Questions (Set-1)

1. Suppose you and your team of four scientists discover a small amount of a hypothetical resource, which could benefit both society and the scientific community.
   This resource could either be used to generate enormous amounts of energy to benefit society, or as a fuel to power rockets as it is very efficient.
   Two of the scientists want to share it with the community and the other two want to use it for society. As a scientist, what do you think is the most efficient way to use this limited resource? Can you think of any other way to resolve this conflict? Or do you agree with one group and why? And how would you work as a team to find a Consensus? **-(SB)**

2. A boat having a length 5 m and breadth 1 m is floating on a lake. The boat sinks by 1.5 cm when a man gets on it. The mass of the man is - **(1M)**
   A) 60kg
   B) 75kg
   C) 96kg
   D) 65kg

3. 'm' represents the slope of a line. It also follows the equation m+3 = m+6. The angle between the line and the x axis is - **(1M)**
   A) 90
   B) 45
   C) 180
   D) 22.5

4. 13 parallel horizontal lines intersect 8 parallel vertical lines. How many parallelograms are formed? - **(3M)**
   A) 2084
   B) 315
   C) 2184
   D) 8736

5. If x and y are positive integers such that (3x+4y) is a multiple of 11, then which of the following is divisible by 11? - **(3M)**
   A) 16x+3y
   B) 2x+y
   C) 4x+3y
   D) 6x+12y

6. Find the sum of the infinite series 1/1 + ⅓ + ⅙ + 1/10 + 1/15 … - **(3M)**
   A) 3!/2
   B) 4!/(2*3!)
   C) 5!/3
   D) 6!/8!

7. The HCF of two numbers is 12 and their LCM is 31980. If one of the numbers is between 700 and 800, find the other number. - **(3M)**
   A) 496
   B) 512
   C) 498
   D) 492

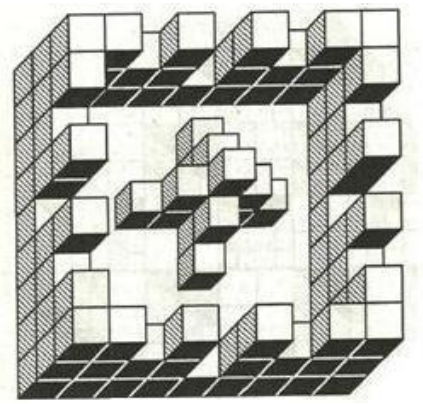
8. Two equal sums were borrowed at 13% simple interest per annum for 5 years and 7 years, respectively. The difference in the interest was Rs.332.8. The sum borrowed was - **(5M)**
   A) 1200
   B) 1240
   C) 1280
   D) 1320

9. David started on a trip to visit casinos, with few coins in his pockets. As soon as he visits any casino, the cash in his wallet increases by a factor of 2 and on his way out, he spends Rs. 100 for food and drinks. He visits 4 casinos on a particular day. After he visits the final casino, his pocket is empty, so how much money did he have initially? - **(5M)**

10. 512 : 640 :: 216 : ? - **(1M)**
    A) 260
    B) 1515
    C) 270
    D) 1520

11. Deepti wants to bake a cake in the oven for her mother's birthday. She has two hour-glasses to measure the time. With a 7-minute hourglass and a 3-minute hourglass, can you explain the quickest way to measure time for baking a cake for 8 minutes by Deepti. - **(3M)**

12. Count the number of cubes in the following figure: - **(3M)**



A) 89
B) 91
C) 95
D) 99

13.

2	→	3
10	→	3
11	→	6
17	→	?

The missing value is ___?
Explain the logic too. - **(3M)**

14. Which is the odd one out of the following - **(3M)**

A) C E H L Q
B) S U X B G
C) H J M Q V
D) N P S W C

15. What must be the next number in this series? - **(1M)**

0 3 3 6 9

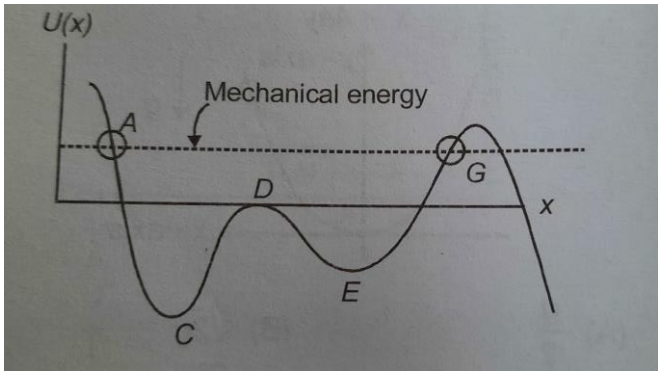
A) 12
B) 13
C) 14
D) 15

16. Complete the series. - **(5M)**

N	252	R
T	500	Y
Y	400	P
K	132	L
G	147	?

