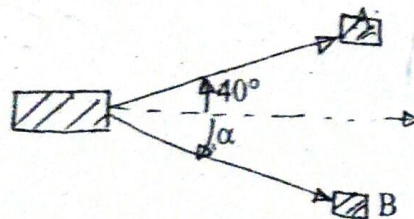


Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCE, BGE, BME	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

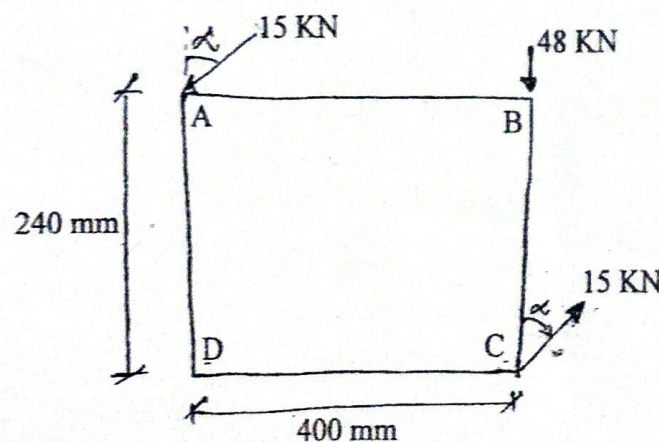
Subject: - Applied Mechanics (CE451)

- ✓ 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.

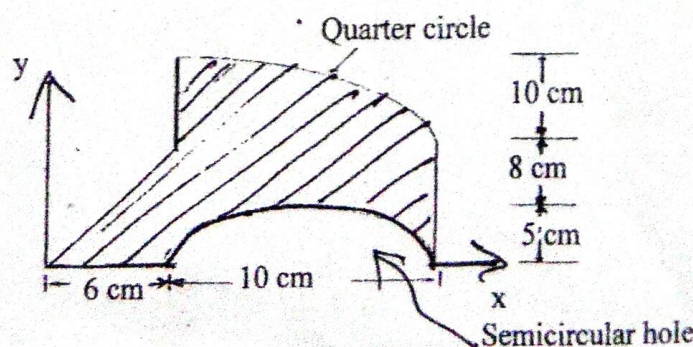
- How does deformable bodies differ from rigid body? What were the assumptions made regarding rigid body for our present study? [3+3]
- A vehicle needs 50 kN to be moved forward by two pullers A and B. Puller A is at 40° to the axis of movement. Compute the value of angle ' α ' for which puller B has to exert minimum force. Also compute the respective values of pull to be exerted. [3+3]



- A rectangular plate is acted upon by the force and couple shown in figure below. The system is to be replaced by a single equivalent force. [11]

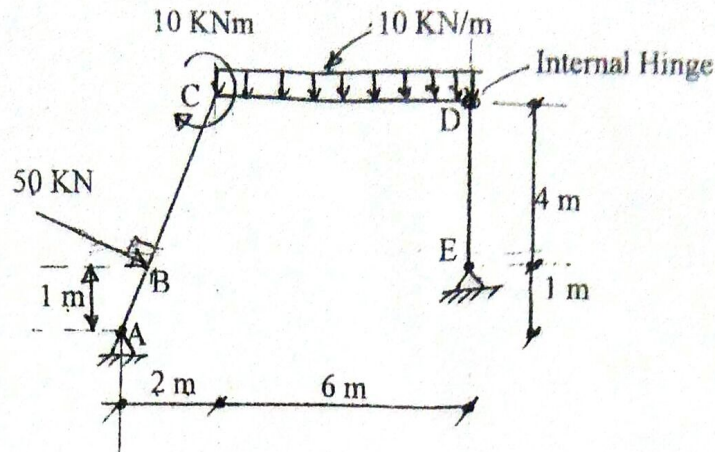


- For $\alpha = 40^\circ$, specify the magnitude and the line of action of the equivalent force
 - Specify the value of α , if the line of action of the equivalent force is to intersect line CD 300 mm to the right of D.
- State and prove the parallel axis theorem for moment of inertia. Find the moments of inertia about the axes through centroid of given shaded area. [4+8]



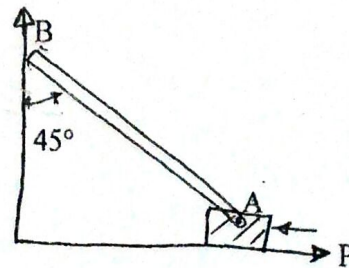
5. Calculate and draw the axial force, shear force and bending moment diagram; with its salient features for the given plane frame.

[13]



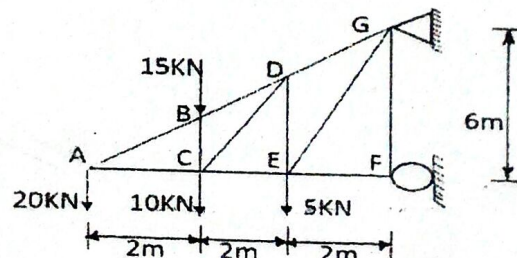
6. A uniform bar AB having length 5 m and weighing 500 N is fastened by a frictionless pin to a block, weighing 200 N as shown in figure below. At the vertical wall, co-efficient of friction is 0.3 while under the block is 0.20. Determine the force P needed to start the motion to the left.

[4]



7. Determine the force developed in members BD, CD, EG and DE of given truss.

[8]



8. The acceleration of a particle is given by the relation $a = 21 - 12x^2$, where a is expressed in m/s^2 and x is in meters. The particle starts with no initial velocity at origin. Determine:
- The velocity when $x = 1.5$ m
 - The position where velocity is again zero
 - The position where velocity is maximum

[10]

9. a) Define dynamic equilibrium and impulse momentum principle for particle.
b) Two blocks in figure are start from rest. The pulleys are frictionless and having no mass. The kinetic coefficient of Friction between the blocks 'A' and the inclined plane is 0.4. Determine the acceleration of each block and tension in each chord.

[2]

[8]

