Code No : **20ME2T02**

R20

I B.TECH II SEMESTER REGULAR EXAMINATIONS, SEPTEMBER - 2021
ENGINEERING MECHANICS
(Common to Civil and Mechanical Branches)

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

Note : Answer **ONE** question from each unit **(5 ×14 = 70 Marks)**

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UNIT-I

1. a) Define Resultant force, equilibrant, Torque and couple. [4M]

   b) Determine the resultant of the four concurrent forces shown in Figure1. [10M]

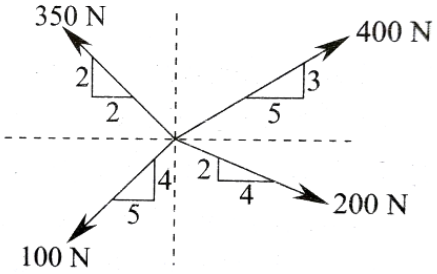

Figure 1

(OR)

2. a) State and Prove Varignon's Theorem. [4M]

   b) A system of loads acting on a beam as shown in Figure-2. Determine the resultant of loads at the distance x from 'A' end. [10M]

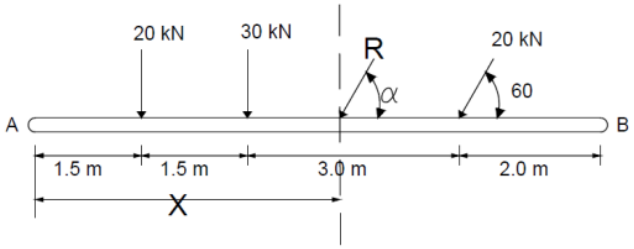

Figure 2

UNIT-II

3. a) Differentiate statically determinate and indeterminate truss. [4M]

   b) Determine the forces in the members GF, CD and CF of the frame shown in Figure-3. [10M]

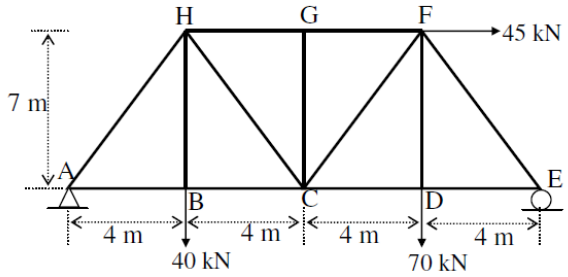

Figure 3
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(OR)

4. a) Differentiate static friction and dynamic friction ? [4M]

   b) Determine the necessary force P acting parallel to the plane to cause motion to impend as shown in the Figure-4. Assume coefficient of friction as 0.25 and the pulley to be smooth. Weight of A 45kg, weight of B is 135 kg and angle is 45^0. [10M]

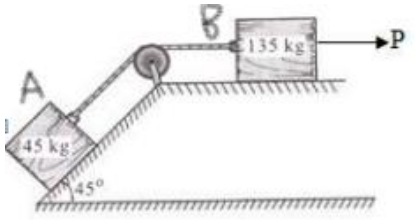

Figure 4

UNIT-III

5. a) Explain the procedure to find centroid of plane composite surface. [6M]

   b) Determine by direct integration the coordinates of the centroid of the shaded area formed by the integration of a straight line $y = mx$ and the parabola $y = kx^2$ as shown in the Figure – 5. [8M]

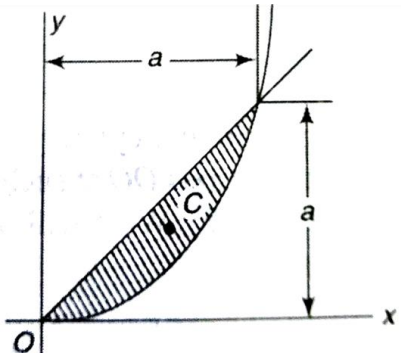

Figure 5

(OR)

6. a) Explain parallel axis theorem in area moment of inertia. [4M]

   b) Determine the moments of inertia of the shaded area with respect to the centroidal axis parallel to side AB as shown in the Figure – 6. [10M]