A) P
B) U
C) Z
D) B

17. A particle executing one dimensional motion moves under the effect of a PE curve as shown. At t=0 the particle was somewhere between A and G. Which of the following is not the correct option? - **(2M)**



A) Kinetic energy is max at C.
B) The velocity is zero at A and G.
C) The force is zero at C,D,E.
D) The force is zero at A and G.

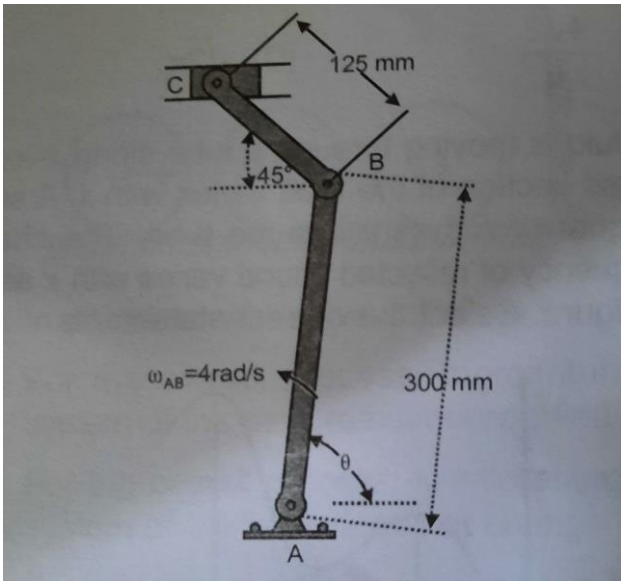
18. A satellite is moving round the earth in a circular orbit. The following statements are given - **(1M)**

(i) it is moving with a constant velocity
(ii) It suffers no acceleration
(iii) its angular momentum wrt the earth remains conserved
(iv) its distance from centre must be equal to √2 times of earth radius

Which of the following options are correct

A) All options are correct
B) only option (i) n (iii)
C) only option (iii)
D) only option (ii) n (iv)

19. Calculate the velocity of the slider block at C at the instant θ =45deg, if link AB is rotating at 4 rad/s. - **(2M)**

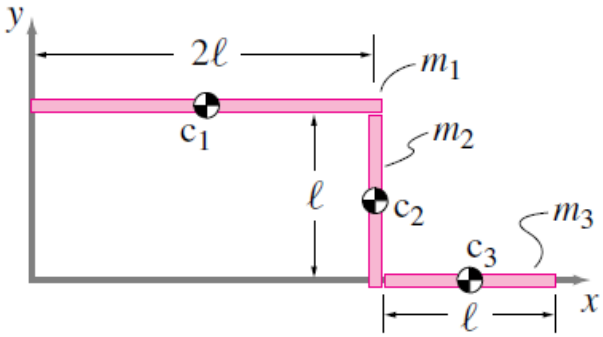


A) 1.2 m/s
B) 1.7 m/s
C) 0.84 m/s
D) 1.95 m/s

20. A binary star has a period T=3 years, while the distance L between its components is 2AU. Assume that the components of the binary stars move in a circular orbit. Find the mass of the binary star in terms of mass of the Sun (Ms). - **(3M)**

A) 8Ms/9
B) 4Ms/9
C) 2Ms/9
D) Ms/3

21. A uniform bar of mass 4 kg is bent in the shape of an asymmetric 'Z' as shown in the figure. Locate the center-of-mass of the bar. Consider l =0.5m. - **(2M)**



Answer Key

1. Common Question. Evaluated in the Interview.
2. (B)75KG
3. (A) 90
4. (C)2184
5. (A) 16x+3y
6. (B) 4!/(2*3!)
7. (D) 492
8. (C) 1280
9. 93.75
10. (C) 270
11. Start both the hourglasses together. Flip the 3-minute hour glass twice and once the 7-minute hourglass is emptied, flip the 3-minute hourglass again to measure 1 minute.
    Therefore, 7+1 = 8 minutes.
12. (C) 95
13. 9 (Number of letters in the number)
14. (D) N P S W C
15. (D) 15
16. (B) U
17. (D)
18. (C)
19. (B) 1.7m/s
20. (A) 8Ms/9
21. x=0.812m ; y=0.312m or 0.812i+0.312j