Code No: R22012      **R10**      SET - 1

**II B. Tech II Semester Supplementary Examinations, April/May - 2016**
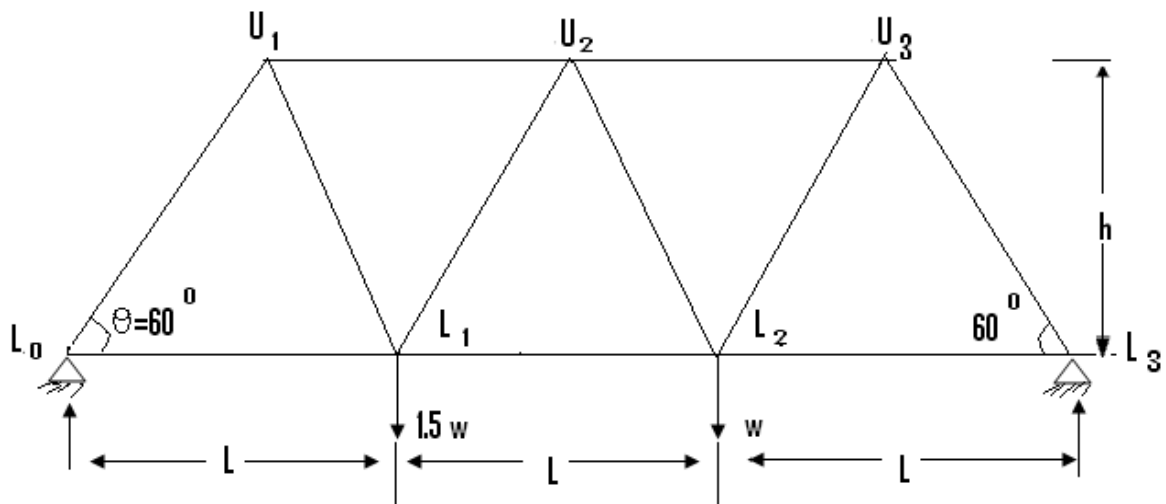**STRENGTH OF MATERIALS**
(Civil Engineering)

Time: 3 hours                        Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. A simply supported beam of span 5 m, carrying a point load of 5 kN at a distance of 3 m from the left end.

   Find      (i) slope at the left support,

                 (ii) deflection under the load and

                 (iii) maximum deflection. Take E= $2 \times 10^5$ N/mm$^2$ and I = $1 \times 10^8$ mm$^4$. Use double integration method.

2. A compound cylinder is made by shrinking a cylinder of external diameter 300 mm and internal diameter of 250 mm over an another cylindrical of external diameter 250 mm and internal diameter 200 mm. The radial pressure at the junction after shrinking is 8 N/mm$^2$. Find the final stresses sent up in the section, when the compound cylinder is subjected an internal fluid pressure of 84.5 N/mm$^2$.

3. Derive an expression for the major and minor principal stresses on an oblique plane, when the body is subjected to direct stresses in two mutually perpendicular directions accompanied by a shear stress.

4. a) Derive the torsion equation from fundamentals T/J =q/r = Nθ/L with usual notation.

   b) A solid steel shaft has to transmit 75 kW at 200 r.p.m., taking allowable shear stress as 70 N/mm$^2$. Find the diameter for the shaft, if maximum torque transmitted at each revolution exceeds the mean by 30%.

|''|'''||''||'''||||

5.  A 1.5 m long column has a circular cross section of 5 cm diameter. One of the ends of the column is fixed in direction and position and the other is free. Taking factory of safety as 3, calculate the safe load using: (i) Rankin's formula, take yield stress is 560 N/mm$^2$ and a = 1/1600 for pinned ends, (ii) Euler's formula, Young's Modulus for is $1.2 \times 10^5$ N/mm$^2$.

6.  A hollow rectangular column of external depth 1 m and external width 1 m is 10 cm thick. Calculate the maximum and minimum stresses in the section of the column if vertical load of 200 kN is acting with an eccentricity of 20 cm.

7.  A beam of rectangular section, 80 mm wide and 10 mm deep is subjected a Bending moment of 12 kN-m. The trace of the plane of loading is included at 45$^o$ to the Y-Y axis of the section. Locate the neutral axis of the section and calculate the maximum bending stress induced in the section.

8.  A truss is loaded as shown in figure. Find the members forces, using method of joints



\*\*\*\*\*

|"|'"||"||'"|||