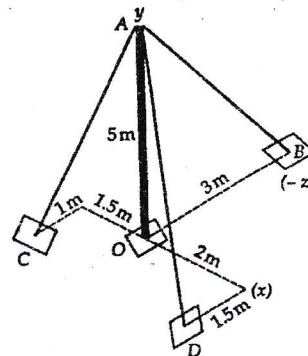


Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	BCE, BME, BGE	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

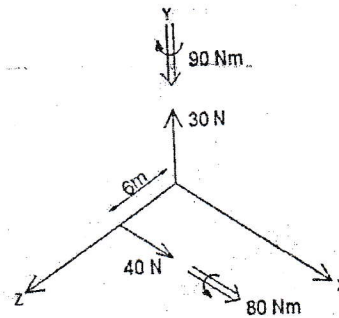
Subject: - Applied Mechanics (CE 451)

- ✓ 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.

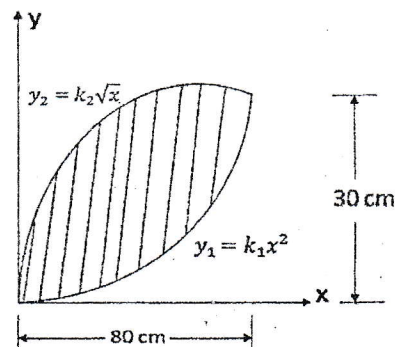
- Describe briefly the principle of transmissibility and its limitation. [4]
- What are the steps to draw Free Body Diagram? Explain with sketches. [4]
- In the system shown in figure, a 5m long pole is held in vertical position by three guys wires AB, AC and AD. If the tension of 600N is induced in AD and the resultant force at A is to be vertical, determine the tension in cables AB and AC. [8]



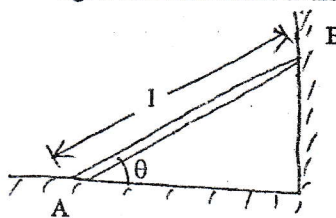
- Replace the two wrenches as shown in figure by a single equivalent wrench. Find its pitch and indicate line of action. [8]



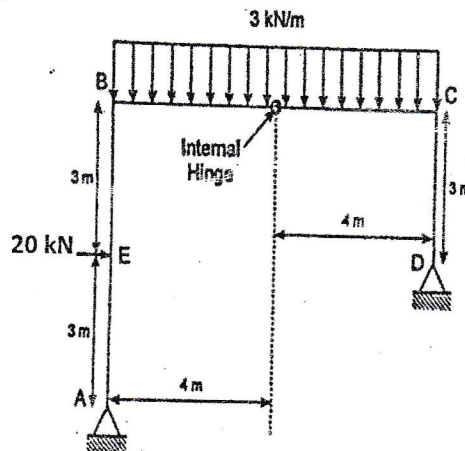
- Define Radius of Gyration. Determine moment of inertia about centroidal axis of the shaded area. [2+10]



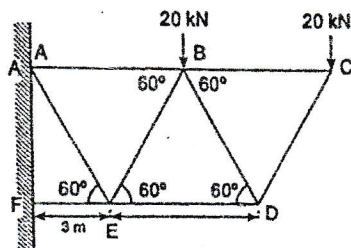
6. Determine the minimum angle ' θ ' at which a uniform ladder can be placed against a wall without slippage under its own weight. The coefficient of friction for all surface is 0.2. [5]



7. Draw axial force, shear force and bending moment diagram of the given frame. Indicate salient features if any. [13]



8. Determine the force developed in the members AB, ED, BC and BD of the truss loaded as shown in figure below. [6]



9. Explain about relative motion of particle with example. The acceleration of a particle is defined by the relation $a = 12x - 28$ where a is in m/s^2 and x is in m. Knowing that $v = 8 \text{ m/s}$ when $x = 0$; Determine

- the maximum value of x .
- the velocity when the particle has travelled a distance of 2.5m.

[2+8]

10. Define angular momentum and prove that the rate of change of angular momentum about any point is equal to the momentum of the force about the point. The velocity of block A is 2 m/s to the right at the instant when $r = 0.73 \text{ m}$ and $\theta = 30^\circ$. If coefficient of kinetic friction between block A and ground is $\mu_k = 0.2$; Neglecting the mass of pulley, determine at this instant

[3+7]

- tension in the cable.
- the acceleration of block A.
- the acceleration of block B.

