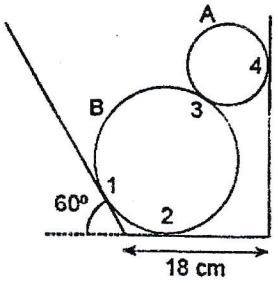
01 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2076 Baishakh

Exam.	Back		
Level	BE	Full Marks	80
Programme	BCE, BGE, BME	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. Differentiate between rigid body and deformable body. Mention Scope of applied Mechanics. [2+1]
2. Define FBD. Two cylinders A and B rest in a channel as shown in figure. The cylinder A has diameter of 10 cm and weighs 200 N whereas the cylinder B has diameter of 18 cm and weighs 500 N. Determine the reaction at all contact points. [2+8]



3. The direction cosines of the line of action of a force with magnitude 200 N passing through point A (2, -2, 2) is (0.5, 0.707, 0.5). Find moment of the force about point P (-2, 2, -2). Define a couple and show that couple is a free vector. [5+4]
4. a) Find the coordinate of center of gravity (CG) of the hatched area shown in Figure 1. [6]
   b) Find the moment of inertia of area in Figure 2 about given coordinate axes using integration technique. [6]

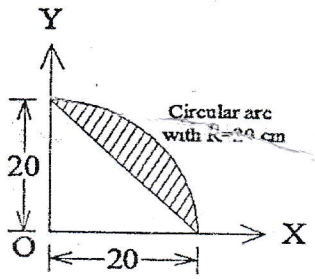


Figure-1

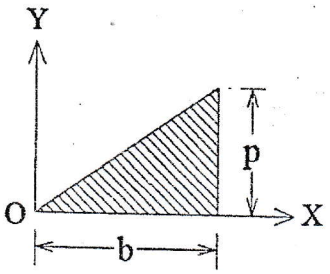
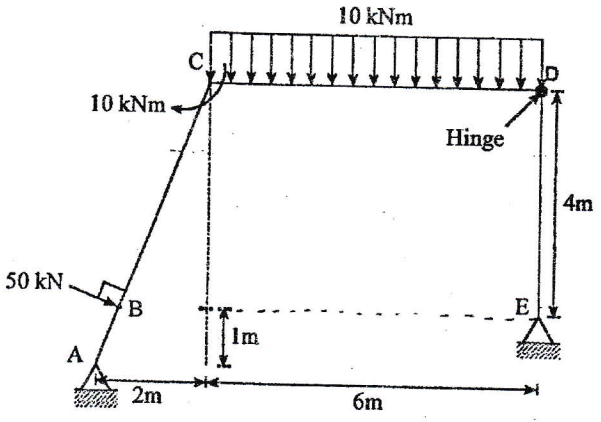


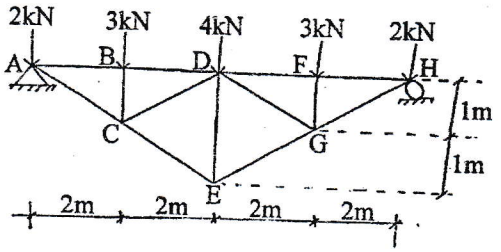
Figure-2

5. Explain the laws of static function. How can we assure the condition of sliding or overturning of a block? [2+2]

6. Calculate and draw the axial force, shear force and bending moment diagram; with its salient features for the given frame. [14]

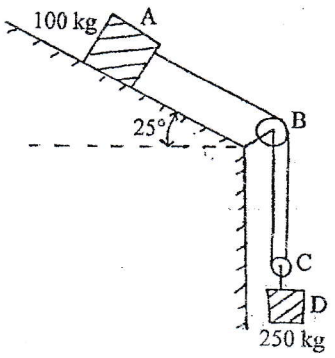


7. Determine the force in members DE, CD, AB and AC for the inverted roof truss shown in figure below. How can we check the determinancy and stability of plane truss? [6+2]



8. The acceleration of a particle is defined by a relation, $a = v^3$. It is known that at time $t = 0$, position is -2m and velocity is 1 m/sec. Find the displacement, position, velocity and acceleration at instant of 0.25 sec. What do you mean by dependent motion of particle? Explain with suitable example. [7+3]

9. What do you mean by dynamic equilibrium? Two blocks in figure starts from rest. The pulleys are Frictionless and having no mass. The kinetic co-efficient of friction between block A and inclined plane is 0.45. Determine the acceleration of each block and tension in each cord. [2+8]



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