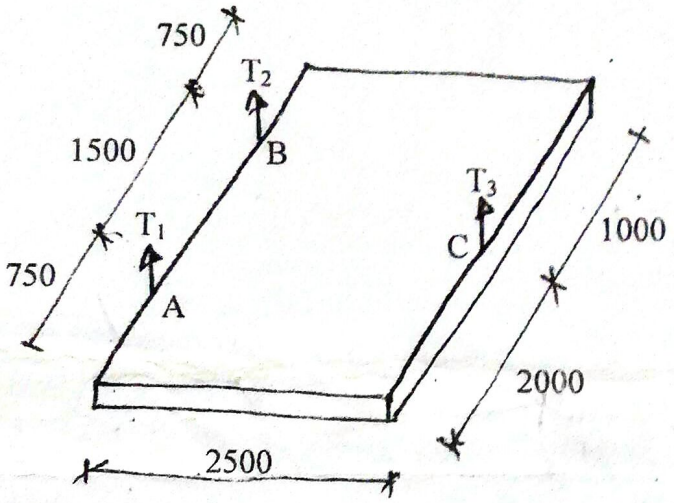
01 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Bhadra

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

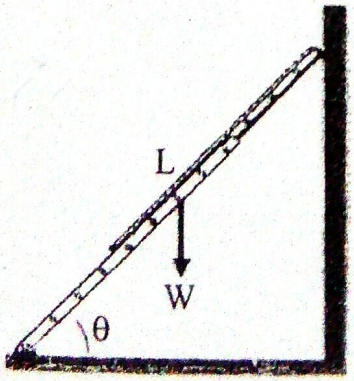
Subject: - Applied Mechanics *(CE451)*

- ✓ 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.*

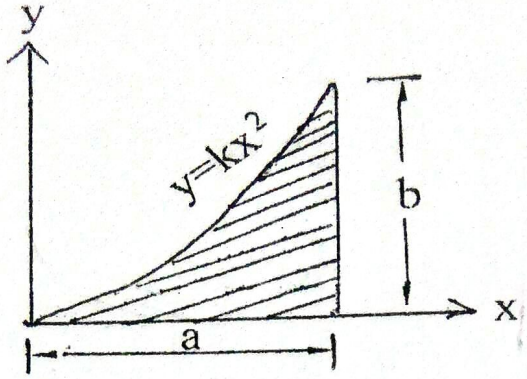
1. What is mechanics? Mention scope of Applied Mechanics in engineering. [2]
2. Illustrate equilibrium condition of a rigid body and concept of free body diagram with suitable examples. [8]
3. Three vertical wires as shown in figure support a plate of 50 kg. Determine the tension in each wire. All dimensions are in mm. [8]



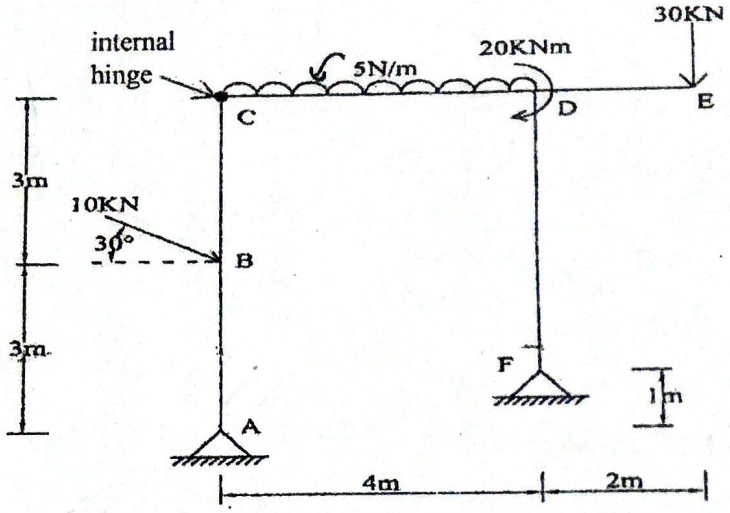
4. Force $\vec{F} = (3\hat{i} - 6\hat{j} + 4\hat{k})$N passes through point (6, 3, 2) m. Replace this force with an equivalent system, where the force $\vec{F}$ passes through point (2, 5, 10) m. [4]
5. Determine the minimum angle θ (made by the ladder AB of length 'L' with the floor) at which a uniform ladder can be placed against a wall without slipping under its own weight (W). The coefficient of friction for all surfaces is 0.2. [4]



