

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

SUBJECT CODE : PH/AC/GP12

B.Sc. DEGREE EXAMINATION NOVEMBER 2007
BRANCH I - MATHEMATICS
FIRST SEMESTER

REG. No. _____

COURSE : ALLIED – CORE
PAPER : GENERAL PHYSICS – I
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:

- Hooke's law states that
a) stress \propto 1/strain b) stress \propto strain c) stress \times strain = constant
- The unit of stress
a) N b) Nm^{-2} c) Nm
- The ratio of increase in length to the original length of a wire is called
a) bulk strain b) linear strain c) normal stress
- For an object moving with very high speed
a) length increases b) mass increases c) time decreases
- When temperature increases, the surface tension of a liquid
a) does not alter b) decreases c) increases
- A liquid molecule experiences greatest intermolecular attraction
a) at the liquid surface b) well within the liquid c) just below the surface
- Viscosity is the characteristic property of
a) liquids b) semi solids c) liquids & gases
- The dimension of viscosity is
a) $\text{ML}^{-1}\text{T}^{-1}$ b) ML^2T^{-2} c) MT^{-2}
- The efficiency of a Carnot's engine depends on
a) mass of engine b) working substance c) temperature of the source & sink
- According to special theory of relativity which of the following is treated as constant in all frames?
a) time b) mass c) velocity of light

11. Sound waves less than 20Hz frequencies are called
a) Infrasonics b) audible c) ultrasonics
12. The rest mass of a body is
a) less than its mass in motion b) greater than its mass in motion
c) equal to its mass in motion
13. The first law of thermodynamics is concerned with the conservation of
a) temperature b) energy c) number of moles
14. The change in entropy of working substance in Carnot's cycle is
a) negative b) positive c) zero
15. For good lubricants which of the following is not necessary
a) high density b) high viscosity c) highly inert

II FILL IN THE BLANKS:

16. Isothermal process takes place at constant _____.
17. Accelerated frames are called _____.
18. The restoring force per unit area is called _____.
19. The forces of attraction between like molecules are called _____.
20. _____ method uses quartz crystal for the production of ultrasonics..

III STATE WHETHER TRUE OR FALSE:

21. In Newtonian mechanics space, mass and time are variable.
22. The efficiency of Carnot's engine is maximum, when the temperature of the source and sink are equal.
23. The work done in stretching a wire is equal to $\frac{1}{2} \times \text{Stress} \times \text{Strain}$.
24. For streamlined flow the velocity of liquid should be less than the critical velocity.
25. Ultrasonic waves travel slower than audible sound.

IV ANSWER BRIEFLY:

26. What is twin paradox?
27. What do you mean by torsional rigidity of a wire?
28. Define angle of contact.
29. State third law of thermodynamics.
30. Give any two medical applications of ultrasonics.

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COURSE : ALLIED – CORE
PAPER : GENERAL PHYSICS – I
TIME : 2 HOURS. MAX. MARKS : 70

SECTION – B

ANSWER ANY FIVE QUESTIONS: (5 x 6 = 30)

1. A metre scale moves with a speed of 2.7×10^8 m/s. Find the percentage decrease in the length of the readings inscribed on it.
2. The half life of a neutron is 13 minutes. At what speed its half life will be increased by 20%.
3. Calculate the load that must be supported from a steel wire 1 mm in diameter to produce an elongation equal to 0.2% of its original length. Given 'q' for steel = 2×10^{11} Nm⁻².
4. What would be the pressure inside a small air bubble of radius 10^{-4} m, situated just below the surface of water? Surface tension of water = 0.07 Nm⁻¹ and atmospheric pressure = 1.013×10^5 Nm⁻¹.
5. A Carnot's engine works between 120°C and 0°C. Find its efficiency. To what temperature should the source be raised to double the efficiency if the temperature of the sink remains the same.
6. Calculate the change in entropy when 1 Kg of ice at 0°C is converted into water at 10°C. Calculate the change in entropy. Given latent heat of fusion of ice is 3.3×10^5 J/kg and specific heat of water is 4200 J/Kg/K.
7. Water is flowing steadily through a horizontal pipe of non-uniform cross section. If the pressure of water is 4×10^4 Nm⁻² at a point where the cross section is 0.02 m² and velocity of flow is 2 m/s. What is the pressure at a point where cross section reduces to 0.01 m²?

SECTION – C**ANSWER ANY TWO QUESTIONS:****(2 x 20 = 40)**

8.
 - a) Show that the centres of suspension and oscillation of a compound pendulum can be reversed.
 - b) Obtain an expression for the variation of mass of an object with velocity.
9.
 - a) Discuss the theory of uniform bending for a beam.
 - b) Derive the equation for period of torsional oscillations.
10.
 - a) Find the change in the entropy for reversible and irreversible processes.
 - b) Discuss briefly about an adiabatic process.
11.
 - a) Explain any one method of production of ultrasonic waves.
 - b) Distinguish between streamlined and turbulent flows.
