Hall Ticket Number:

Code No. : 1106S

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD
B.E. I Year I - Semester (Supplementary) Examinations, July/Aug - 2015

Engineering Mechanics - I

Time: **3** hours Max. Marks: **70**

*Note: Answer ALL questions in **Part-A** and any **FIVE** questions from **Part-B***

Part-A (10 X 2=20 Marks)

1. Compute the unit vector $\hat{n}_{AB}$ along the line directed from A(5,-1,4) to B(17,3,7)
2. Explain cone of friction and its significance.
3. State the conditions of equilibrium of a general case of system in a plane?
4. Two forces of magnitude 50 kN and 80 kN are acting on a particle, such that the angle between the two is 135^0. If both the forces are acting away from the particle, calculate the resultant and find its direction.
5. Compute the polar moment of inertia of a hollow circular section of external diameter 'D; and internal diameter 'd'.
6. Describe the essential properties of couples.
7. State Coulomb's laws of dry friction.
8. Define radius of gyration with respect to x-axis of an area.
9. Define the following terms: (a) Coplanar forces (b) Concurrent forces.
10. Explain different types of supports with neat sketches.

Part-B (Marks: 5×10=50)

11. A vertical load of 1500 N is supported by an assemblage of 3 bars as shown in the Figure 1 below. Find the force in each bar.

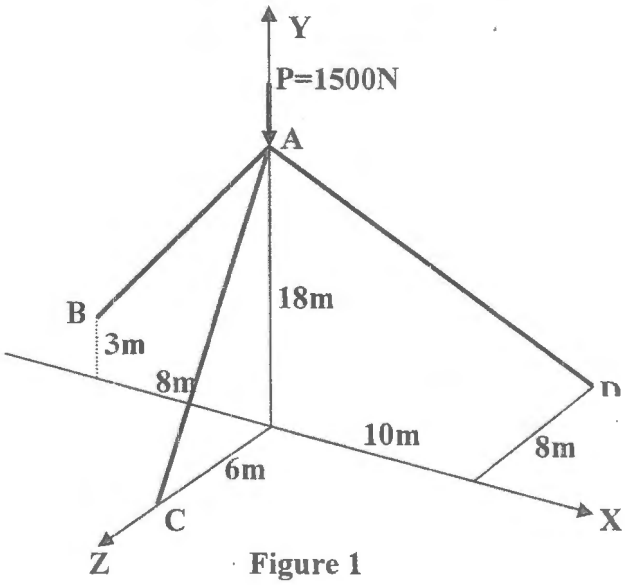

Figure 1

Contd ..2..

12. a) Determine the magnitude and direction of the smallest force P required to start the wheel over the block of height h= 150 mm as shown in Figure 2. The self-weight and radius of the wheel is W=20 kN, and 700 mm respectively.

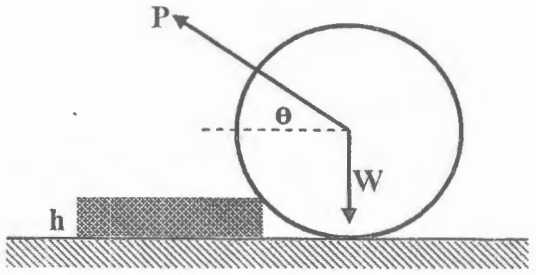

Figure 2

b) A force P of magnitude 250 N acts at a point A(2,3), oriented right-up with an inclination of 30 degrees to the positive direction of x-axis. Compute the moment of force P at the points B(-2,5) and C(-1,-3).

13. Consider the system shown in Figure 3. If $\emptyset = 70$ degrees and $\mu = 0.25$ at all surfaces of contact and it is required to slide the wedge (A) in the downward direction, compute the weight W of block A if it is required to slide B.

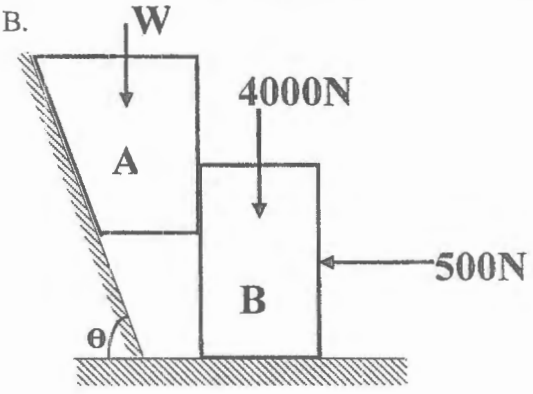

Figure 3

14. A truss is subjected to loading as shown in Figure 4. Compute the forces in the members of the truss using method of joints.

