

B.Sc. DEGREE EXAMINATION NOVEMBER 2010  
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:

- Modulus of Elasticity is  
a)  $\frac{\text{strain}}{\text{stress}}$       b)  $\frac{\text{shearing angle}}{\text{stress}}$       c)  $\frac{\text{stress}}{\text{strain}}$       d)  $\frac{\text{stress}}{\text{elastic limit}}$
- What is the dimension of modulus of elasticity  
a)  $ML^{-1}T^{-1}$       b)  $ML^{-2}T^{-2}$       c)  $MLT^{-2}$       d)  $ML^{-1}T^{-2}$
- What is dimension of stress  
a)  $ML^{-1}T^{-2}$       b)  $ML^{-2}T^{-2}$       c)  $M^{-1}LT^{-1}$       d)  $ML^{-1}T^{-2}$
- The ratio of tangential stress to angle of shear is  
a) modulus of elasticity      b) bulk modulus  
c) Young's modulus      d) rigidity modulus
- The torque per unit twist is  
a)  $MgR$       b)  $\frac{4MgRlD}{\pi r^4 s}$       c)  $\frac{\pi n a^4}{2L}$       d)  $\frac{\pi n a^4}{L}$
- What is the dimension of surface tension  
a)  $ML^{-1}T^{-1}$       b)  $MLT^{-2}$       c)  $MT^{-2}$       d)  $MT^2$
- What is the unit of surface tension  
a) N-S      b) N/m      c) N-m      d)  $N/m^2$
- The excess of pressure inside a drop is  
a)  $\frac{4T}{r}$       b)  $\frac{3T}{r}$       c)  $\frac{2T}{r}$       d)  $\frac{T}{r}$
- The dimensional formula for viscosity is  
a)  $ML^2T^{-2}$       b)  $MLT^{-2}$       c)  $ML^{-1}T^{-1}$       d)  $MLT^{-1}$
- Positive rays are also called as  
a)  $\alpha$  – rays      b)  $\beta$  – rays      c)  $x$  – rays      d) canal rays
- The equation  $2d \sin\theta = n\lambda$  is  
a) Moseley's law      b) Stoke's law      c) Bragg's law      d) Einstein's law

12. "No two electrons can have same quantum state. This is called  
 a) Raman effect b) Zeeman effect c) Stark effect d) Pauli's exclusion principle
13. The expression given by Einstein for photoelectric effect is  
 a)  $h\nu + h\nu_0 = \frac{1}{2}mv^2$  b)  $\frac{h\nu}{h\nu_0} = \frac{1}{2}mv^2$   
 c)  $h\nu - h\nu_0 = \frac{1}{2}mv^2$  d) none
14. The process of removing an electron from an atom is called  
 a) excitation b) radiation c) ionization d) electrolysis
15. Splitting of spectral lines due to electric field is called as  
 a) Paschen back effect b) Zeeman effect c) Stark d) electric

**II FILL IN THE BLANKS:**

16. Restoring force per unit area is .....
17. Surface tension is defined as .....
18. The Stokes formula for the measurement of viscous force is .....
19. .... is used to measure the wavelength of X-rays.
20. The canal rays are composed of .....

**III STATE WHETHER TRUE OR FALSE:**

21. Strain has no dimension.
22. The unit of the coefficient of viscosity is  $\text{Nm}^{-2}$ .
23. The uniform velocity attained by a body moving under gravity in a viscous medium is called critical velocity.
24. Positive rays are not deflected by electric field.
25. 'l' is called the principle quantum number.

**IV ANSWER BRIEFLY:**

26. What is meant by beam?
27. What is torsional pendulum?
28. Define the coefficient of viscosity.
29. Define Photo electric effect.
30. What is Compton effect?

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

**SUBJECT CODE : PH/MC/PA14**

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**BRANCH III - PHYSICS**  
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**TIME : 2 ½ HOURS** **MAX. MARKS : 70**

**SECTION – B**

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

1. A bar of length 1m and cross-section  $5 \times 10^{-3}$ sq.m is supported at its two ends and loaded in the middle. The depression observed in the middle is  $1.96 \times 10^{-3}$ m under a load of 0.1kg. Calculate the young's modulus of the material.
2. A metal disc of 0.1m radius and mass 1kg is suspended in a horizontal plane by a vertical wire attached to its centre. If the diameter of the wire is  $10^{-3}$ m, its length 1m, and the period of torsional vibrations is 4 seconds, find the rigidity modulus of the wire.
3. Water flows through a horizontal tube of length 0.2 metres and internal radius  $8.1 \times 10^{-4}$  metre under a constant head of the liquid 0.2 metres high. In 12 minutes  $8.64 \times 10^{-4}$  m<sup>3</sup> of liquid issues from the tube. Calculate the coefficient of viscosity of water.
4. Derive an expression for the bending moment of a beam,
5. State Laws of photo electric effect.
6. Derive Stoke's formula for a highly viscous liquid.
7. What is Debye's explanation of normal Zeeman effect?

**SECTION – C**

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

8. Determine the rigidity modulus of torsion pendulum and obtain expression for the M.I. of the disc.
9. Describe Jaegar's method of determining surface tension.
10. Derive Poiseuille's formula.
11. Describe Aston's mass spectrograph.
12. Describe the vector model of the atom and explain the different quantum number associated with it.

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