VIT
Vellore Institute of Technology

SCHOOL OF MECHANICAL ENGINEERING

Continuous Assessment Test – I - Fall Semester 2019-2020

Programme Name & Branch: B.Tech – BME

Course Name & Code: MEE2002 –Strength of Materials

Class Number: VL2019201001053, VL2019201001259, VL2019201001827.

Faculty Name: Prof. Anandavel K, Prof. Edwin Sudhagar, Prof. Senthilnathan N

Slot: C2+TC2+V5 **Exam Duration:** 90 mins **Maximum Marks:**50

General instruction(s):

- Answer All Questions
- Indicate the question numbers clearly on the left of margin line in the answer sheet

S.No.	Question
1.	A mild steel rod of 22 mm diameter and 300 mm long is enclosed centrally inside a hollow copper tube of external diameter 30 mm and internal diameter of 26 mm. The ends of the tube and rod are brazed together, and the composite bar is subjected to an axial pull of 35 kN. If the Young's modulus for steel and copper is 200 GN/m^2 and 100 GN/m^2 respectively, find the a) stresses developed in the rod and tube b) extension of the rod.
2.	A metallic bar of 200 mm (x) x 80 mm (y) x 30 mm (z) is subjected to a force of 20 kN(tensile), 25 kN(tensile) and 15 kN(tensile) along x, y, z direction respectively. Determine the change in the volume of the metallic bar. Take Elastic modulus as 2×10^5 N/mm^2 and Poisson's ratio as 0.25.
3	A compound bar is constructed from three bars 50 mm wide by 10 mm thick fastened together to form a bar of 50 mm wide by 30 mm thick. The middle bar is of aluminium alloy and the outside bars are of brass. If the bars are initially fastened at 18 °C and temperature of whole body is then raised to 50 °C, determine the stresses set up in brass and aluminium alloy. E for aluminum alloy and brass is 68 GN/m^2 and 100 GN/m^2 respectively. $\alpha_{Brass} = 18 \times 10^{-16}$ per °C and $\alpha_{Aluminium\ alloy} = 22 \times 10^{-16}$ per °C.
4	An elemental cube is subjected to tensile stress of 60 N/mm^2 and 20 N/mm^2 acting on two mutually perpendicular planes and a shear stress of 20N/mm^2 on these planes. Draw the Mohr's circle of stresses and determine the magnitude and directions of principal stresses, and also the greatest shear stress.
5	Direct stress of 160 N/mm^2 tensile and 120 N/mm^2 compressive stress exists on two perpendicular planes at a certain point in a body. They are also accompanied by a shear stress on the planes. The maximum principal stress at a point due to these stresses is 200 N/mm^2. What must be the magnitude of shearing stresses on the two planes (on which direct stresses act)? What will be the maximum shearing stress at the point?