

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

SUBJECT CODE : 11PH/AC/PM13

B.Sc. DEGREE EXAMINATION NOVEMBER 2011
BRANCH I - MATHEMATICS
FIRST SEMESTER

REG. No. _____

COURSE : ALLIED – CORE

PAPER : PHYSICS FOR MATHEMATICS – I

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:

- Accelerated frames are called as
 - Galilean frames
 - inertial frames
 - non – inertial frames
 - Newtonian frames
- As the length of the compound pendulum decreases
 - the time period decreases up to centre of mass
 - the time period increases up to centre of mass
 - the period first increases and then decreases
 - the period first decreases and then increases
- The period of bifilar pendulum does not depend on
 - moment of inertia
 - length
 - mass
 - area
- Meson decay is a good example for
 - Galilean frame
 - length contraction
 - time dilation
 - mass variation
- According to the theory of relativity ('c' – velocity of light)
 - an object can travel more than 'c'
 - an object can travel with 'c'
 - 'c' does not vary in moving frame
 - 'c' varies in a moving frame
- A wire that can support a load 'w' kg is cut into two equal parts. The maximum load that can be supported by either part is
 - w/4
 - w/2
 - w
 - 2w
- For a fixed load the elongation ($\Delta\ell$) in a wire depends upon
 - length only
 - diameter only
 - both
 - mass only
- The unit of elastic moduli is
 - Nm
 - Nm^{-1}
 - Nm^2
 - Nm^{-2}
- The significance of first law of thermodynamics is that
 - Conversion of heat into internal energy
 - conversion of heat into work
 - Conversion of work into heat
 - conversion of internal energy into heat

10. The work done per unit volume in stretching a wire is given by
a) $2 \times \text{stress} \times \text{strain}$ b) $\text{stress} / (2 \times \text{strain})$
c) $\frac{1}{2} \times \text{stress} \times \text{strain}$ d) $(2 \times \text{stress}) / \text{strain}$
11. Surface tension of a liquid
a) tends to maximize the surface area b) tends to minimize the surface area
c) increases the surface thickness d) decreases the surface energy
12. The frequency range of ultrasonic waves is
a) 20 KHz to 2 MHz b) 20 Hz to 20 MHz
c) 20 Hz to 20 KHz d) 20 Hz to 2 MHz
13. The concept of thermal equilibrium is given by
a) Zeroth law b) First law of thermodynamics
c) Second law of thermodynamics d) Third law of thermodynamics
14. Mechanical vibrations are generated when electrical signal is given to
a) calcite crystal b) quartz crystal c) liquid crystal d) rock salt crystal
15. Entropy is constant for
a) isothermal process b) adiabatic process
c) isobaric process d) irreversible process

II FILL IN THE BLANKS

16. The work done in twisting a wire is stored as _____
17. Sound waves with frequencies less than 20 Hz are called as _____
18. The method of production of ultrasonic waves using ferromagnetic rod is known as _____
19. _____ is a measure of disorder in a system.
20. The velocity above which the flow of a liquid becomes turbulent is known as _____.

III STATE TRUE OF FALSE

21. In compound pendulum the centre of suspension and centre of oscillation can be interchanged.
22. When an object is at rest, its kinetic energy is given by m_0c^2 .
23. The ratio of normal stress to linear strain is known as Young's modulus.
24. In a tube the velocity of flow of a liquid is maximum, where the area of cross section is maximum.
25. Ultrasonic waves cannot travel in vacuum.

IV ANSWER BRIEFLY

26. What do you mean by equivalent simple pendulum length?

27. What is twin paradox?

28. State Hooke's law.

29. What is thermodynamics?

30. What is piezoelectric effect?

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SECTION – B

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

1. A rectangular object of length 10 m and breadth 8 m is moving with a velocity 0.6 times the velocity of light in longitudinal direction. Calculate the change in area due to its motion.
2. At what speed, the mass of an object increases 25% more than the mass at rest?
3. What is fluxural rigidity? Obtain an expression for it.
4. Distinguish between streamline flow and turbulent flow.
5. A load of 5 kg produces an extension of 2 mm in a wire of length 2 m and area of cross section 10^{-4} cm^2 . Calculate the Young's modulus of the material of the wire. (Take $g = 10 \text{ ms}^{-2}$)
6. Calculate the change in entropy when 100 gm of water at 100°C is converted into steam at the same temperature. Given latent heat of vaporization of water is $226 \times 10^4 \text{ Jkg}^{-1}$
7. List the properties and applications of ultrasonic waves.

SECTION – C

ANSWER ANY TWO QUESTIONS: (2 x 20 = 40)

8. a) Explain the theory of bifilar pendulum in detail.
b) Describe the compound pendulum experiment to find 'g'.
9. Define surface tension. Describe with theory how the surface tension of a liquid and interfacial surface tension between two liquids can be determined by drop method.
10. Explain how the mass of a moving object varies with its speed. How is it used to obtain the mass energy relation?
11. What is entropy? State thermodynamic law on entropy. Calculate the change in entropy for a reversible and an irreversible processes.
