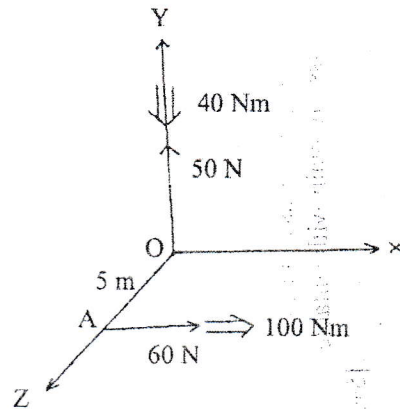


Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCE, BME, BGE	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

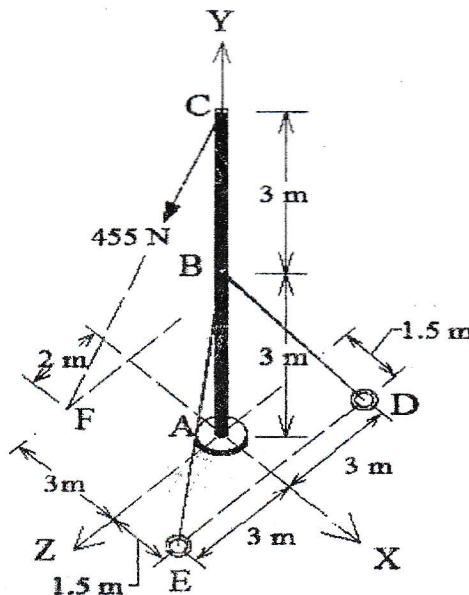
Subject: - Applied Mechanics (CE451)

- ✓ 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.

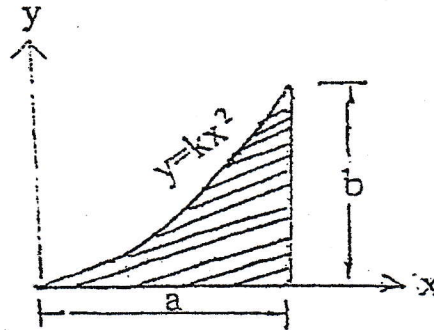
1. Differentiate between particle and rigid body. How can we draw a good FBD? [2+2]
2. Define couple and show that couple is free vector. Replace the two wrenches as shown in figure below by a single equivalent wrench and determine (a) Resultant force (b) the point where its axis intersects the XZ plane. [4+7]



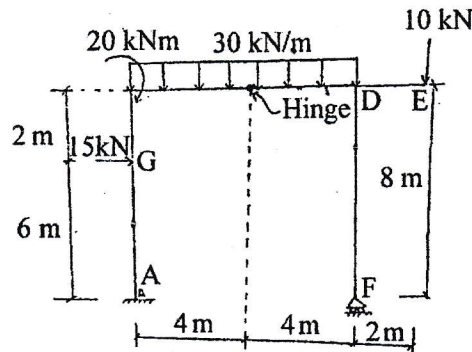
3. The 6m pole ABC is acted upon by 455 N force as shown. The pole at A is supported by two cables BD and BE as shown in figure. Determine tension in each cable and the reaction at A. [7]



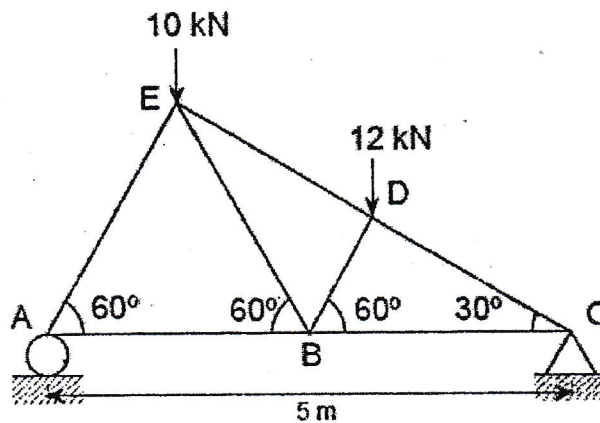
4. Determine the moment of inertia about centroidal axes of the shaded plane area by using direct integration method. Define the terms: Centroid, centre of gravity, radius of gyration and axes of symmetry. [8+4]



5. Explain the laws of dry friction. Define the terms: angle of friction and impending motion. [2+2]
6. Draw the axial force, shear force and Bending moment diagram of the given Frame. Indicate also the salient features if any. [14]

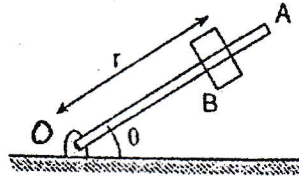


7. Determine the force developed member ED, BD, AB and BC of the given truss. How can we check the determinacy and stability of beam, frame and truss? Explain with suitable examples. [5+3]



8. Define the uniformly rectilinear motion and the uniformly accelerated rectilinear motion? The rotation of the 0.9m arm OA about O is defined by the relation $\theta = 0.15t^2$ where θ is expressed in radians and t in seconds. Collar B slides along the arm in such a way that its distance from O is $r = 0.9 - 0.12t^2$, where r is expressed in meters and t in seconds. After the arm OA has rotated through $\theta = 25^\circ$, determine (a) the total velocity of the collar, (b) the total acceleration of the collar, (c) the relative acceleration of the collar with respect to the arm.

[2+8]



9. Explain the Principle of impulse and momentum. The velocity of the block A is 1.8 m/s to the right at the instant when $r = 0.73$ and $\theta = 30^\circ$. Neglecting the mass of pulley and effect of friction, determine at this instant

[2+8]

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

