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

SUBJECT CODE: 15PH/AC/PH13

B.Sc. DEGREE EXAMINATION NOVEMBER 2017
BRANCH I - MATHEMATICS
FIRST SEMESTER

COURSE : ALLIED – CORE
PAPER : PHYSICS– I
TIME : 30 MINS. MAX. MARKS : 30

SECTION – A

ANSWER ALL QUESTIONS: (30 x 1 = 30)

I. CHOOSE THE CORRECT ANSWER:

1. A particle executes simple harmonic oscillation with an amplitude a. The period of oscillation is T. The minimum time taken by the particle to travel half of the amplitude from the equilibrium position is
   a) T/4 b)T/8 c)T/12 d)T/2
2. The graph between restoring force and time in case of SHM is
   a) straight line b)circle c)parabola d) sine curve
3. If the distance between earth and sun were half its present value the number of days in ayear would have been
   a)64.5 b)129 c)182.5 d)730
4. Consider two particle system of masses m_1 and m_2 .If the first particle is pushed towards the centre through a distance d then to keep the centre of mass constant the second particle should be moved through a distance.
   a) m_2d/ m_1 b) $m_2d/(m_1+ m_2)$ c) m_1d/ m_2 d)d
5. The ratio of mean distances of three planets from the sun are 0.5;1;1.5 then the square of time periods are in the ratio
   a)1:4:9 b)1:9:4 c)1:8:27 d)2:1:3
6. A wire is stretched through 1mm by certain load. The extension produced in the wire produced in the wire of same material with double the length and double the radius will be
   a)4mm b)3mm c)1mm d)0.5mm
7. A liquid is flowing through a horizontal tube with velocity 2m/s. Find the velocity of the liquid,if the radius is decreased by 20%
   a)3.13 m/s b)1.13 m/s c) 13m/s d)1.33 m/s
8. In designing a beam for its use to support a load. The depression at centre is proportional to(where Y is youngs modulus)
   a)Y^2 b)Y c)1/Y d)$1/Y^2$
9. A force is applied on the wire of radius r and length L and change in the length of wire is l.If the same force F is applied on the wire of the
   a)l/2 b)l c)3l/2 d)none of these
10. The wettability of surface by a liquid depends primarily on
    a)viscosity b)surface tension c) density d)angle of contact between surface and the liquid
11. The unit of strain is
    a)N b)m c)Ns d)no unit
12. If x is the displacement from mean position then the total energy of a particle executing simple harmonic motion is proportional to
    a)x b)x^2 c)independent of x d)x^3

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13. According to relativity a square in a accelerated frame will appear as which of the following for a observer in a stationary frame of reference.
    a) Sphere b) circle c) rectangle d)parallelogram
14. The critical velocity of liquid depends on
    a)viscosity b)surface tension c)pressure d)temperature
15. The couple per unit twist of the wire is independent of its
    a)length b)radius c)rigidity modulus d) all of the above

II. FILL IN THE BLANKS:

16. The centre of mass of a ring is at _____.
17. The velocity of a particle executing simple harmonic motion is maximum at_____.
18. The angle of contact for water is_____.
19. According to Hookes law stress is propotional to strain within_____.
20. Newtons laws of motion is obeyed in _____ frame of reference.

III. STATE WHETHER TRUE OF FALSE:

21. The centre of mass of a two particle system lies on the line joining the two particles, is closer to the heavier particle.
22. The acceleration of the paricle executing S.H.M is maximum at the extreme position.
23 .When a liquid has a concave surface the angle of contact is obtuse.
24. Unaccelerated frame of reference is called non inertial frame.
25. A moving clock appears to be slowed down for a stationary observer.

IV. ANSWER BRIEFLYALL THE QUESTIONS:

26. What is centre of gravity?
27. State Keplers first law
28. State Hookes law.
29. State postulates of special theory of relativity.
30. Define surface tension.

SECTION – B

ANSWER ANY FIVE QUESTIONS: (5x5=25)

31. A person weighing 45Kg sits on one end of a sea saw while a boy of 15 kg sits on the other end.If they are separated by 4m how far from the boy is the centre of mass situated.Neglect weight of sea saw
32. A body executing SHM has displacement y=100sin2t find its maximum velocity and acceleration.
33. A rectangular bar 0.02m in breadth and 0.01m in thickness and 1m in length supported at its end on two knife edges .A 2kg is hung in the middle .Calculate the depression if the youngs modulus of the material of the bar is $2x10^{10}N/m^2$.
34. Calculate the force required to remove a flat circular plate of radius 0.02m from the surface of water. Assume surface tension of water is $0.07Nm^{-1}$.
35. If 4kg of substance is fully converted into energy how much energy is produced.
36. Explain length contraction.
37. Find the time period for a torsional pendulum.

SECTION – C

ANSWER ANY THREE QUESTIONS: (3x15=45)

38. Determine the centre of gravity of solid hemisphere and solid cone
39. Explain the theory of compound pendulum.
40. Find the expression for depression at the middle of a bar, subjected to non-uniform bending.
41. What is the meaning of mass-energy equivalence? Obtain Einstein's mass-energy relation.
42. Explain the method of determination of surface tension and interfacial surface by drop weight method.

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