

Mid-West University
Examinations Management Office
End Semester Examinations 2081

Bachelor level/ B.E. Hydropower/ 1st Semester

Time: 3 hours

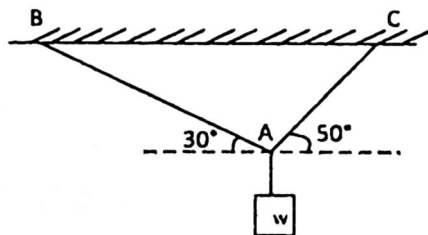
Subject: Applied Mechanics (HE411/HE101/CE101)

Full Marks: 50

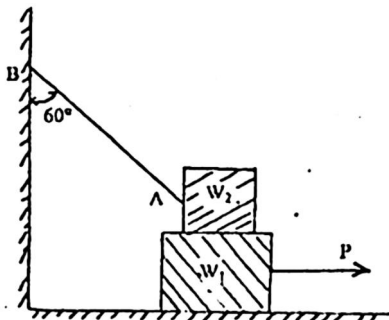
Pass Marks: 25

- Attempt all the questions
- Figures in the margin indicate full marks.
- Assume suitable values, with a stipulation, if necessary.
- Candidates are required to answer the questions in their own words as far as possible.

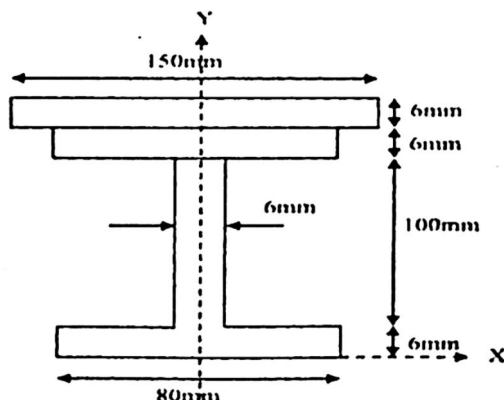
1. Explain rigid body and deformable body with example. (2)
2. Define static equilibrium. Describe equation of static equilibrium for 2D and 3D analysis of particle and rigid body. (4)
3. Determine the largest weight w that can be supported by two wires system as shown in figure. (4)
The stress in either wires is not to exceed 30 N/cm^2 . The cross sectional areas of wires AB and AC are 0.4 cm^2 and 0.5 cm^2 respectively.



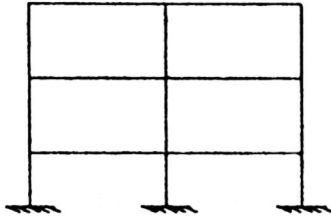
4. A block of weight $W_1 = 839 \text{ N}$ rests on a horizontal surface and supports on top of it another block of weight $W_2 = 539 \text{ N}$ as shown in figure below. The block W_1 is attached to a vertical wall by the inclined string AB. Find the magnitude of the horizontal force P , applied to the lower block as shown, that will be necessary to cause just sliding. The coefficient of static friction for all contact surface is 0.48. (5)



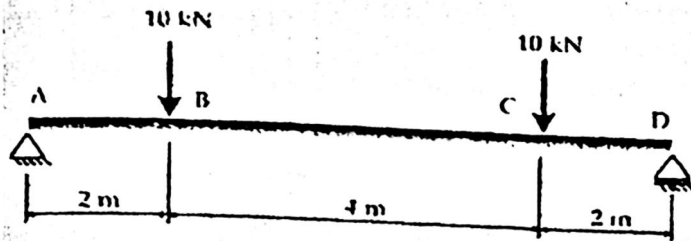
5. Find the MOI about centroidal axis of given composite figure. (5)



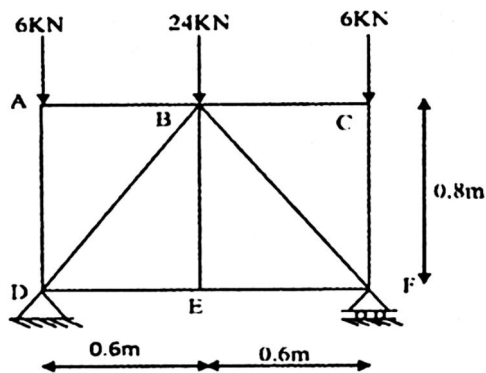
6. What are statically determinate and indeterminate structures? (2)
7. Derive the relationship between load, shear force and bending moment. (4)
8. Determine the degree of static indeterminacy of following system. (3)



9. Calculate shear force, Bending moment for beam subject to loads as shown in figure below, then draw shear force diagram (SFD) and Bending Moment Diagram (BMD). (8)



10. Using the methods of joint, analyze the given truss to determine axial force in each member. (8)



11. A particle moving in a straight line has an acceleration, $a = \sqrt{v}$, its displacement and velocity at time $t = 2$ sec. are $\frac{128}{3}$ m and 16 m/s. Find the displacement, velocity and acceleration at time $t = 3$ sec. (5)

The End