B. E. First Semester (All) / Second (Group B)SoE–2014-15 Examination

Course Code : CV 1101/CV 101 **Course Name : Engineering Mechanics**

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions are compulsory.
(2) All questions carry marks as indicated.
(3) Assume suitable data wherever necessary.
(4) Illustrate your answers wherever necessary with the help of neat sketches.
(5) Use of non – programmable calculator is permitted.

1. Sovle any **One** :

(A) What is Engineering Mechanics ? Explain the classification of Engineering Mechanics with suitable examples. and What do you mean by resolution of forces ? State and explain Varignon's theorem. 7

OR

(B) State and explain principle of transmissibility of forces and What is Couple ? State properties of couple also explain the moment of a force. 7

2. Solve any **One**

(A) A force, F,70 N in magnitude passes through point A(-2,1,3) towards B(4,4,5), coordinates at point C and D are (-2,0,1) and (2,0,-2) respectively Find.

(i) Moment of F about lineCD. 8

OR

(B) A bar AB of length 5m as shown in Figure 1 is of negligible weight. Iy is acted upon by two forces, 150N and 200N. A horizontal force

150N act along the bar at 2m from 'A 'and vertical force 200N acts at 4m along the bar from A. The bar is in contact with smooth vertical wall and inclined plane. Determine inclination θ of the plane for equilibrium of the bar.

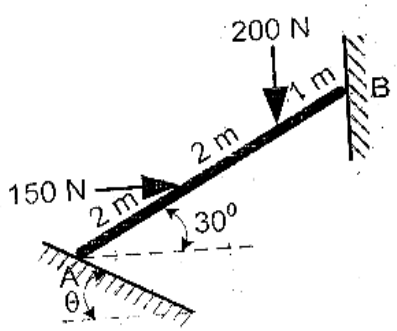

FIG. (1)

8

3. Solve any **One** :

(A) Define the following terms: Friction, limiting force of friction and angle of friction and Prove that the angle of friction is equal to the angle of the inclined plane, when a solid body of weight W placed on inclined plane, is about to slide down. 7

OR

(B) State the assumption made in analysis of trusses and analyze the truss shown in Figure 2 by method of joint and write the result in tabular form

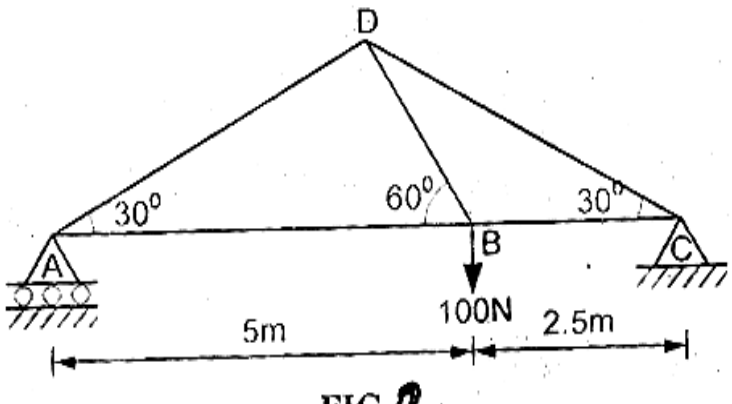

FIG-2

7

Solve any One

(A) Determine the moment of inertia of the composite area as shown in Figure 3 about x and y- axis.

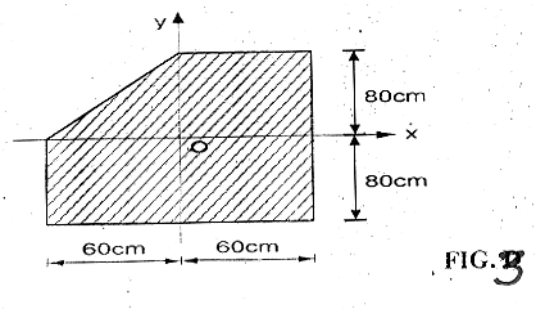

FIG. 3

8

(B) Find the centroid of the shaded region shown in Figure 4 reference to X and Y axes.

