VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
MID SEMESTER EXAMINATION-2016

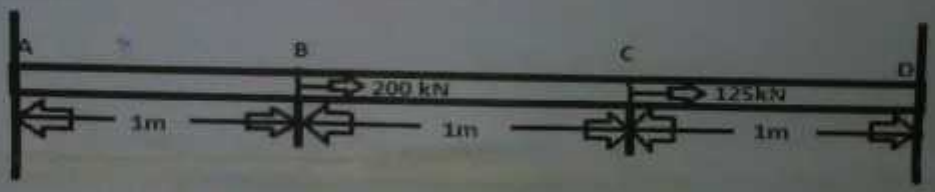
TIME- 2hours | TOTAL-20marks
SEMESTER-4TH PE | SUBJECT- SM

(Answer any four including question no.1)

1. (a) Define stress, strain and elasticity. Derive a relation between stress and strain of an elastic body. 1×5
   (b) What do you mean by statically indeterminate problems and structures?
   (c) What is factor of safety? How is it helpful in design of components and structures?
   (d) Define principal planes and principal stress and explain their uses.
   (e) What is resilience?

2. Two parallel walls 6m apart are stayed together by a steel rod 25mm diameter passing through metal plates and nuts at each end. The nuts are tightened home, when the rod is at a temperature of 100° C. Determine the stress in the rod, when the temperature falls down to 60° C, if 3×5
   (a) the ends do not yields, and
   (b) the ends yield by 1mm Take E= 200GPa and $\alpha = 12\times10^{-6}/^{\circ}C$

3. An aluminium bar 3m long and 2500mm^2 in cross-section is rigidly fixed at A and D as shown in fig.



   Determine the loads shared and stress in each portion and the distances through which the points B and C will move. Take E for aluminium as 80 GPa.

4. The stresses at point of a machine component are 150 Mpa and 50 Mpa both tensile. Find the intensities of normal, shear and resultant stresses on a plane inclined at an angle 55° with the axis of major tensile stress. Also find the magnitude of the maximum shear stress in the component.

5. A steel rod of 20mm diameter passes centrally through a tight fitting copper tube of external dia. 40mm. And both are 300mm of length. The tube is closed with the help of rigid washers of negligible thickness and nuts threaded on the rod. The nuts are tightened till the compressive load on the tube is 50kN. Determine the stress in the rod and the tube, when the temperature of the assembly falls, by 50K. Take E of steel and copper as 200GPa and 100GPa respectively. Take co-efficient of expansion for steel and copper as $12\times10^{-6}K$ and $18\times10^{-6}K$ respectively.