

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

SUBJECT CODE : 11PH/AC/PM13
B.Sc. DEGREE EXAMINATION NOVEMBER 2013
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:

- Unit of stress is
a) Nm^{-1} b) N^2m c) Nm d) Nm^{-2}
- The couple per unit twist of a wire is inversely proportional to
a) length b) diameter c) mass d) shearing strain
- If a $4kg$ substance is fully converted to energy the energy produced will be _____ joules.
a) 3.6×10^{11} b) $3.6 \times 10^{+17}$ c) 3.6×10^7 d) 3.6×10^{10} joules
- A body which appears to be spherical to an observer at rest relative to it, will for a moving observer seen as
a) square b) rectangle c) oblate spherical d) ellipse
- The angle of contact for mercury
a) acute b) zero c) obtuse d) none of the above
- If the temperature of a liquid is increased then its surface tension is
a) decreased b) increased c) does not change d) equal to viscosity
- The zeroth law leads to the concept of
a) heat b) pressure c) temperature d) entropy
- The entropy of a solid or liquid is zero at
a) $-273 K$ b) $-273^{\circ}C$ c) $273 K$ d) $273^{\circ}C$
- Ultrasonic waves will have wavelength of
a) $0.0165 m$ b) $0.165 m$ c) $0.00165 m$ d) $1.65 m$
- Piezoelectric effect is produced in
a) quartz b) glass c) graphite d) none
- The time period of the torsional pendulum increases with increase in
a) moment of inertia b) radius of wire c) a & b d) none of the above

12. The change of entropy in irreversible process is
 a) positive b) negative c) zero d) 1
13. Unit of surface tension is
 a) N b) Nm c) Nm^{-1} d) $N^{-1}m$
14. The speed of ultrasonic waves increases with
 a) temperature b) wavelength c) frequency d) pressure
15. Water flows through a horizontal pipe of varying cross section at the rate of $0.2\ m^3s^{-1}$. The velocity of water at a point where the cross section of the pipe is $0.10\ m^2$ is
 a) $2ms^{-1}$ b) $20ms^{-1}$ c) $200ms^{-1}$ d) $0.2ms^{-1}$

II FILL IN THE BLANKS:

16. For ultrasonic waves the frequency is greater than _____.
17. Newtons laws of motion are obeyed in _____ frame.
18. A beam supported at its end and loaded in the middle is called _____ bending.
19. Above critical velocity flow of water becomes _____.
20. When a system undergoes a reversible adiabatic process _____ remain constant.

III STATE WHETHER THE STATEMENT IS TRUE OR FALSE:

21. Zero Kelvin is achievable.
22. Ultrasonic wave is used to accelerate crystallization.
23. Angle of contact for water is almost zero.
24. Length of an object in motion as measured by an observer appears to him to be longer than it is at rest.
25. Surface energy is numerically equal to surface tension.

IV ANSWER BRIEFLY ALL THE QUESTIONS:

26. What is a non-inertial frame?
27. What is neutral axis?
28. Define surface tension.
29. State zeroth law of thermodynamics.
30. What is magnetostriction.

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TIME : 2½ HOURS **MAX. MARKS : 70**

SECTION – B

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

1. Write Lorentz transformation equations. Using these equations explain length contraction and time dilation.
2. What is entropy change in reversible process.
3. Explain the determination of interfacial surface tension.
4. Obtain an expression for bending moment of a beam.
5. Explain stream line and turbulent flow.
6. How fast would a rocket have to be relative to an observer for its length to be contracted to 99% of its length at rest.
7. One mole of a perfect gas is expanded isothermally to twice its initial volume. Calculate the change in entropy $R = 8.313 JK^{-1}mol^{-1}$.

SECTION – C

ANSWER ANY TWO QUESTIONS: (2x20=40)

8. Explain the theory of compound pendulum and determination of 'g' with bar pendulum.
9. a) Explain the theory of non uniform bending.
b) Explain variation of surface tension with temperature.
10. a) Explain the concept of entropy.
b) State the three statements of second law of thermodynamics.
c) In what way entropy and disorder of the system are related.
11. a) Give some applications of ultrasonics.
b) Explain piezo electric effect.
