

B.Sc. DEGREE EXAMINATION NOVEMBER 2013
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:

- Equal weights are suspended from two wires of the same material. One wire is of length 2m and diameter 1mm, whereas the other is of length 1m with diameter 0.5mm. Then
 - First wire has greater extension
 - Second wire has greater extension
 - Both wires have the same extension
 - It depends up on the material of the wire
- What will happen if a metal wire is stretched a little beyond its elastic limit (or yield point) and released
 - It loses it elastic property completely
 - It does not contract
 - It contracts, but its final length will be greater than the original length
 - It contracts only up to its length at the elastic limit
- If for a material, Y and B are Young's modulus and Bulk modulus then
 - $Y < 3B$
 - $Y = 3B$
 - $Y > 3B$
 - $3Y = B$
- Surface tension of a liquid:
 - Rises with rise in temperature
 - Falls with rise in temperature
 - Is independent of temperature
 - Rises up to a temperature and then falls
- What will happen if n drops of a liquid each has surface energy E, combine to form a single drop?
 - No energy will be released in the process
 - Some energy will be absorbed in the process
 - Energy released or absorbed will be $E(n-n^{2/3})$
 - Energy released or absorbed will be $En(2^{2/3}-1)$

6. Excess pressure inside a soap bubble of radius r and surface tension T will be
 - a) $2T/r$
 - b) $4T/r$
 - c) T/r
 - d) $3T/r$

7. Water is flowing in a river. If the velocity of a layer at a distance 10cm from the bottom is 20cm/s, the velocity of layer at a height 40cm from the bottom is
 - a) 10cm/s
 - b) 20cm/s
 - c) 40cm/s
 - d) 80cm/s

8. When a liquid flows in a tube with a velocity V (critical velocity V_0), the flow is stream line if
 - a) $V < V_0$
 - b) $V > V_0$
 - c) $V = V_0$
 - d) Either (b) or (c)

9. Hare's apparatus is used to find
 - a) Density of liquid
 - b) Relative density of liquid
 - c) Density of a solid
 - d) Relative density of a solid

10. A charged particle of mass m moving with a velocity V goes un deviated in a velocity selector maintained with electric and magnetic fields E and B , then
 - a) $V = E/B$
 - b) $V = E/2B$
 - c) $V = B/E$
 - d) $V = B/2E$

11. In Bragg's law " $2d \sin\theta = n\lambda$ ", θ refers
 - a) Scattering angle
 - b) Incident angle
 - c) Glancing angle
 - d) Angle of diffraction

12. The photo electric current depends on
 - a) Frequency of the incident radiation
 - b) Intensity of the incident radiation
 - c) Intensity of the incident radiation provided the incident frequency is greater than the threshold frequency
 - d) Work function of the metal

13. If r_0 is the radius of the electron in the ground state of hydrogen, then its radius in the second excited state becomes
- Twice
 - Half
 - Four times
 - Nine time
14. Splitting of spectral line by electric field is
- Zeeman effect
 - Anomalous Zeeman effect
 - Paschen back effect
 - Start effect
15. In atom model “ Spatial Quantisation “ was introduced by
- Bohr
 - Vector
 - Rutherford
 - JJ. Thomson

II FILL IN THE BLANKS:

16. In torsional oscillations the time period of oscillation $T = 2\pi(I/C)^{1/2}$ where I refers of the disc.
17. Capillary rise is due to
18. number is used to find the nature of flow of liquids in a tube.
19. X rays are produced at tube
20. Ionisation potential of Hydrogen atom iseV.

III STATE WHETHER TRUE OR FALSE:

21. When a beam is bent. the neutral axis “ neither compresses not elongates” .
22. If adhesive forces are more than cohesive forces in a liquid, then the liquid will have an obtuse angle of contact.
23. Quantity of liquid flowing through a narrow capillary tube depends on the pressure gradient on the capillary tube.(True /False)
24. Stopping potential increases with the frequency of the incident light provided it is greater than the threshold frequency(True /False)
25. Ionisation energy is always less than the excitation energy.(True /False)

IV ANSWER BRIEFLY:

26. What is a cantilever?
27. Why rainy drops are spherical in nature?

28. Define terminal velocity.

29. State Mosley's law.

30. What is Zeeman Effect?

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TIME : 2 ½ HOURS **MAX. MARKS : 70**

SECTION – B

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

1. A metallic disc of mass 1 kg is suspended symmetrically on a thin wire of radius 0.6mm and of length one metre. When allowed to oscillate about the axis of the disc it makes 8 oscillations in 10 seconds. If the rigidity modulus of the material wire is $8.2 \times 10^{10} \text{N/m}^2$, calculate the moment of inertia of the disc about the axis of rotation.
2. Two rainy drops of same size falling through air with terminal velocity 20cm/s. If the two drops combine to form a single drop, find the new terminal velocity of the coalesced drop.
3. Find the excess pressure inside spherical drop.
4. Find the work done in blowing a soap bubble from a radius of 10cm to 15cm. Given surface tension of soap solution is $35 \times 10^{-3} \text{N/m}$.
5. Discuss continuous and characteristic X- ray spectrum.
6. A light of wavelength $4 \times 10^{-7} \text{m}$ falls on a photo sensitive material and ejects an electron. Find the stopping potential required if the threshold wavelength is $5.4 \times 10^{-7} \text{m}$.
7. Write note on selection rules of “S” and” L”.

SECTION – C

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

8. Derive bending moment of a beam. Use the same to find the depression at a cantilever loaded at an end.
9. With necessary theory, explain the determination of ratio of coefficient of viscosities of two liquids using Oswald viscometer
10. How will you find experimentally the surface tension of a liquid at different temperatures using Jaeger’s apparatus?
11. Give the principle and working a Dempster’s mass spectrograph. How is it used to find the isotopic masses?
12. With a neat diagram explain Stern and Gerlach experiment to confirm Vector atom model.