

B.Sc. DEGREE EXAMINATION NOVEMBER 2007  
BRANCH III - PHYSICS  
FIRST SEMESTER

REG. No. \_\_\_\_\_

COURSE : MAJOR – CORE  
PAPER : PROPERTIES OF MATTER AND SOUND  
TIME : 30 MINS. MAX. MARKS : 30

SECTION - A  
TO BE ANSWERED ON THE QUESTION PAPER ITSELF  
ANSWER ALL QUESTIONS: ( 30 x 1 = 30 )

I CHOOSE THE CORRECT ANSWER:

1. A body of mass 'M' rises to a height one fifth of the radius of the earth above the surface of the earth, the increase in P.E. is  
a)  $Mgh$                       b)  $(5Mgh)/6$                       c)  $(4Mgh)/5$                       d)  $(6Mgh)/7$
2. If the gravitational force of the earth suddenly disappears then which of the following is correct.  
a) the weight of the body becomes zero                      b) mass of the body becomes zero  
c) both mass and weight becomes zero                      d) none of the above
3. The pressure inside two soap bubbles is 1.01 and 1.02 atm. The ratio of their respective volume is  
a) 6                      b) 8                      c) 4                      d) 2
4. The value of 'g' decreases more when it is at \_\_\_\_\_ from the surface of the earth  
a)  $h = 9R$                       b)  $h = 5R$                       c)  $h = 3R$                       d)  $h = 7R$
5. Solids which break or rupture above the elastic limit are called  
a) Brittle                      b) Ductile                      c) Malleable                      d) Elastic
6. With increase of temperature the young's modulus of the given material  
a) increases                      b) decreases                      c) remains unchanged                      d) erratic change
7. At critical temperature the S.T. of a liquid is  
a) zero                      b) infinity                      c) same as at room temp.                      d) none of the above
8. In SHM the acceleration of the particle is zero when the velocity is  
a) maximum                      b) zero                      c) half its maximum value                      d) none of the above
9. Resonance is a special case of  
a) forced vibration                      b) natural vibration  
c) damped vibration                      d) none of the above

10. Ultrasonic, infrasonic and audible waves travel through a medium with speeds  $u, v$  and  $w$  respectively then  
 a)  $u = v = w$       b)  $u < v < w$       c)  $u > v > w$       d)  $u < v = w$
11. If two waves of amplitude  $A$  produce a resultant wave of amplitude  $A$  then the phase difference between them will be  
 a)  $60^\circ$       b)  $90^\circ$       c)  $120^\circ$       d)  $180^\circ$
12. How many times more intense is a 50 dB sound than 20 dB sound  
 a) 10 times      b) 20 times      c) 100 times      d) 1000 times
13. A satellite is rotating close to earth in order to make it to escape from the gravitational field its velocity is to be increased by  
 a) 20%      b) 41.4%      c) 4.14%      d) 10%
14. If the work done in blowing a bubble of volume  $V$  is 'W'. then the work done in blowing a soap bubble of volume  $2V$  will be  
 a)  $W$       b)  $2W$       c)  $1.414W$       d)  $\sqrt[3]{4} W$
15. Two sources of intensities ratio 25:1 interference. The intensity ratio at maxima and minima will be  
 a) 9:4      b) 2:3      c) 2:1      d) 5:1

## II      **FILL IN THE BLANKS:**

16. When the earth rotates 17 times faster, its new period will be \_\_\_\_\_.
17. When there is increase in length it is called \_\_\_\_\_ stress.
18. The turbulent motion is also known as \_\_\_\_\_ motion.
19. The maximum distance upto which a molecule exerts a force of attraction on another is called the range of \_\_\_\_\_.
20. The elevation for a concentration of 1 mole/100cc is  $5.33^\circ\text{C}$  and is called \_\_\_\_\_ of boiling point.

## III      **STATE WHETHER TRUE OR FALSE:**

21. Elastic fatigue can be removed by giving sufficient rest to the wire.
22. Escape velocity depends on the mass and size of the projectile.
23. Time period of pendulum in a falling lift is infinity.
24. The force of attraction between molecules of same substance is called adhesive force.
25. The velocity distribution curve of the advancing liquid in a capillary tube is a parabola.

**IV ANSWER BRIEFLY:**

26. State Newton's law Gravitation.
27. What is I section of girders.
28. Explain: Angle of contact.
29. What is Osmotic pressure?
30. What are Lissajous figures?

\*\*\*\*\*

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.**  
**(For candidates admitted during the academic year 2004-05 & thereafter)**

**SUBJECT CODE : PH/MC/PS14**

**B.Sc. DEGREE EXAMINATION NOVEMBER 2007**  
**BRANCH III - PHYSICS**  
**FIRST SEMESTER**

**COURSE : MAJOR – CORE**  
**PAPER : PROPERTIES OF MATTER AND SOUND**  
**TIME : 2½ HOURS. MAX. MARKS : 70**

**SECTION – B**

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

1. Estimate the mass of sun assuming the orbit of the earth round the sun to be circle. The distance between the sun and the earth is  $1.49 \times 10^{11}$  m.  
 $G = 6.67 \times 10^{-11} \text{Nm}^{-2}\text{kg}^{-2}$ .
2. Two soap bubbles of radii  $r_1$  and  $r_2$  coalesce to form a single bubble of radius  $r$ . If the external pressure is  $P$  and S.T. is  $T$  then prove that  
 $4T(r_1^2 + r_2^2 - r^2) = P(r^3 - r_2^3 - r_1^3)$
3. Calculate the work done in producing an extension of 2cm in a steel wire of length 2m and diameter 1mm. 'q' of the steel =  $20 \times 10^{10} \text{ N/m}^2$ .
4. A body suspended symmetrically from the lower end of a wire 1m long 1.22 mm in diameter oscillates above the wire as axis with a period 1.25 sec. If the rigidity modulus of the material of the wire is  $8 \times 10^{10} \text{ Nm}^2$ , calculate the M.I of the body about the axis of rotation.
5. Calculate the amount of work done in blowing a soap bubble of radius from 10cm to 15cm. S.T. of the soap bubble = 0.035 N/m.
6. Two equal drops of water are falling through air with steady terminal velocity of  $5 \times 10^{-2} \text{ m/s}$ . If the drops coalesce, what will be new terminal velocity.
7. A particle executes SHM with an amplitude of 0.1 m and period of 0.5 sec. Calculate its displacement velocity and acceleration, (1/12) sec after crossing the mean position

## SECTION – C

ANSWER ANY THREE QUESTIONS:

( 3 x 15 = 45 )

8.
  - a) Explain the terms gravitational potential and gravitational field.
  - b) Derive an expression for the gravitational potential due to a solid sphere at a point (i) inside and (ii) outside the sphere
9.
  - a) What is a cantilever?
  - b) Describe with necessary theory, the oscillation method to determine 'q' of the material of a cantilever.
10.
  - a) Define viscosity.
  - b) Explain streamlined and turbulent flow.
  - c) Derive Poiseuille's formula for the rate of flow of a liquid through a capillary tube.
11. State Fourier's theorem. Apply it in analyzing saw tooth wave form.
12.
  - a) What are the different basic requirements for the acoustically good auditorium.
  - b) Write short notes on absorption coefficient.
  - c) What are damped vibrations? Obtain an expression for the displacement in the case of a damped oscillatory motion.

\*\*\*\*\*