SP-45

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Seat No.	

S.Y. B.Tech. (Civil Engineering) (Semester - IV) (CBCS) Examination, December - 2023

ESE-CV 401 : STRUCTURAL MECHANICS

Sub. Code : 79112

10526

Day and Date : Wednesday, 27-12-2023 **Total Marks : 70**

Time : 2.30 p.m. to 5.00 p.m.

Instructions :
1) **Question one and five are compuslory and solve and two questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data is necessary and state them clearly.**
4) **Use of non-programmable calculator is allowed.**

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SECTION - I

Q1) a) Explain Obliquity and its formula. **[3]**

b) Find the core or Kernel of Sections in Rectangular and Circular section. **[3]**

c) Draw Influence line diagram for Reactions of Simply supported Beam. **[3]**

Q2) An element in a stressed material has a tensile stress of 400 N/mm^2 and compressive stress of 250 N/mm^2 acting on two mutually perpendicular planes and equal shear stress of 80 N/mm^2 on these planes. Find principal stresses and the position of the principal planes. Find also maximum shear stresses. **[13]**

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Q3) A masonry dam is 4.5 m, 1 m wide at the top and 3.5 m wide at the base retains water to the full height. The water face of the dam is vertical. Determine the extreme pressure intensities at the base. Take Wt. of water and masonry 9,810 N/mm^2 and 22,500 N/mm^3 respectively. Find also the extreme intensities at the base, when the dam is empty. **[13]**

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P.T.O.

Q4) A beam ACB 10 m long is fixed at A and is simply supported at B and is provided with an internal hinge at C 5 m from A. Draw the ILD for the following **[13]**

a) B.M. at A
b) Reaction at B
c) Reaction at A

SECTION - II

Q5) a) Write assumptions made in Euler's theory. **[3]**

b) Explain the suitability of Conjugate beam Method. **[3]**

c) Derive the formula of Power transmitted through shaft. **[3]**

Q6) Compare the crippling loads given by Rankine's and Eulers formulae for tubular strut 2.25.m long having outer and inner diameters of 37.5 mm and 32.5 mm loaded through pin jointed at both ends. Take yield stress as $\sigma c = 315 N/mm^2$ and a = 1/7500, E=200 GPa. **[13]**

Q7) A beam of span 8 m is simply supported at the ends. It carries a U.D.L of 30 KN/m overits entire length and a concentrated load of 60 KN at 3 m from the support A. Determine the maximum deflection in the beam and the location where the deflection occurs by Macaulay's Method. Take $E = 200 \times 10^6$ KN/m^2, $I = 80 \times 10^{-4} m^4$ **[13]**

Q8) Calculate the diameter of the shaft required to transmit 100 KW at 190 r.p.m, if the maximum torque is likely to be exceed the mean by 40% for maximum permissible shear stress of 75 N/mm^2. **[13]**