21 TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING

Examination Control Division

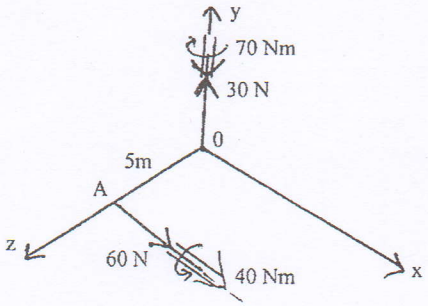
2074 Ashwin

Exam.	Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BAME, BCT, BIE, B.Agri., B.Arch.	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

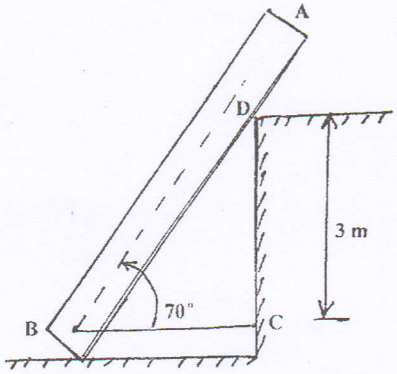
Subject: - Applied Mechanics *(CE401)*

- ✓ 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. Define Equilibrium and its essence. What are the equations of static equilibrium for 2D and 3D analysis of particle and Rigid Body? [6]
2. Replace the two wrenches as shown in figure below by a single equivalent wrench and determine the point where its axis intersects the XZ plane. [8]

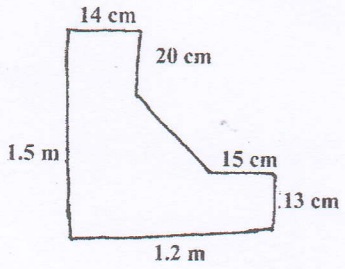


3. Determine the tension in the cable BC which holds a part AB of length 4m length from sliding. The past has a mass of 10 kg. Assume all the contact surfaces are smooth. [6]



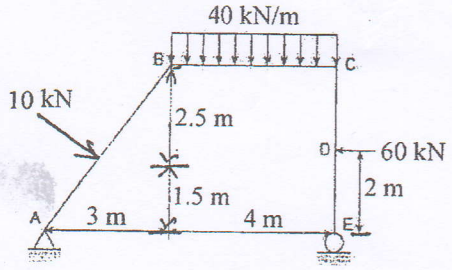
4. Illustrates the conditions of no friction, no motion, impending motion and motion with necessary sketches. How can you assure condition of sliding or overturning of the block? [3+2]

5. Determine moment of inertia about centroidal XX and XY axes of the plane figure shown in figure below. Define centroid, centre of gravity and axes of symmetry. [9+3]

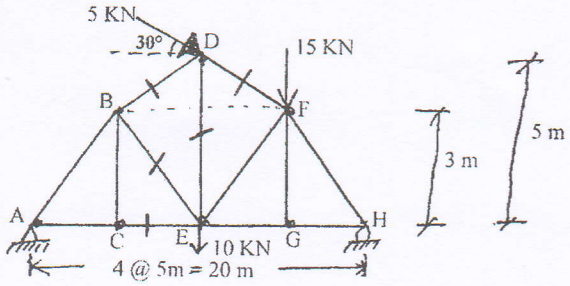


6. a) How can you check the determinacy and stability of the frame? Explain with examples. [3]

   b) Calculate and draw the axial force, shear force and bending moment diagram; with its salient features for the given frame. [12]



7. Find the member force in the indicated members of the truss shown below. [8]



8. Explain about relative motion of particle with example. A projectile is fired from position A with an initial velocity of 200 m/sec at a target B on right located 500m above from the position A. The horizontal distance between A and B is 3000 m. Determine the firing angle neglecting air resistance. [2+8]

9. The resultant external force acting on a 2 kg particle in space is $\vec{F} = \left(12t\,\hat{i} - 24t^2\,\hat{j} - 40t^3\,\hat{k}\right)$ N, where t is the time measured in seconds. The particle is at rest at the origin when t = 0. Determine the acceleration component a_y, the velocity component V_y, and the coordinate y of the particle at the instant of 4 sec. What do you mean by principle of impulse and momentum? [8+2]

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