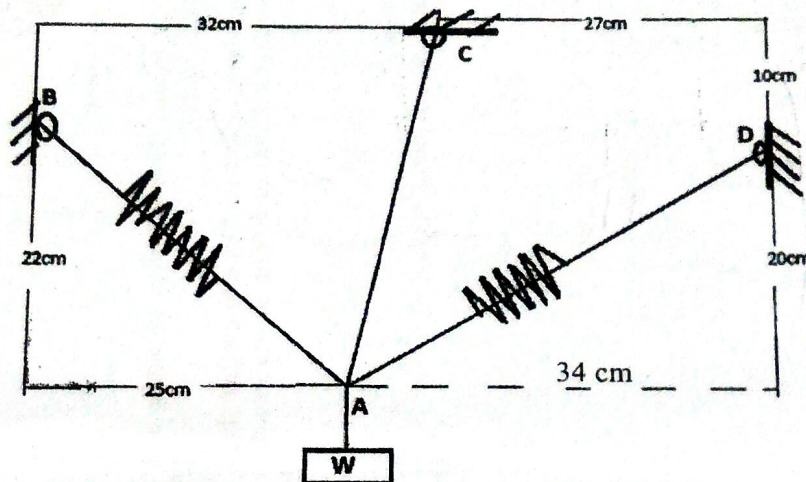


Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCE, BGE, BME	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

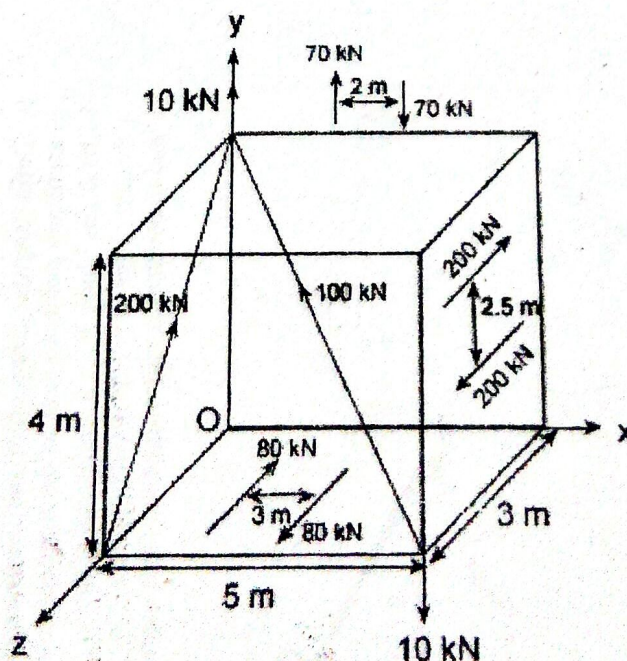
**Subject:** - Applied Mechanics (CE451)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

- What is Rigid body? Explain the transmissibility of force and its limitation. [1+3]
- A block of weight  $W$  is suspended by a cord  $AC$  and two spring of which the unstretched length of 25 cm knowing that the constants of spring are  $AB = 10\text{N/cm}$  and  $AD = 3.5\text{N/cm}$ . Determine: [8]
  - Tension in the cord  $AC$
  - Weight of the block

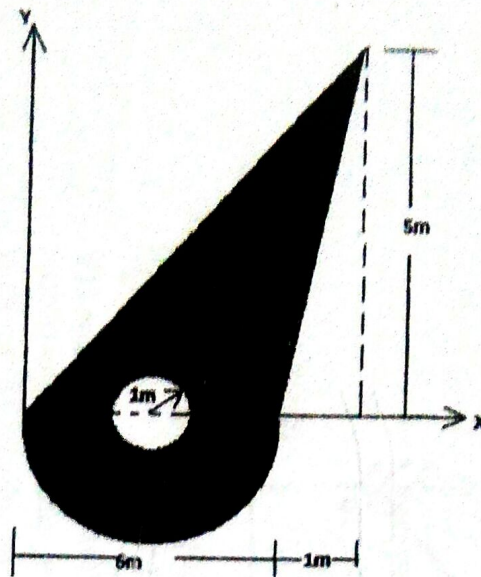


- State and prove varignon's theorem. Determine the resultant force and moment about point  $O$ . [2+8]

