Total No. of Questions: 22 Total No. of Pages: 04

Roll No. _____

B.Tech IV sem (Main/Back) Exam April-May 2026
Civil Engg.
4CE4-05 Strength of Materials
Paper Code : 4E1315

Time: 3 Hours **Maximum Marks: 70**

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1 _____ 2. _____

Part A (Answer should be given up to 25 words only)

All questions are compulsory

Q.1	Define proof stress.	
Q.2	What is elastic instability in a column?	
Q.3	Explain the parallel axis theorem.	
Q.4	What is complimentary shear stress?	
Q.5	Illustrate the contraflexure point with suitable example.	
Q.6	Define ductility and hardness of a material.	
Q.7	What is slenderness ratio in a column?	
Q.8	List any two principal methods used for calculating the deflection of beams.	
Q.9	What are the perfect, deficient and redundant frames?	
Q.10	What do you mean by statically determinate and indeterminate beam?	10 x 2 = 20

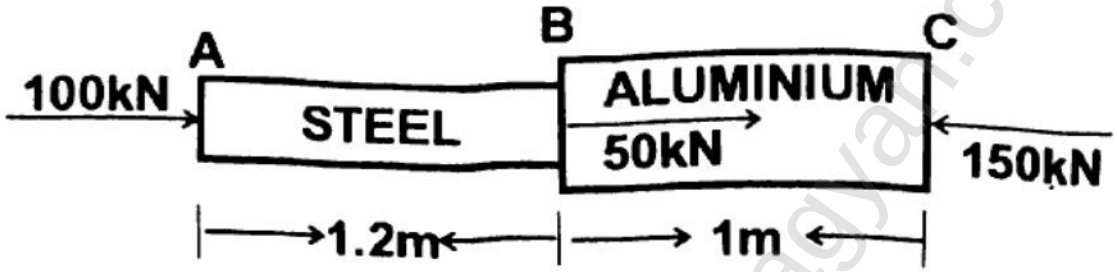
Part B(Analytical/Problem solving questions)

Attempt any Five questions

Q.1 Derive the expression for two perpendicular normal stresses accompanied with state of simple shear.

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Q.2 A member ABC is formed by connecting a steel bar of 20 mm diameter to an aluminium bar of 30 mm diameter, and is subjected to forces as shown in Figure. Determine the total deformation of the bar, taking E for aluminium as 0.7×10^5 N/mm^2 and that for steel as 2×10^5 N/mm^2.



Q.3 Discuss the extension in length of the uniformly tapering circular bar.

Q.4 Discuss the parallel axis theorem and polar moment of inertia. Derive the expression for moment of inertia for a triangular section.

Q.5 What are the equilibrium conditions of a column? Define effective length and discuss Rankine's formula for column.

Q.6 Discuss major and minor principal stresses and draw Mohr's circle for two unlike stresses p_1 and p_2.

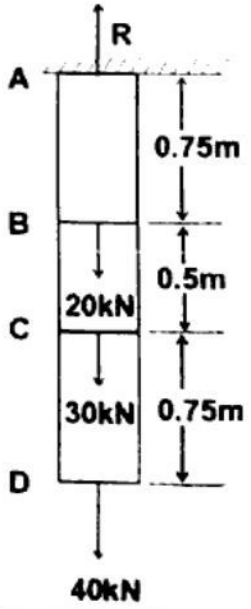
Q.7 Draw the SFD and BMD for simply supported beam when point load applied at center of span L.

