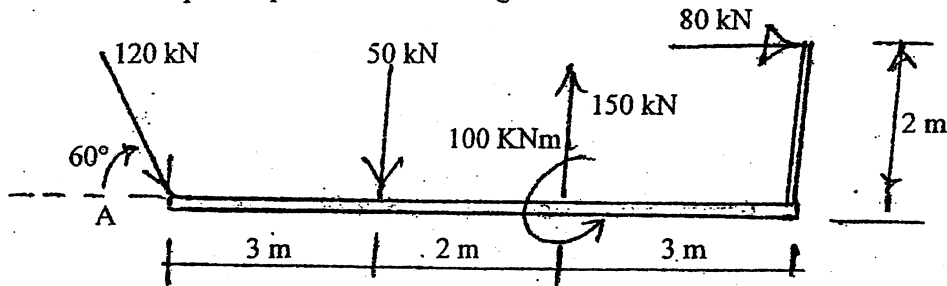


Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, BIE, B. Agri., B.Arch.	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

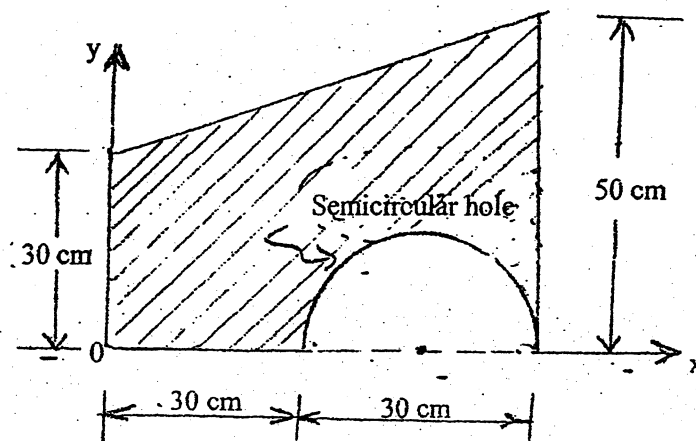
Subject: - Applied Mechanics (CE401)

- ✓ 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. Explain the physical meaning of equilibrium and its application in structural engineering. [4]
2. a) Differentiate between rigid body and deformable body. Also explain the free body diagram. [2+2]
- b) Determine the magnitude, direction and position of the resultant of the system of forces with respect to point A shown in figure below. [12]



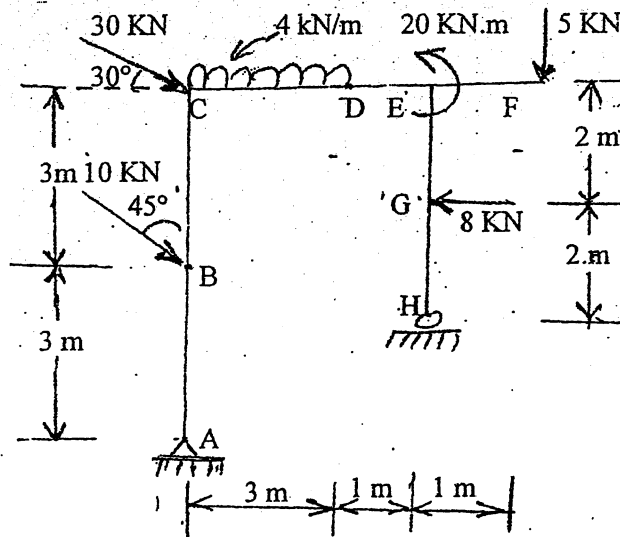
3. State and prove the parallel axis theorem for moment of inertia. Determine the moment of inertia of the given composite area as shown in figure below about its centroidal X-X axis. [4+8]



4. Define friction force and explain condition of tipping and sliding of a block. [1+3]

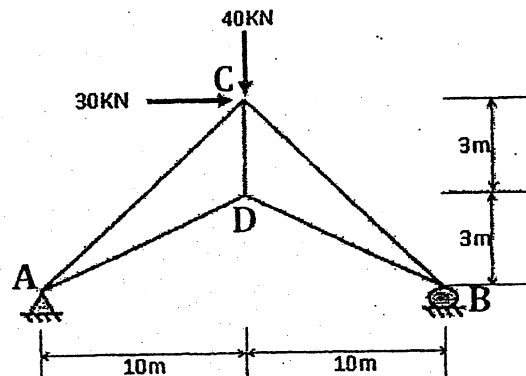
5. Draw AFD, SFD and BMD of the given frame loaded as shown in figure below. Indicate also the salient features if any.

[14]



6. Write down the ideal assumption of truss. Calculate the force developed in all members of the truss loaded as shown in figure by using suitable methods.

[2+8]



7. What do you mean by dependent motion of particles? Illustrate it with suitable example.

A particle starting from origin is subjected to acceleration such that $a_x = -2 \text{ m/sec}^2$ and $a_y = -5 \text{ m/sec}^2$. The initial velocity is 60 m/sec directed at a slope of 30° w.r.t. horizontal. Compute the radius of curvature at the end of 3 sec. Also determine its position at the end of 3 sec.

[3+7]

8. Show that, "rate of change of angular momentum about a point is equal to moment of the force about the same point." The resultant external force acting on a 5 kg particle in space is $\vec{F} = (12t \hat{i} - 24t^2 \hat{j} + 40t^3 \hat{k}) \text{ N}$, where t is seconds. The particle is initially at rest at origin. Determine the x component of acceleration, velocity and position at the instant of 5 sec.

[4+6]
