



Subject (Name & Code): Mechanics of Solids (CIE 1051)

Date of Examination:

Assignment test - III

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Total Marks:

Q. No	Questions	Marks	CO
1	<p>A bronze bar is fastened between a steel bar and an aluminum bar as shown in the fig. Axial loads are applied at the positions indicated. Find the largest value of P that will not exceed an overall deformation of 3.0 mm, for the following stresses: 140 MPa in the steel, 120 MPa in the bronze, and 80 MPa in the aluminum. Assume that the assembly is suitably braced to prevent buckling. Use $E_{st} = 200$ GPa, $E_{al} = 70$ GPa, and $E_{br} = 83$ GPa</p>	5	4
2	<p>A rectangular steel block is 300 mm long in x direction, 200 mm long in y direction, and 400 mm long in z direction. The block is subjected to a triaxial loading of three uniformly distributed forces as follows: 48 kN tension in x direction, 60 kN compression in y direction, and 54 kN tension in z direction. If Poisson's ratio is 0.30 and $E = 210$ GPa, determine the single uniformly distributed load in x direction that would produce the same deformation in y direction as the original loading.</p>	5	4
3	<p>A metal tube of external diameter 25mm and internal diameter 20mm is subjected to an axial load of 30kN. The extension on a gauge length of 75mm is 0.06mm and decrease in outer diameter was 0.006mm. Determine a) Young's modulus of elasticity. b) Poisson's ratio. c) Change in volume if the length of the tube is 0.5m</p>	5	4
4	<p>A steel tube is rigidly fastened between aluminium and bronze rods and the axial loads are applied at the position shown. Find P that will not exceed stress of 80 MPa in Aluminium, 100 MPa in bronze and 150 MPa in steel, given the following details Aluminium : $A = 200$ mm², $L = 1$m; Steel : $A = 400$mm², $L = 2$m Bronze: $A = 500$mm², $L = 3$m</p>	5	4



5	<p>Determine the stress at each section and total deformation for the stepped bar shown below. Take $E_{st} = 200 \text{ GPa}$ and $E_{al} = 70 \text{ GPa}$.</p>	5	4
6	<p>Determine the length of the tapered portion if the total deformation of the stepped bar is equal to 0.35 mm. Take $E = 200 \text{ GPa}$.</p>	5	4
7	<p>A solid cylindrical bar of 25 mm diameter 260 mm long is welded to a tube of 25 mm internal diameter, 140 mm long. The assembly is subjected to an axial tensile load of 60 kN. Determine the thickness of the tube so that;</p> <ol style="list-style-type: none"> The stress in both the segment is same The total elongation of the assembly is equal to 0.30 mm 	5	4
8	<p>A steel stepped bar is loaded as shown in the figure. Determine the maximum stress in each section and total deformation of the bar. Take $E = 200 \text{ GPa}$.</p>	5	4
9	<p>A Stepped rod of circular section is axially loaded as shown in the figure. Calculate the value of modulus of elasticity, if the total extension of the bar is 0.01mm.</p>	5	4



10	<p>A 300mm long stepped bar shown in the figure has enlarged ends of square section 60 mm x 60 mm. If the stress in the middle square portion is 140 N/mm^2, find the size and length of the middle portion so that total extension of the bar is 0.14mm. Bar is subjected to axial tension load of 87.5kN at the ends. Take $E=200 \text{ GPa}$.</p>	5	4