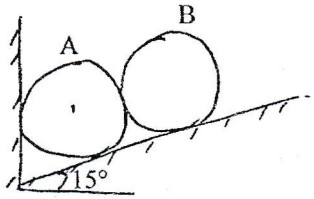
TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Chaitra

Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, BAM, BIE, BAG, BAE, BAS	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

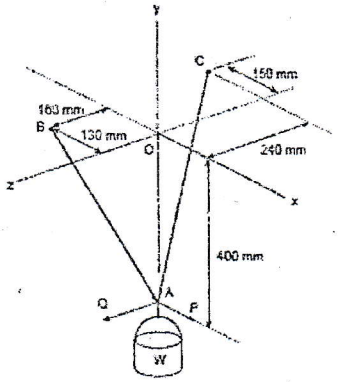
Subject: - Applied Mechanics *(CE 401)*

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

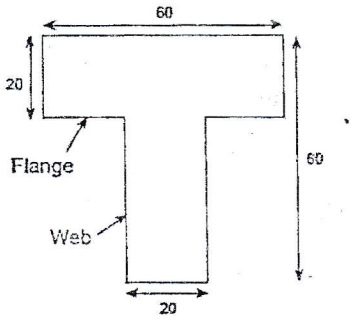
1. Differentiate between particle and rigid body. [2]
2. Determine the forces developed on the contact surfaces of the following body. Neglect the effect of friction. Given: Mass of body A = Mass of body B = 100 kg
   Dimensions of body A = Dimension of body B [9]



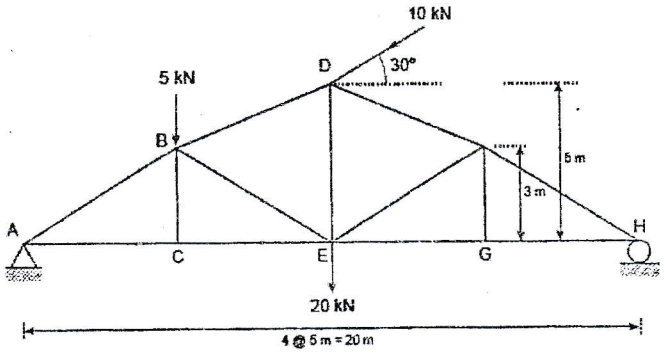
3. A container of weight W is suspended from ring A. Cable BAC passes through the ring and is attached to fixed supports at B and C. Two forces P = Pi and Q = Qk are applied to the ring to maintain the container in the position shown. Knowing that W = 376 N, determine P and Q. [7]



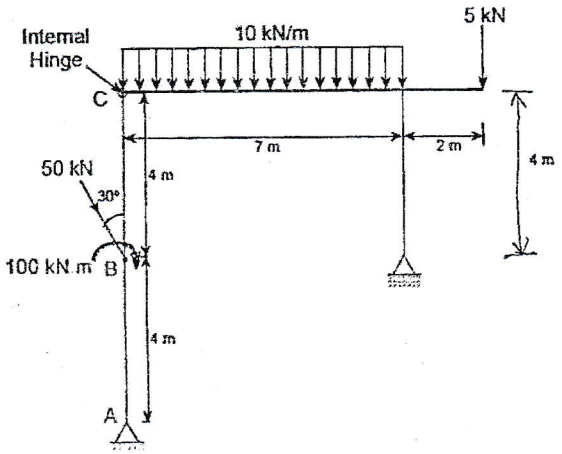
4. State and prove varignon's theorem. [4]
5. Define the angle of friction, impending motion and condition of tipping and sliding of block. [4]
6. Calculate the MOI about centroidal axes. All dimensions in cm. [10]



7. Determine the member force in AB, CE, BE, ED and BD for given truss. [10]



8. Draw AFD, SFD and BMD for the beam loaded as shown in figure. Also show the salient point (if any). [14]

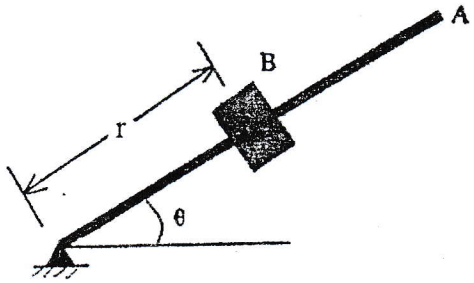


9. Define tangential and normal component of acceleration. The motion of particle is given by the relation $v_x = 2 \cos t$ and $v_y = \sin t$. It is known that initially both x and y coordinate are zero. Determine

   a) Total acceleration at the instant of 2 sec
   b) The equation of path [2+8]

10. What do you mean by the principle of impulse and momentum? The motion of a 1000 gm block B in a horizontal plane is defined by the relations $r = 3(1+\sin 2\pi t)$ and $\theta = 2\pi t$, where r is expressed in metres, t in seconds and θ in radians. Determine the radial and transverse components of the force exerted on the block when [2+8]

    a) t = 0 and
    b) t = 0.5 sec.



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