5 x 4 = 20

Part C(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

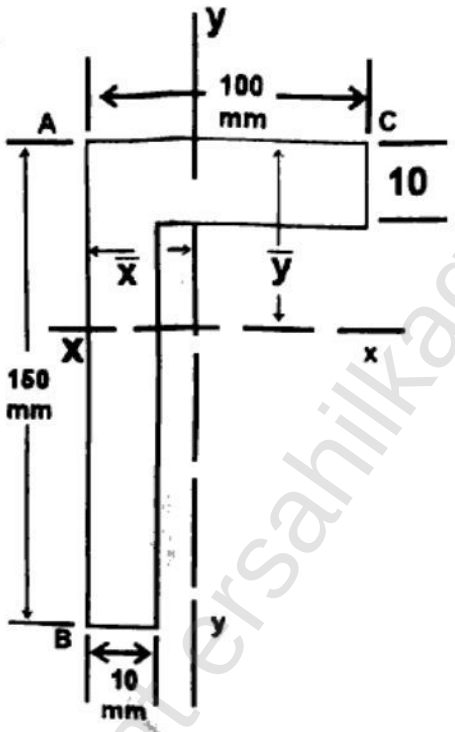
Q.1 A steel bar of 2m length and uniform section of 600 sq. mm is suspended vertically and loaded as shown in figure. Taking E=2.05x103 N/mm^2, determine the total elongation of the bare



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Q.2 Discuss the theory of simple bending in detail and derive the expression for flexure formula

Q.3 Find the moment of inertia and radius of gyration along x-axis and y-axis for an unequal angle section shown in figure.



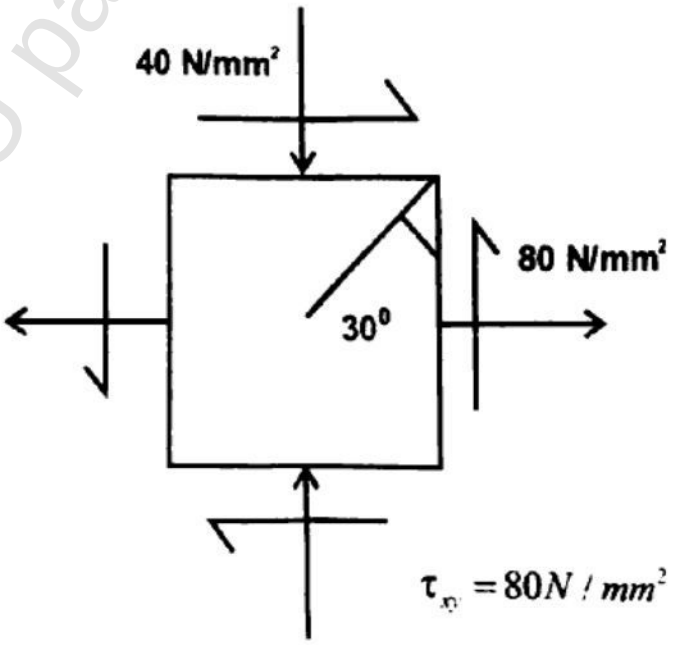
Q.4 For given state of stress, calculate.

a) Normal and shear stress on oblique plane.

b) Principal stress and its location.

c) Maximum Shear stress and its plane.

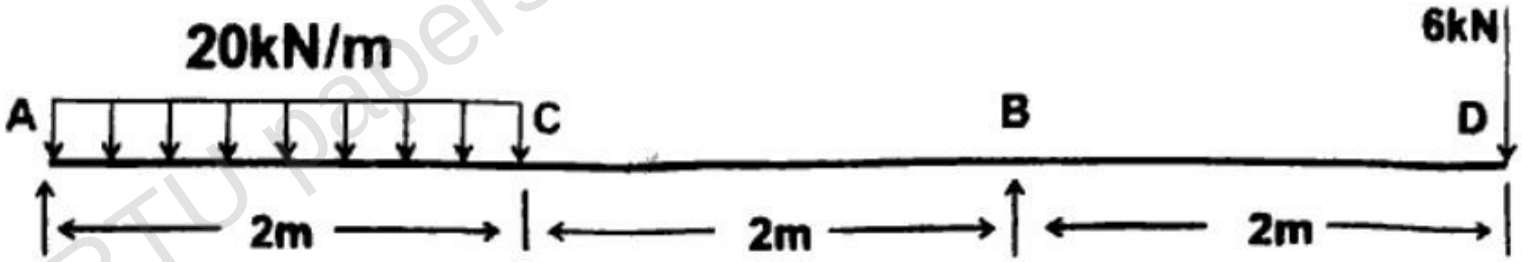
d) Obliquity and resultant stress



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Q.5 Draw the SFD and BMD for an overhanging beam. 3 x 10= 30



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