

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 2018  
BRANCH I - MATHEMATICS  
FIRST SEMESTER

COURSE : ALLIED – CORE  
PAPER : PHYSICS - I  
TIME : 3 HOURS

MAX. MARKS : 100

SECTION – A

ANSWER ALL QUESTIONS: (30 x 1 = 30)

I CHOOSE THE CORRECT ANSWER:

1. A wire is stretched through 1mm by certain load. The extension 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
2. 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
3. In designing a beam for its use to support a load. The depression at centre is proportional to (where Y is young's modulus)  
a) $Y^2$                       b)Y                      c)1/Y                      d)1/ $Y^2$
4. 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 same length at twice the radius is  
a) l/2                      b)l                      c)l/4                      d)none of these
5. 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
6. 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
7. 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
8. The graph between restoring force and time in case of SHM is  
a) straight line                      b)circle                      c)parabola                      d) sine curve
9. If the distance between earth and sun were half its present value the number of days in a year would have been  
a) 64.5                      b)129                      c)182.5                      d)730



**SECTION – B****ANSWER ANY FIVE QUESTIONS:****(5 x 5 = 25)**

31. How fast would a rocket have to go relative to an observer for its length to be contracted to 99% of its length at rest?.
32. A body executing SHM when its displacement from the mean position is 4cm and 5cm and it has velocity  $10\text{cm s}^{-1}$  and  $8\text{cm s}^{-1}$  respectively, what is its time period?
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 young's modulus of the material of the bar is  $2 \times 10^{10} \text{N/m}^2$  .
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  $0.07 \text{Nm}^{-1}$
35. Three masses 1kg,2kg and 3kg are placed at the vertices of an equilateral triangle of side 1m.Find the centre of mass of the system.
36. Explain time dilation.
37. Find the time period for a torsional pendulum.

**SECTION – C****ANSWER ANY THREE QUESTIONS:****(3 X 15 = 45)**

38. Determine the centre of gravity of solid hemisphere and solid cone.
39. State and prove keplers law of areas and periods.
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.

