Dr Saurav

COURSE CODE: 18B11CE315   MAX. MARKS:35
COURSE NAME: ENGINEERING MECHANICS
COURSE CREDITS: 3   MAX. TIME: Two Hours

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.


Q1. A horizontal line PQRS is 12 m long, where PQ = QR = RS = 4 m. Forces of 1000 N, 1500 N, 1000 N and 500 N act at P, Q, R and S respectively with downward direction. The lines of action of these forces make angles of 90°, 60°, 45° and 30° respectively with PS. Find the position of the resultant force from point P.   [4]
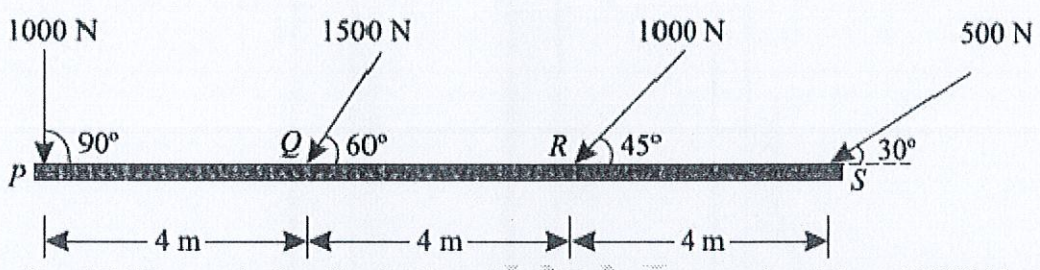
Q2. A string ABCD, attached to fixed points A and D has two equal weights of 1000 N attached to it at B and C. The weights rest with the portions AB and CD inclined at angles as shown in Fig. below. Find the ratio of tensions in the portions AB and CD of the string, if the inclination of the portion BC with the vertical is 120°.   [5]
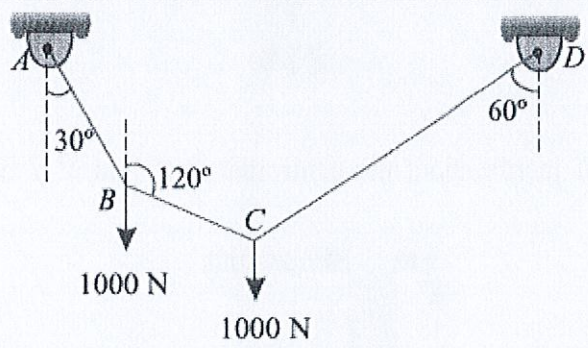

Q3. A cantilever truss is loaded as shown in Fig below. Find the value W, which would produce the force of magnitude 15 kN in the member AB.   [6]
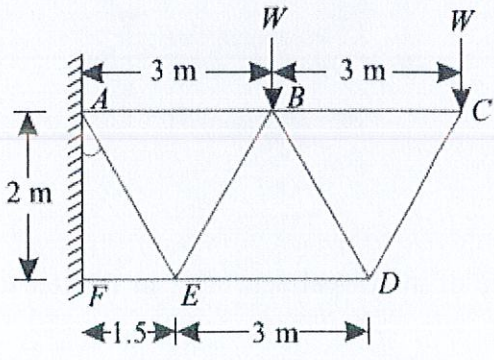
Q4. The extension of a bar uniformly tapering from a diameter of $(d + a)$ to $(d - a)$ in a length L is calculated by treating it as a bar of uniform cross-section of average diameter d. What is the percentage error? **[4]**

Q5. Three bars made of copper, zinc and aluminum are of equal length and have cross section area 5, 7.5 and 10 square cm respectively. They are rigidly connected at their ends. If this compound member is subjected to axial pull of 25 tonnes, estimate the proportion of load carried on each rod and the induced stresses. $E_c = 1.3 \times 10^6$ kg/cm^2 $E_{zinc} = 1.0 \times 10^6$ kg/cm^2 and $E_{al} = 0.8 \times 10^6$ kg/cm^2 **[5]**
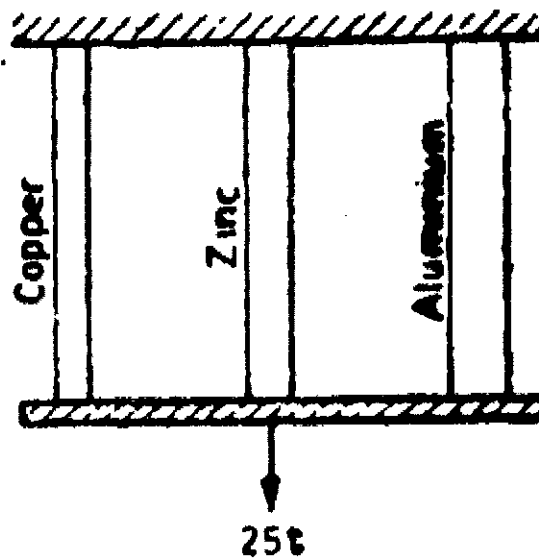
Q6. Find the moment of inertia about the centroidal X-X and Y-Y axes of the angle section shown in Fig. **[8]**
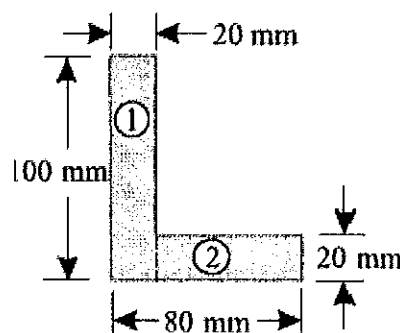
Q7. Draw stress- strain curve of mild steel specimen in tension test. Discuss various salient points on the curve. **[3]**