



GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

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Name of Examination : **Winter 2020** - (Preview)

Course Code & Course Name : **ME204U - Strength of Materials**

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Maximum Marks : **60**

Duration : **3 Hrs**

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Answer Key Submission Type: No marking scheme and solution

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

1) All Sub questions are compulsory.

- a) Two solid cylindrical rods AC & CD both of the same alloy ($E = 72 \text{ GPa}$) are welded together at 'C' & subjected for loading as shown in figure. Determine, i) Total deformation of the rod ACD and ii) Displacement of point C. [9]

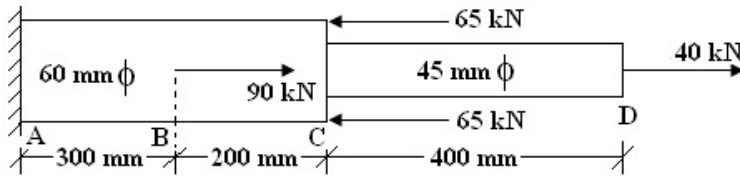


Figure 1.

- b) Following figure shows a punch of 25mm diameter to make a hole in a 10mm thick plate. Find the value of force P required to make hole, if average shear resistance of plate is 320 N/mm^2 . [6]

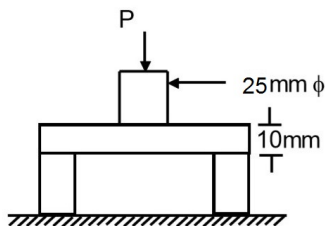


Figure 2.

OR

Define the terms i) Principal Stresses & Planes ii) Bulk Modulus iii) Poisson's ratio [6]

2) All Sub questions are compulsory.

- a) Draw Shear Force and Bending Moment diagram for a beam shown in figure below. [9]

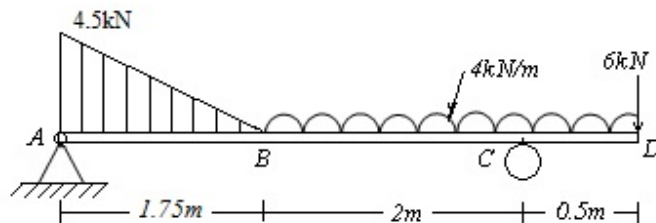


Figure 3.

- b) The Tee section is used as a simply supported beam over a span of 6.75m. The beam carries udl of 5 kN/m over entire span. The flange width is 175mm, web and flange thickness are 15mm and overall depth is 225mm of tee section. Calculate the maximum value of tensile and compressive stresses set up in the cross section. [6]

OR

A masonry dam is 12.5m high. Its width at the top is 1.75m and at bottom is 5.5m. Its water face is vertical and retains the water depth of 11m. Determine the maximum and minimum stress values at the base and draw stress distribution diagram. The self-weight of masonry is 23 kN/m^3 . The specific weight of water is 9.81 kN/m^3 . [6]

3) All Sub questions are compulsory.

- a) Find the slope and deflection for a Simply Supported beam carrying uniformly distributed load $w \text{ kN/m}$ over the entire span by Macaulay's method. [8]
- b) A rod of 15mm length is stretched by 2.75mm under a steady load of 8kN. What would be the stress produced in the same rod by a weight of 785N falling through a height of 60mm on the rod which is initially in the unstressed condition. [7]

4) All Sub questions are compulsory.

- a) Using Euler's formula, calculate the critical stresses for a series of struts having slenderness ratio of 80, 120, 160 and 200 under the following conditions: [9]
- (i) One end hinged & other is fixed, and (ii) Both ends fixed.
- b) Compare the resistance to torsion of a hollow shaft to that of a solid shaft if the inside diameter of the hollow shaft is $2/3$ of the external diameter and the two shafts have the same material and weight and of equal length. [6]

OR

A 600mm long steel cylinder is made up of 4mm thick plates. The inside diameter of the cylinder is 120mm. when it is subjected to an internal pressure of 6.5 MPa , the increase in its volume is found to be 5500 mm^3 . Determine the value of Poisson's ratio and the modulus of rigidity. $E = 205 \text{ GPa}$. [6]

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