Mid-West University

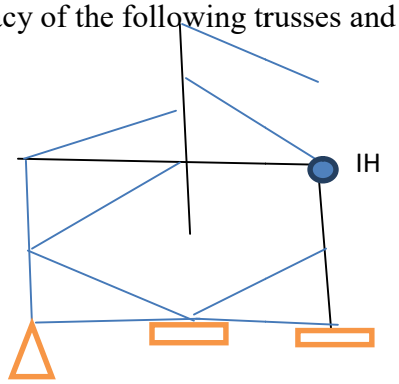
Examinations Management Office

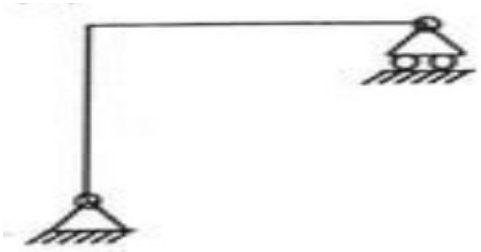
End-Semester Examinations -2080

Bachelor level/ B.E. Civil /3rd Semester — Full Marks: 50
Time: 3 hours — Pass Marks: 25
Subject: Strength of Materials (CE431/CE204)

- *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.*

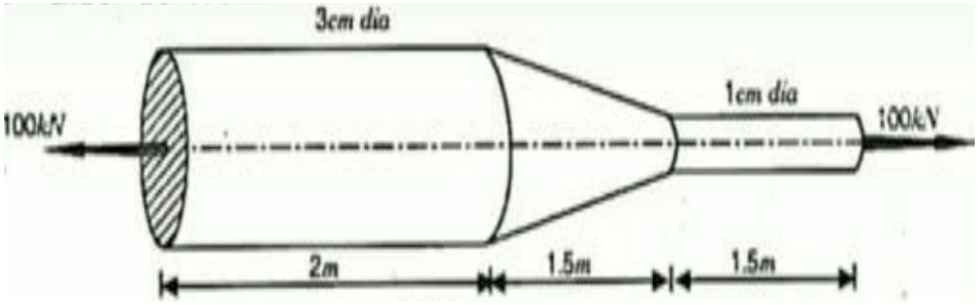
1. (a) Find the stability, determinacy or Indeterminacy of the following trusses and Frames. 4





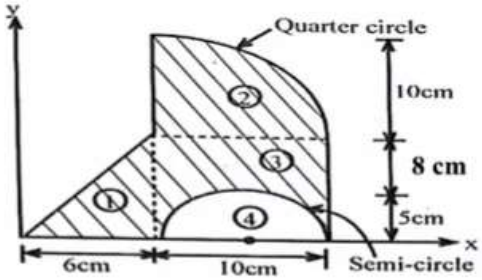
(b) Define stress and Strain. Determine the elongation of bar shown in below figure.

Take E= 2.10x 10^5 N/mm^2 **6**

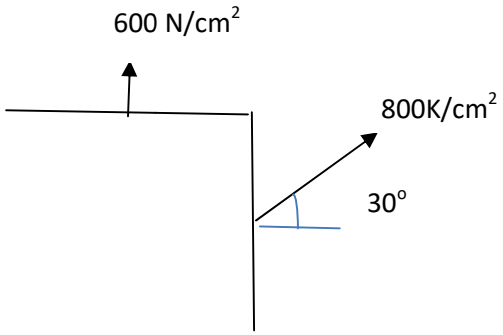


2. (a) Derive the relationship between the Elastic constants, i. e. E, υ and K. The symbols have their useful meanings. **4**

(b) Define Principal Axis? For the section shown in below figure determine the principal moment of inertia and Locate the principal Axis. **6**



3. (a)The intensity of the resultant stress on a plane AB at a point in a material under stress is 800N/cm^2 and it is inclined at 30^o to the Plane AB. The normal components to the Plane BC is 600N/cm^2 at right angle. Determine



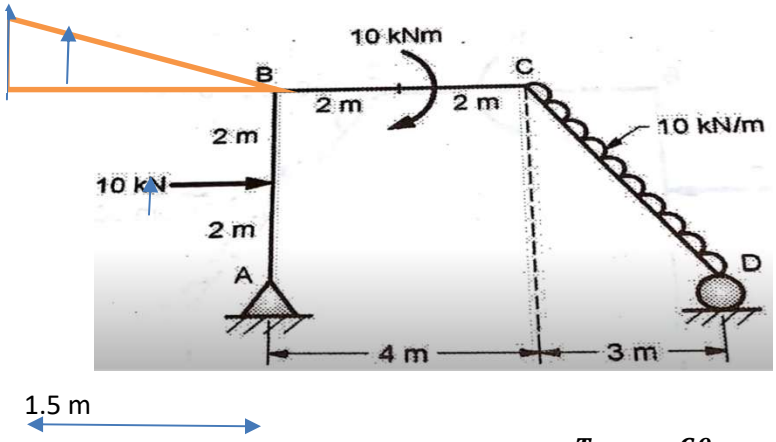
i) Resultant Stress on BC

ii) Principal stress and Their Direction

iii) The maximum stress and Their Plane

(b) Define Point of Contra flexure? Derive the relationship between rate of Loading, Shear force and Bending Moment. **4**

4. (a) Draw Axial force, Shear Force and Bending Moment following given frame. **6**



(b) Derive Torsional Equation with Assumptions $\frac{T}{J} = \frac{q}{r} = \frac{G\theta}{L}$. The symbols have their useful meanings. **4**

5. a) Derive Relationship between Circumferential, longitudinal and radial stress developed in thin cylinder subjected to internal pressure. Differentiate between thin and thick cylinders. **3**

(b) Derive the Euler's formula for critical load for column with one ends Fixed and other end is Free. The symbols have their useful meanings. **4**

(c) A Hollow steel shaft of the 16cm outer diameter and 12cm internal diameter is rotating with a speed of 250rpm. If the permissible shearing stress for the material is 105MN/m2 and maximum torque is 1.9 times the mean torque. Determine the power transmitted by the shaft. **3**

The End