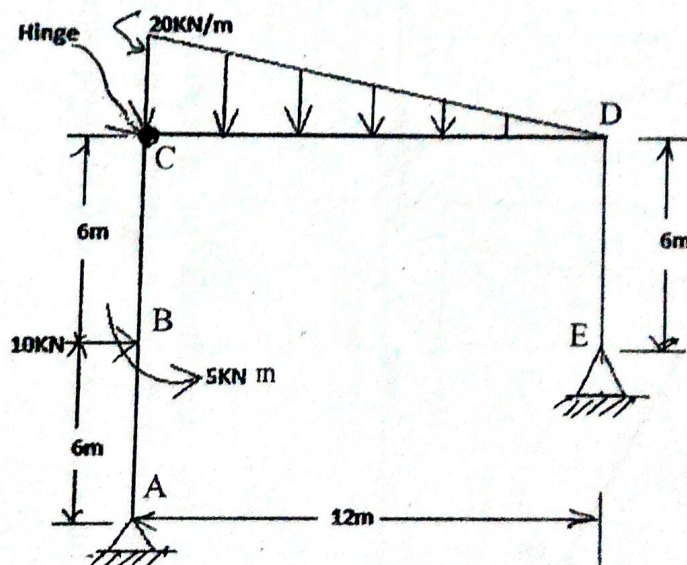




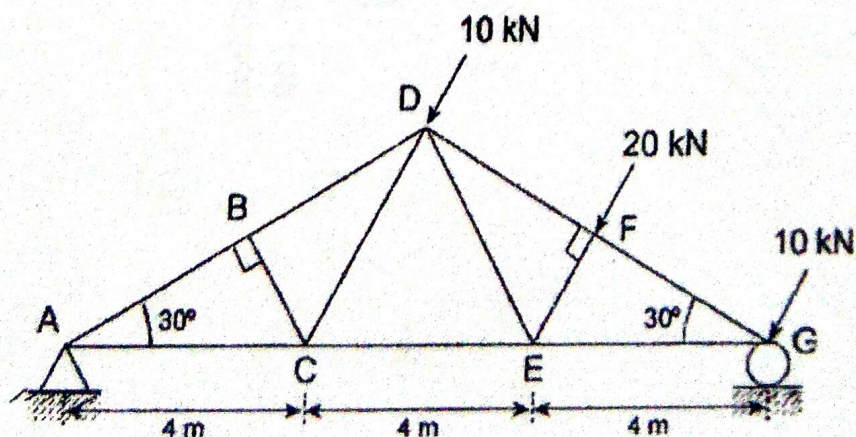
4. a) State and prove parallel axis theorem for moment of inertia. [4]  
 b) Calculate moment of inertia of given shaded composite section about centroidal Y-Y axis. [8]



5. Define friction and explain about laws of dry friction. How condition of sliding or overturning can be decided for a block? Explain in brief. [2+2]  
 6. Draw AFD, SFD and BMD of given frame. Indicate salient features also. Deduce the relationship between load, shear force and bending moment for a beam section loaded uniformly with intensity of load  $w$ . [11+3]

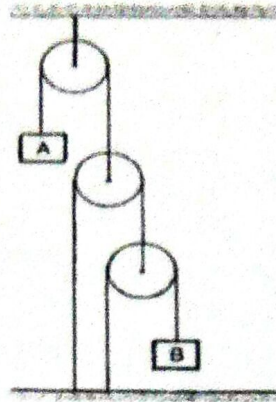


7. Find the member forces in BD, CE and CD for the given truss. Write down the assumptions of ideal truss. [6+2]





8. Define radial and transverse component of velocity and acceleration. Find the acceleration of block B if the acceleration of A is  $4 \text{ m/s}^2 (\downarrow)$  for the following connection. Neglect the mass of blocks and pulleys. Assume that cords are inextensible and pulleys are friction less. [3+7]



9. Define angular momentum and illustrate that the rate of change of angular momentum about any point is equal to the momentum of the force about the point. The motion of a 1000 gm block B in a horizontal plane is defined by the relations  $r = 3(1 + \sin 2\pi t)$  and  $\theta = 2\pi t$ , where  $r$  is expressed in meters,  $t$  in seconds and  $\theta$  in radians. Determine the radial and transverse components of the force exerted on the block when i)  $t = 0$  and  $t = 0.5 \text{ sec}$ . [3+7]

