STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2015-16)

SUBJECT CODE :15PH/AC/PH13

B.Sc. DEGREE EXAMINATION NOVEMBER 2015
BRANCH I - MATHEMATICS
FIRST SEMESTER

REG. No._____

COURSE : ALLIED – CORE
PAPER : PHYSICS– 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 ANSWER:

1. The C.G. of the cone is along its axis at a distance _____ from the vertex.
   a) $\frac{1}{4}^{th}$ b) $\frac{3}{4}^{th}$ c) $\frac{1}{2}$ d) $\frac{1}{8}^{th}$

2. The total weight of the body may be supported to act at its
   a) C.G. b) C.P. c) midpoint of C.G. and C.P. d) none of the above

3. The C.G. of the solid hemisphere is on its axis at a distance _____ from the centre.
   a) $\frac{3}{8}$ b) $\frac{3}{8}\,r$ c) $\frac{3}{4}\,r$ d) $\frac{3}{2}\,r$

4. Astronomical unit of force is
   a) Gravitational constant b) acceleration due to gravity
   c) Newton d) none of the above

5. Initial phase is also called as
   a) epoch b) phase constant c) both (a) & (b) d) none of the above

6. The length of the equivalent simple pendulum is _____ than the length of the compound pendulum.
   a) always greater b) always lesser c) sometimes greater d) sometimes less

7. The modulus of elasticity is dimensionally equal to
   a) stress b) surface tension c) strain d) coefficient of viscosity

8. Young's modulus for a perfectly elastic body is
   a) zero b) infinite c) one d) finite

9. Young's modulus of a substances depends on its
   a) length b) acceleration due to gravity c) area d) none of the above

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10. A liquid tends to assume a spherical shape because of _____ face.
    a) the surface tension b) the viscous
    c) the gravity d) the elastic

11. The unit of Surface Tension
    a) N/m^2 b) N/m c)$N \times m$ d) $Joule/m$

12. The angle of contact of pure water and clean glass is
    a) 0° b) 8° c)90° d) 135°

13. Under Galilean Transformation acceleration is
    a) Variant b) Invariant c) Zero d) none of the above

14. Energy equivalent of Unified Mass Unit is
    a) 931.3 Me V b) 9.30.3 Me V c) 932.3 Me V d) 933.0 Me V

15. The length contraction becomes appreciable only when
    a) $V = C$ b) $V > C$ c) $V \approx C$ d) $V < C$

II FILL IN THE BLANKS:

16. A body may not have a C.G. but it has _____.
17. The length of an equivalent simple pendulum _____.
18. Out of solid, liquid and gas _____ has maximum elasticity.
19. A liquid does not wet the surface of a solid if the angle of contact is _____.
20. _____ has only a relative and not an absolute meaning.

IIISTATE WHETHER TRUE OF FALSE:

21. The cone may be considered to be made up of a large number of circular discs parallel to the base.
22. The path of a planet is elliptical/orbit, with the sun at one of its foci, known as law of elliptical orbits.
23. Young's modulus of a perfectly rigid body is zero.
24. Surface Tension arises due to cohesive force between the molecules.
25. If photons have a speed C in one reference frame, they can be found at rest in any other frame.

IV ANSWER BRIEFLYALL THE QUESTIONS:

26. Define centre of gravity.

27. What is Simple Harmonic Motion?

28. What is a Cantilever?

29. Define Surface Tension of a liquid.

30. What is Twin Paradox?

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SECTION – B

ANSWER ANY FIVE QUESTIONS: (5x5=25)

1. A solid right cone has its base scooped so that the hollow is a right cone on the same base. How must be scooped out so that C.G. of the reminder may coincide with the vertex of the later.

2. A particle executing a Simple Harmonic Motion has a maximum displacement of 4cm and its acceleration at a distance 1cm from its mean position is 3cm/sec^2. What will its velocity when it is at a distance of 2cm from its mean position?

3. A uniform rectangular bar 1m long, 0.02m broad and 0.003m thick is supported on its flat surface symmetrically on two knife-edges 0.7m apart. When the loads of 0.2kg are hung from ends, the elevation of the bar above its normal position is found to be 0.0022m. Find the young's modulus of the material of the bar.

4. In a dropweight determination of the surface tension between water and chloroform, a glass tubes 4mm external diameter was used and 50 drops of chloroform, density 1500kg/m^3 were allowed to fall in the water. The weight of the drops was 3.43×10^{-3}gm kg. Find the interfacial surface tension.

5. A spacecraft S moving relative to the earth. An observer on the earth monitors that 360 / seconds elapses on a clock in the spacecraft for a duration of one hour on the earth. Calculate the space craft speed relative to the earth.

6. Derive an expression for the period of oscillation of torsion pendulum.

7. Explain the terms streamline, turbulent flow and critical velocity.

SECTION – C

ANSWER ANY THREE QUESTIONS: (3x15=45)

8. Calculate the centre of gravity of solid Hemisphere.
9. Give the theory of compound pendulum. Explain the reversibility of centers of oscillation and suspension.
10. Describe with relevant theory, Experiment to determine the Young's modulus of a material of a bar by non-uniform bending.
11. Explain the method of finding the Surface Tension and Interfacial Surface Tension by method of drops.
12. Derive the Lorentz space-time formula. Discuss the length construction and dilation.

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