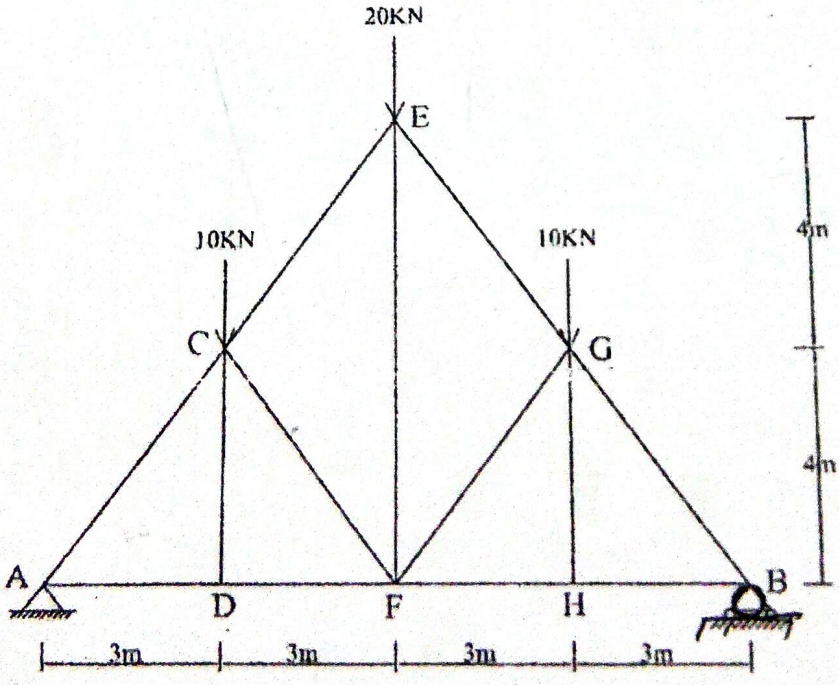
6. Determine the moment of inertia about centroidal axis of the shaded plane area by using Direct integration method. [12]



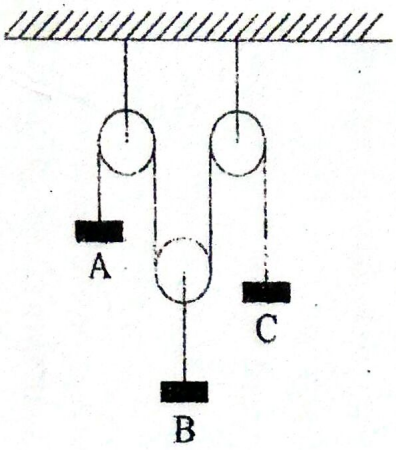
7. Draw the axial force, shear force and bending moment diagram of given frame. Indicate also the salient features if any. [14]



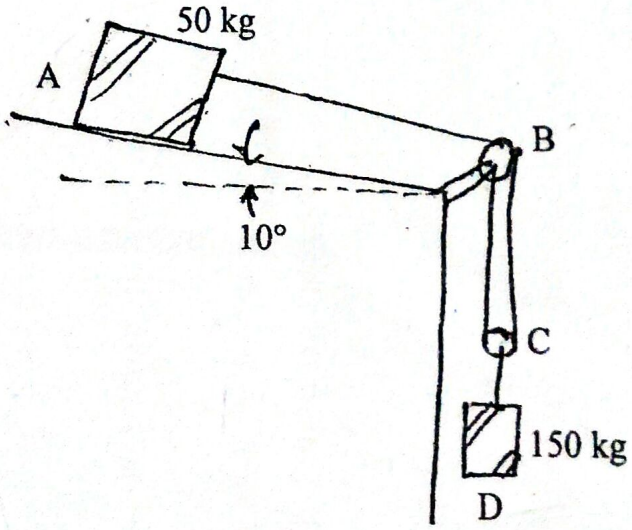
8. Determine the force developed in members CE, DF, EF, GH of given truss loaded as shown in figure. [8]



9. Define uniformly rectilinear motion and uniformly accelerated rectilinear motion. For the pulleys systems as shown in figure, calculate the velocity and acceleration of Block 'C'. If the velocities and acceleration of Block 'A' and 'B' are 3 m/s(↓), 2 m/s^2(↑), 4 m/s(↑) and 5 m/s^2(↓) respectively. [8]



10. Two blocks shown in figure starts from rest. The pulleys are frictionless and having no mass. The kinetic co-efficient of friction between block A and inclined plane is 0.37. Determine the acceleration of each block and tension in each cord. What do you mean by dynamic equilibrium? [8+2]



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