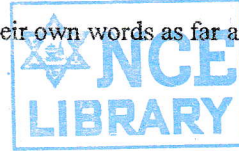


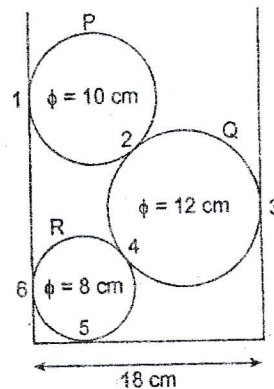
Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCE, BME, BGE, BCH	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

Subject: - Applied Mechanics (CE 451)

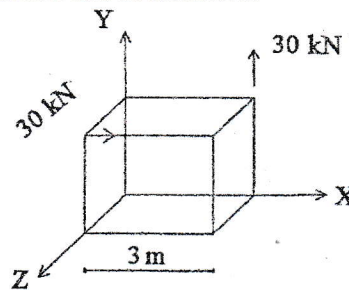
- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.



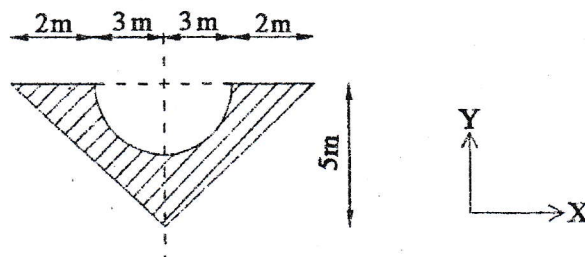
1. "Objects do not necessarily need to be small to be accurately idealized as a particle in the study of mechanics". Justify the statement with suitable example. [4]
2. Define the free body diagram with examples. Compute all the unknown reactions and contact forces from the given figure. Given, weight of P, Q and R are 2 kN, 4 kN and 2 kN respectively. Their diameters are shown in the figure. [2+7]



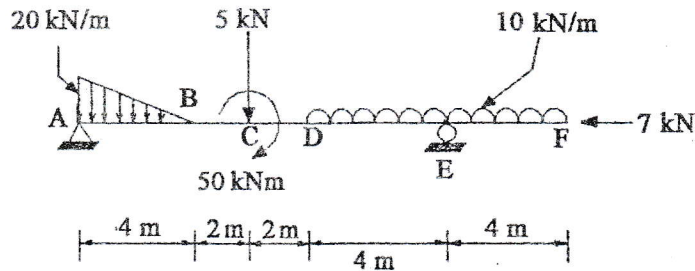
3. Two forces of the same magnitude 30 kN act on a cube of side 3m as shown. Replace the two forces by an equivalent wrench and determine the pitch and axis of wrench. Explain principle of transmissibility of force and its limitation. [7+3]



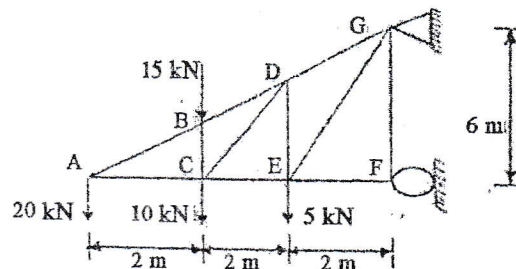
4. a) Determine by method of integration, the centroidal y-distance of a quarter circular area lying on first quadrant. [4]
b) Calculate moment of inertia of the shaded section below about centroidal x-axis only. [8]



5. Show that angle of repose is always equal to angle of friction. Explain impending motion. [3+1]
6. Calculate axial force, shear force and bending moment at various points of overhanging beam and draw AFD, SFD and BMD showing salient features if any. Explain about static determinacy and indeterminacy of frame structure. [10+3]



7. Determine the force developed in members BD, CD, EG and DE of the given truss. [8]



8. Derive an expression to determine motion of particle when acceleration is the given function of time. The motion of particle is defined by position vector $\vec{r} = 3t^2 \vec{i} + 4t^3 \vec{j} + 5t^4 \vec{k}$ where \vec{r} is in meter and t in seconds. At the instant $t = 4$ seconds, find the normal and tangential component of acceleration and radius of curvature. [3+7]
9. Two blocks shown in figure starts from rest. The pulleys are frictionless and have no mass. The kinetic co-efficient of friction between block A and inclined plane is 0.37. Determine the acceleration of each block and tension in each chord. What do you mean by dynamic equilibrium? [8+2]