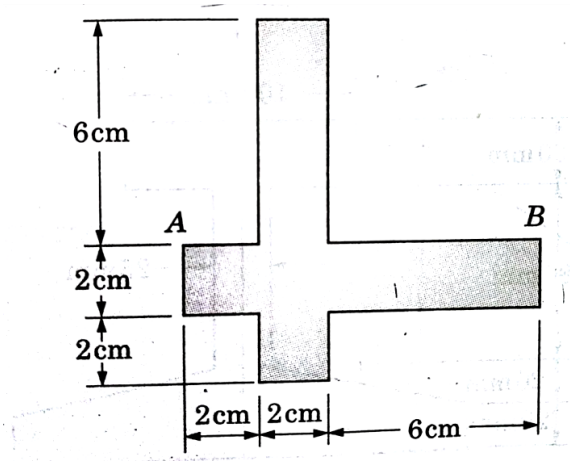

Figure 6

UNIT-IV

7. a) A stone is dropped into a well while splash is heard after 2.5 seconds. Then determine depth of water surface assuming the velocity of sound as 330 m/s. [6M]

   b) A motorist takes 10 seconds to cover a distance of 20m and 15 seconds to cover a distance of 40m. Find the uniform acceleration of the car and the velocity at the end of 15 seconds. [8M]

(OR)

8. a) Establish the Relationship between Angular motion & linear motion? [4M]

   b) Determine the tension in the string and the velocity of 1500 N block shown in **Figure 7,** 5 seconds after starting from (i) Rest (ii) Starting with a downward velocity of 3 m/sec. Assume pulleys are weightless and frictionless. [10M]

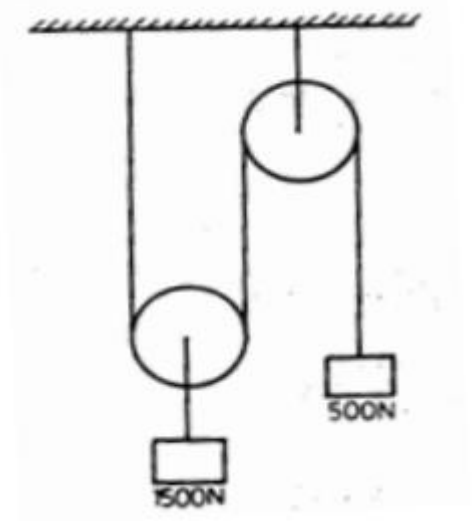

Figure 7

UNIT-V

9. a) Determine the constant force P that will give the system of bodies shown in Figure-8 acceleration of 1m/sec^2 starting from rest. Coefficient of friction between the blocks and the plane is 0.3.Pulleys are smooth. [14M]

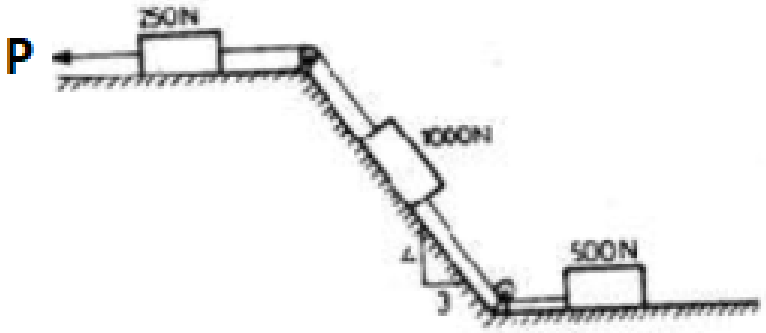

Figure 8

(OR)

10. Determine the time required for the weights shown in Figure-9 to attain a velocity of 9.81m/sec. What is tension in the chord? Take μ=0.2 for both planes. Assume the pulleys as frictionless [14M]

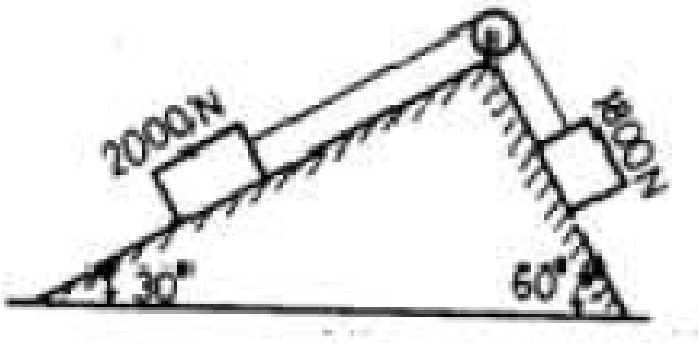

Figure 9

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