

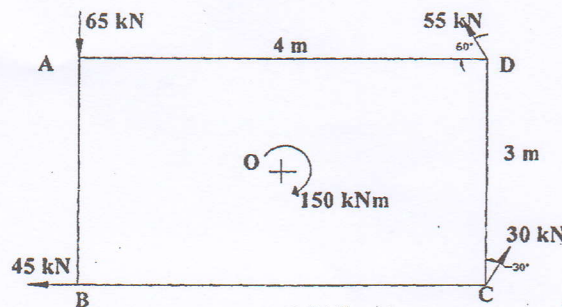
2075 Ashwin

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

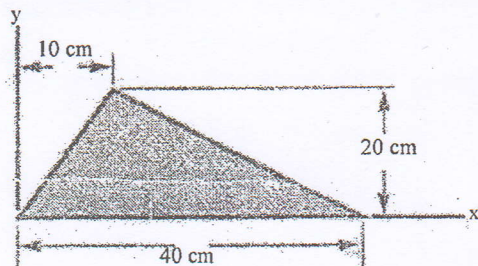
Subject: - Applied Mechanics (CE401)

- ✓ 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.

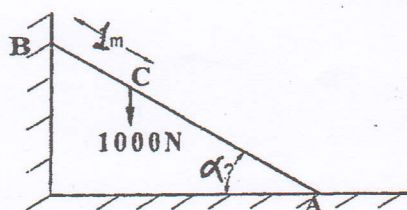
1. Define rigid body. Explain about the principles of Mechanics? [1+2]
2. It is very important to draw free body diagram for the analysis of problem in statics, Explain. Describe about the equations of static equilibrium for 2-D and 3-D analysis of a particle and a rigid body. [3+3]
3. State principle of transmissibility with its limitations. Explain, couple is a free vector. [2+2]
4. Determine the magnitude; direction and position with respect to center 'O' of the resultant of the forces acting on the resultant plate ABCD as shown in the figure below. [8]



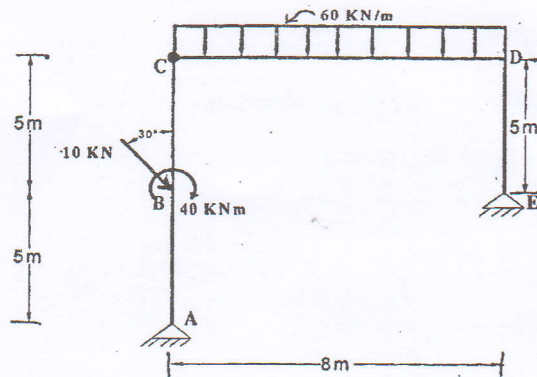
5. Define centroid, centre of gravity and axis of symmetry. Find I_{xx} and I_{yy} for the given triangle about its centroidal axes. [3+9]



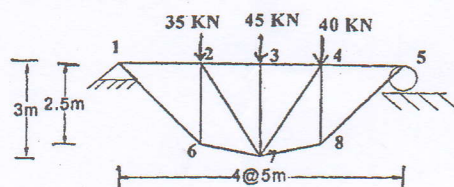
6. A ladder shown in figure is 4m long and is supported by a horizontal floor and a vertical wall. The co-efficient of friction at the wall is 0.3 and at the floor is 0.45. The weight of the ladder is 300N. The ladder supports a vertical load of 1000N at C. Determine the reactions at A, B and C and compute the least value of α at which ladder may be placed without slipping to right. [5]



7. Draw AFD, SFD and BMD for the following structure. Also show salient features, if any. [13]



8. Determine the member forces in the members 26,23,27,67,37. How can we check the determinacy and stability of the plane truss? Explain with examples. [5+4]



9. Define average and instantaneous velocity. Two cars A and E travel along the same straight route. At any time t their distance x_a and x_e from the starting point are given by: [2+8]

$$x_a = 2.5t + 1.2t^2$$

$$x_e = 3t^2 - 0.25t^3$$

Where t in seconds and x_a and x_e are in meters.

- Which car is ahead just after they leave the starting point?
 - At what time are the cars at the same point?
 - At what time is the distance between A and E neither increasing nor decreasing?
 - At what time do A and E have the same acceleration?
10. The resultant of the force applied on a 3kg particle is given by the relation;

$$\vec{F} = (12t\hat{i} - 24t^2\hat{j} - 40t^3\hat{k}) \text{ N. The particle is initially at origin at rest. Determine the}$$

y-component of acceleration, velocity and position at the instant of 3 sec. What do you mean by dynamic equilibrium for a particle?

[7+3]