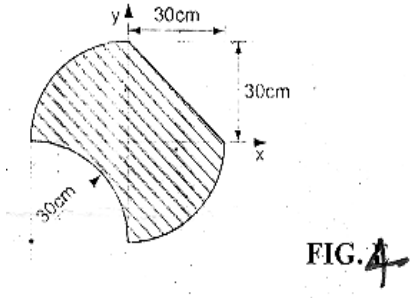

FIG. 4

8

5. Solve any **Two** :

(A) Two blocks are arranged as shown in Figure 5 having weights 500N and 200N respectively. Determine the acceleration of each block. Assuming the pulley to be frictionless and of negligible weight.

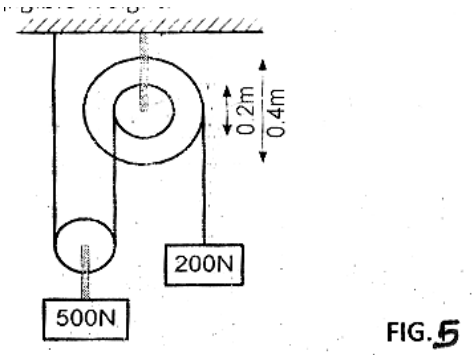

FIG. 5

7.5

(B) Find the acceleration of each block shown in figure 6. Assume the coefficient of friction between block C and horizontal surface is 0.4. Weight of block A,B and C Care W_A = 1000N, W_B= 3000N,W_c=800 N respectively. Assume the pulleys are frictionless.

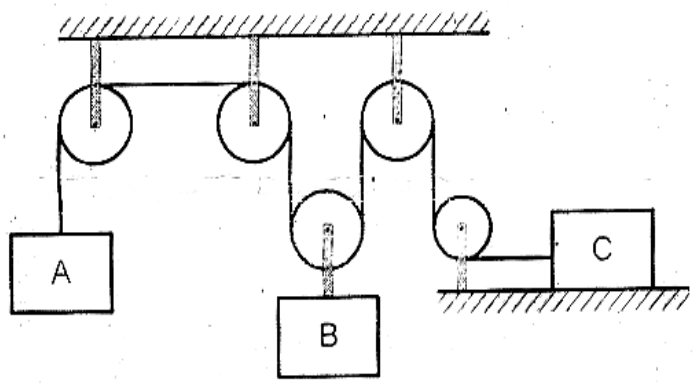

FIG. 6

7.5

(C) Using Virtual Work method determines reaction at supports A,B and D for the beam shown in Figure 7 Point B is the internal hinge in the given beam.

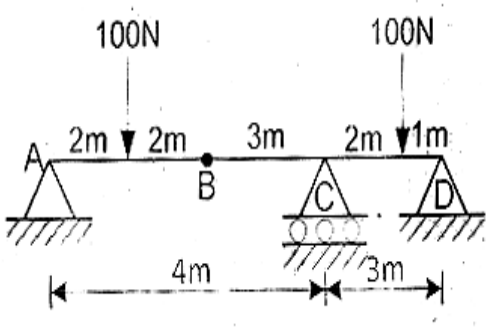

FIG. 7

7.5

6. Solve any **Two** :

(A) Explain Work Energy Method. State law of Conservation of Linear Momentum with the help of neat sketch. 7.5

(B) Two bodies A and B weighing 200N and 300N respectively approach each other with velocity 4m/s and 2m/s respectively. If the coefficient restitution is 0.6 find, The velocities of bodies A and B just after impact, Loss of energy during impact and, if the impact lasts for 0.01 sec, find average impact force. 7.5

(C) A woman of mass m stands in a boat of mass M. if she jumps horizontally with a velocity of v relative to the boat, determine the velocity of the boat immediately after she jumps off the boat.

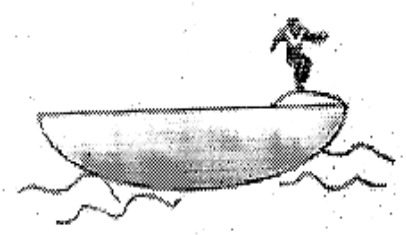

FIG. 8

7.5