

B. ENGG (Construction, 1st yr 1st Semester, Engineering Mechanics-I) **EXAMINATION, 2017**
 (Supplementary)

Time : 3 hours Answer any five [5] questions All questions carry equal marks Full Marks-100

1.a) The 30-N force P is applied perpendicular to the portion BC of the bent bar. Determine the moment of P about point B and about point A . (Fig-1)

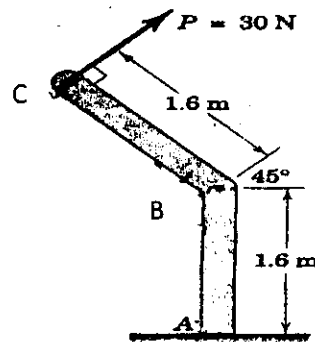


Fig.1

b) Given that the forces $P=4i-2j+3k$, $Q=2i+4j+5k$ and $R=7i-j+xk$. Determine the value of x for which the forces will be coplanar.

2.a) A uniform wheel of diameter 900mm and weight 5000N rests against a rigid rectangular block of 100mm heights as shown in Fig.2. Determine the minimum pull required through the centre of the wheel so to just turn it over the corner of the block.

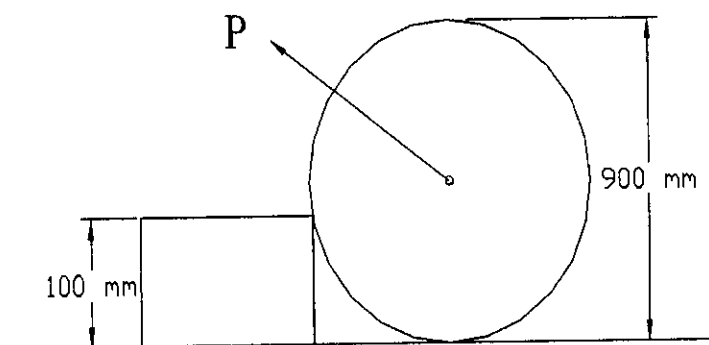


Fig.2

b) $W_1=200\text{ N}, W_2=50\text{ N}, \mu=0.3$ (all contact surfaces), Find the necessary P to impend slipping.(Fig-3)

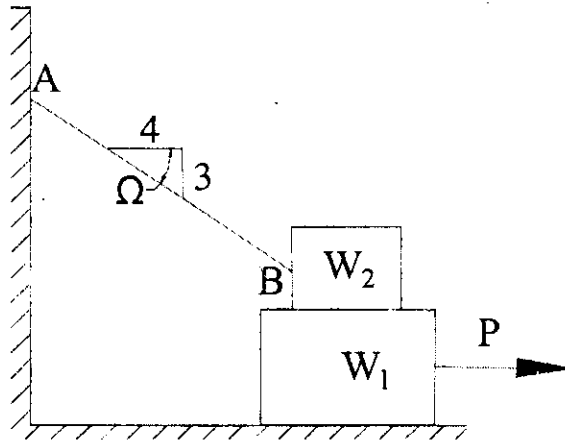


Fig.3

3. Determine the coordinates of the centroid of the shaded area.(Fig-8)

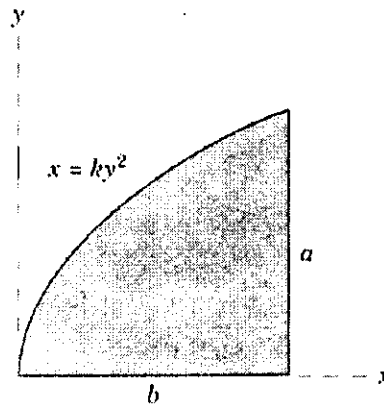


Fig.4

4 .a) What are the angle of friction and angle of repose? Find out the relation between them.

b) State and Prove Lami's Theorem

5. A ball of weight W rests on a smooth plane as shown(Fig-5). Find angle α and the normal reaction on the ball for equilibrium.

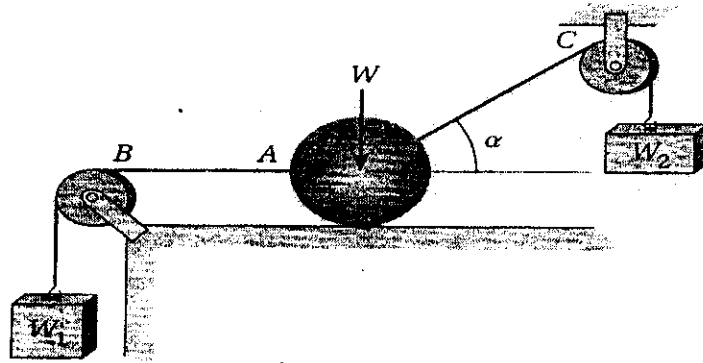


Fig-5

6. a) Derive the relation of the vector components if the co-ordinate of the system rotate θ with respect to Z-axis?

b) From the above relation show that the dot product of two vectors remain same. after rotation of the co-ordinate.

7. Draw the shear force and bending moment diagram for the beam shown in fig below.



Fig-6

8. Determine the moment of inertia and the radius of gyration of the area shown in the fig-7.

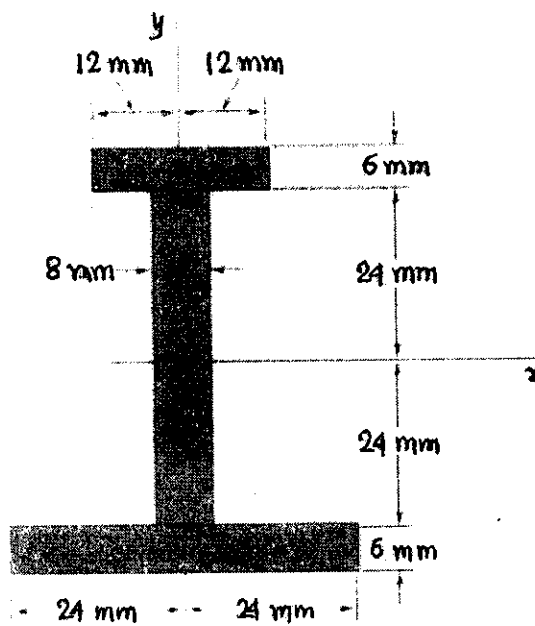


Fig-7