Vellore Institute of Technology

SCHOOL OF MECHANICAL ENGINEERING

CONTINUOUS ASSESSMENT TEST – I - WINTERSEMESTER 2019-2020

Programme Name & Branch: BME

Course Name Code: MEE 2002

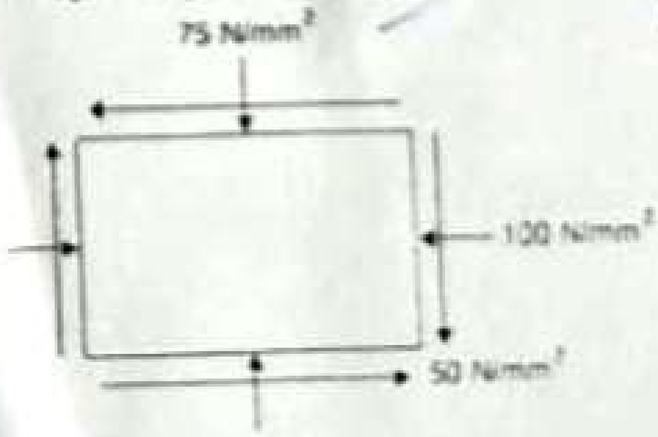
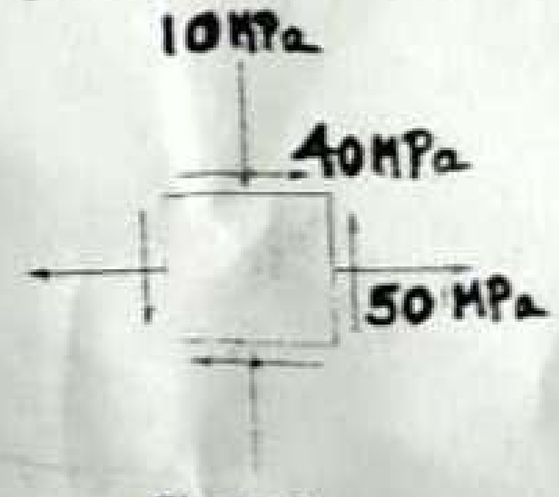
Course Name: Strength of materials

Faculty Name(s): Prof AkashMohanty, Prof. P. Edwin Sudhagar

Class Number(s): VL2019205001586, 1342 **Exam Duration:** 90 mins **Maximum Marks:** 50

General instruction(s): Assume suitable initial guess/data/method if required.

Section – A (5 x 10 = 50 Marks)

Sl.No.	Question
1.	A circular rod of diameter 16 mm and 500 mm long is subjected to a tensile force 40kN. The modulus of elasticity for steel may be taken as 200 kN/mm^2. Find stress, strain and elongationof the bar due to applied load.
2.	A compound bar of length 600 mm consists of a strip of aluminium 40 mm wide and20 mm thick and a strip of steel 60 mm wide × 15 mm thick rigidly joined at the ends. If elasticmodulus of aluminium and steel are 1×10^5 N/mm^2 and 2×10^5 N/mm^2, determine the stressesdeveloped in each material and the extension of the compound bar when axial tensile force of 60kN acts.
3.	A bar of brass 20 mm is enclosed in a steel tube of 40 mm external diameter and 20 mm internal diameter. The bar and the tubes are initially 1.2 m long and are rigidly fastened atboth ends using 20 mm diameter pins. If the temperature is raised by 60°C, find the stresses inducedin the bar, tube and pins. $E_s = 2 \times 10^5 N/mm^2$ $E_b = 1 \times 10^5 N/mm^2$ $\alpha_s = 11.6 \times 10^{-6}/°C$ $\alpha_b = 18.7 \times 10^{-6}/°C$
4.	The state of stress in two-dimensionally stressed body at a point is as shown infigure 1. Determine the principal planes, principal stresses, maximum shear stress and theirplanes.  Figure 1.
5.	For the state of plane stress shown in figure 2. (*a*) construct Mohr's circle, (*b*) determine the principal stresses, (*c*) determine the maximum shearing stress and the corresponding normal stress.  Figure 2