect? Give a qualitative account of stark effect.

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