

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 2012
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:

- Rigid body capable of rotating freely about a horizontal axis is called
a) Bifilar pendulum b) compound pendulum
c) torsion pendulum d) simple pendulum
- The fundamental physical laws and principles are identical in all inertial Frames of reference
a) General theory of relativity b) Newtonian relativity
c) special theory of relativity d) twin paradox
- The contraction of length of an object along its direction of motion is
a) Lorentz-Firzgerald contraction b) length contraction
c) frame of reference d) mass-energy equivalence
- Unaccelerated frames of reference are called
a) inertial frames b) Newtonian frames c) Galilean frames d) Lorentz frames
- In length contraction, square and circle in one appear to the observer in the other to be rectangle and
a) Spherical b) oblate c) triangle d) ellipse
- Unit of strain
a) N/m^2 b) N/m c) No unit d) Nm
- Stress/ strain is a constant
a) Poisson's ratio b) Modulus of elasticity
c) Hooke's law d) Modulus of rigidity
- In torsional oscillations, couple per unit twist (c) is equal to
a) $\pi nr^4/2l$ b) $\pi nr^3/2l$ c) $\pi nr/2l$ d) $\pi nr^2/2l$
- When a beam is supported at its ends and loaded in the middle, the reaction at each knife edge is acting vertically upwards.
a) $W/2$ b) W^2 c) $W/4$ d) W

10. Movement of liquid in a zig-zag path is called as
a) Stream line b) turbulent c) terminal velocity d) surface tension
11. Entropy of a system increases in all process
a) Irreversible b) reversible c) adiabatic d) isothermal
12. According to which law of thermodynamics, the molecules of a system are in perfect order
a) First law b) second law c) third law d) zeroth law
13. Producing ultrasonic waves using ferromagnetic rod is given by the method
a) Piezo electric b) magneto striction c) Galton whistles d) mechanical
14. Human ear is sensitive to sound waves in the frequency range
a) 20 to 20,000 Hz b) 20KHz to 2MHz c) 20Hz to 2MHz d) 20Hz to 20MHz
15. Elastic vibrations are produced when alternating potential difference is given to
a) Quartz crystal b) calcite crystal c) liquid crystal d) tourmaline crystal

II FILL IN THE BLANKS

16. The centre of suspension and centre of oscillation can be interchanged in
17. The time interval measured by a clock at rest relative to the observer is
18. The axis of the beam lying on the neutral filament is
19. The dimension of surface tension is
20. Sound waves of high frequency are called

III STATE TRUE OF FALSE

21. Light propagates through ether as sound waves.
22. Critical velocity is the velocity above which the motion of liquid is orderly and below which the motion of liquid becomes turbulent.
23. Entropy is not constant during adiabatic reversible process.
24. Magnetic charges are produced in Piezo-electric effect.
25. Wavelength of ultrasonic waves are small.

IV ANSWER BRIEFLY

26. Give the postulates of special theory of relativity.

27. List out the three different kinds of elastic moduli.

28. Define angle of contact.

29. What are the three methods of producing ultrasonic waves?

30. State Zeroth law of thermodynamics.

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TIME : 2½ HOURS **MAX. MARKS : 70**

SECTION – B

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

1. Derive Lorentz transformation equations.
2. Explain length contraction and time dilation.
3. Derive an expression for bending moment.
4. Explain torsional oscillations and derive an expression for time period.
5. Calculate the change in entropy when 5kg of water at 100°C is converted into steam at the same temperature.
- 6.a. 100 drops of water falling down a tube of external diameter 3.5mm are collected under coconut oil of specific gravity 0.8. Calculate the interfacial surface tension between water and oil if the water collected weighs 12.35g.
- b. Give the experimental study of variation of surface tension with temperature.
7. List the applications of ultrasonic waves.

SECTION – C

ANSWER ANY TWO QUESTIONS: (2x20=40)

- 8.a. Give the theory of bifilar pendulum.
- b. How will you determine (g) at a given place using compound pendulum?
9. Explain the depression at the midpoint of a beam loaded at the middle and also find an expression for the Young's modules of the beam by uniform bending.
10. Explain with necessary theory to determine the surface tension of a liquid and interfacial surface tension between two liquids by drop weight method.
- 11.a. State first law of thermodynamics.
- b. Deduce an expression for the change of entropy in reversible and irreversible process.