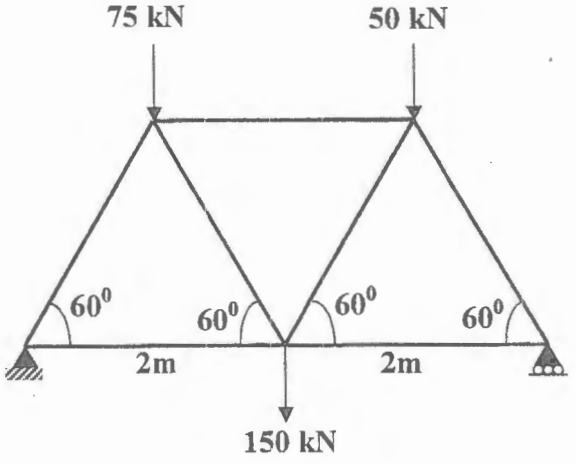

Figure 4

Contd..3..

15. a) Evaluate the perpendicular distance of a point (2,-3,4) from the line joining the points (-1,2,3) and (-4,3,5).
b) Compute the following in the cantilever framework shown in the Figure 5, given that the force multiplier of a force P acting from A to E is Pm=50N/m:
i) Component of P along BD
ii)Moment of P about D.
iii)Angle between the lines AE and BD

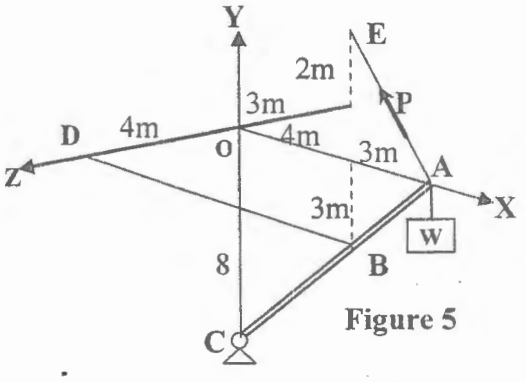

Figure 5

16. Compute the area moment of inertia about the centroidal axes parallel to the base of the composite area shown in Figure 6.

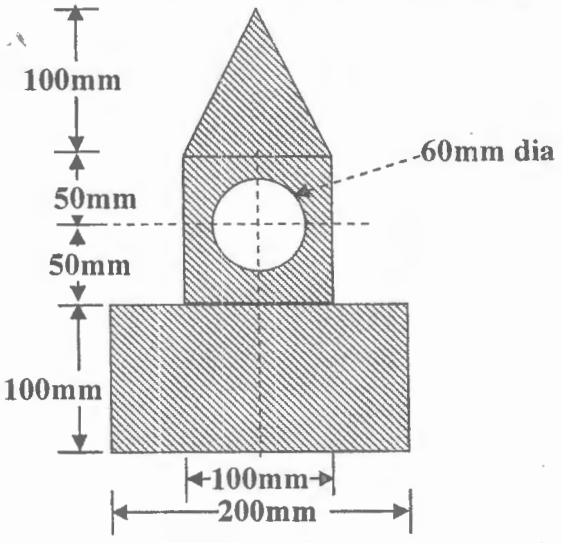

Figure 6

17. a) Locate the centre of gravity of the area shown in Figure 7(a)
b) Compute the volume generated by rotating the shaded area shown in Figure 7(b) about the x-axis.

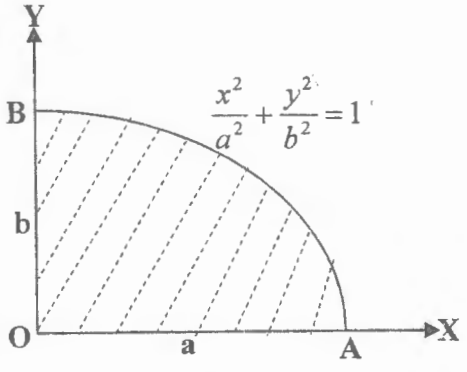

Figure 7(a)

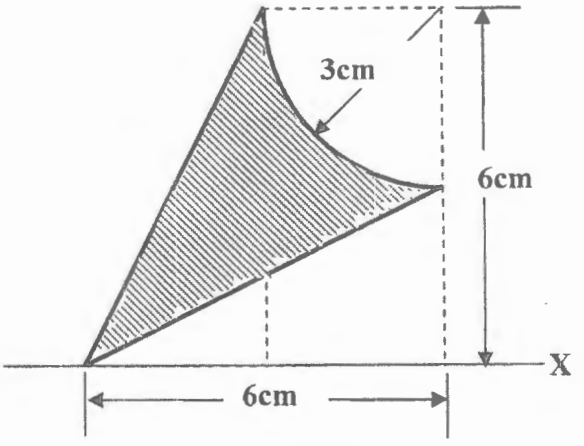

Figure 7(b)

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