PVP 20

Code: 20CE3503

III B.Tech - I Semester – Regular / Supplementary Examinations
NOVEMBER 2024

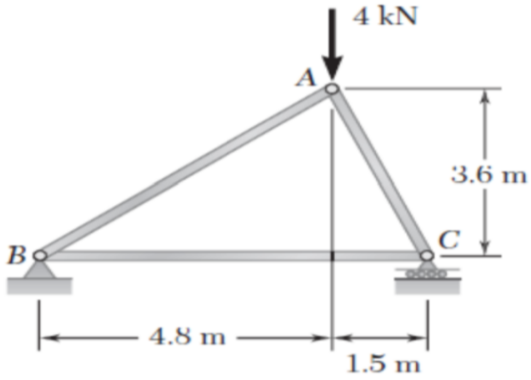
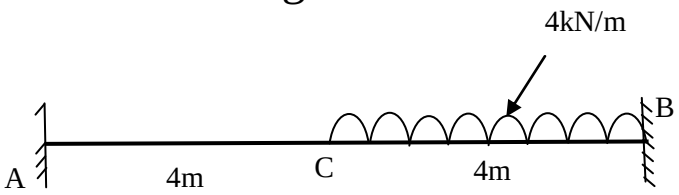
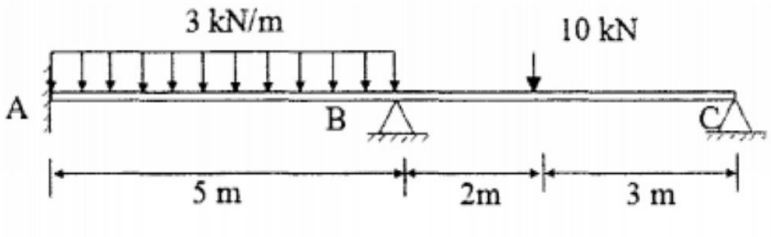
STRUCTURAL ANALYSIS
(CIVIL ENGINEERING)

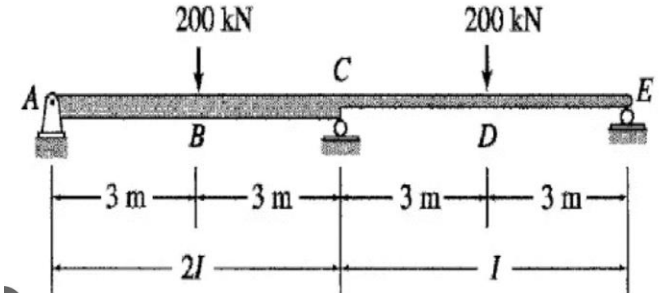
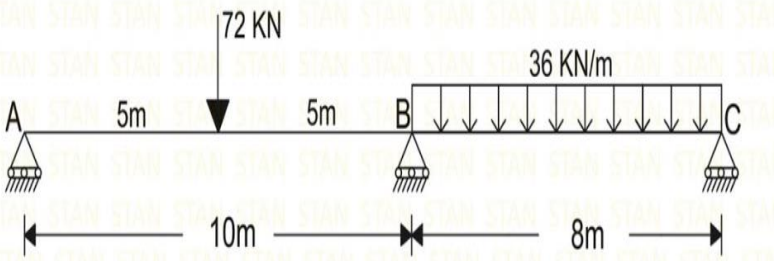
Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	A cantilever beam of length 2 m carries a point load of 20 kN at the free end and another 20 kN at its center. If E= $2x10^5$ N/mm^2 and I= 10^8 mm^4 for the cantilever, determine the slope and deflection of a cantilever at the free end by moment area method.		L4	CO1	14 M
OR					
2	Determine the vertical deflection at joint A of the truss as shown in figure 1. Take E= $2x10^5$ N/mm^2 and sectional area of each member A=$100x10^{-6}$ m^2.		L4	CO1	14 M

	 **Figure 1**			
	UNIT-II			
3	Find the fixed end moments and draw the shear force and bending moment diagrams for the beam shown in figure 2.  **Figure 2**	L4	CO2	14 M
	OR			
4	Analyze the continuous beam shown in figure 3 using slope deflection method and draw shear force and bending moment diagrams.  **Figure 3**	L4	CO2	14 M
	UNIT-III			
5	Analyze the continuous beam shown in figure 4 using moment distribution method and draw	L4	CO3	14 M

	shear force and bending moment diagrams. E is constant.  **Figure 4**			
OR					
6	Analyze the continuous beam shown in figure 5 using Kani's method and draw shear force and bending moment diagrams.  **Figure 5**		L4	CO3	14 M
UNIT-IV					
7	a)	Derive the equation for Euler's crippling load for a column of length '*L*' with one end fixed and other end free, subjected to an axial load of '*P*' at the free end.	L2	CO4	7 M
	b)	A straight circular bar of steel 1 cm diameter and 120 cm long is mounted in testing machine and loaded axially in compression till it buckles. Estimate the buckling load of column, if both ends are pinned take $E=2*10^5$ N/mm^2.	L3	CO4	7 M

	OR			
8	The external and internal diameters of the hollow cast iron column are 5 cm and 4 cm respectively. If the length of the column is 3 m and both its ends are fixed, determine the crippling load using Rankine's formula. Also compare Euler's critical load with Rankine's critical load. Take σ_c=550 N/mm^2, α=1/1600 and E=8 x 10^4 N/mm^2 .	L4	CO4	14 M
	UNIT-V			
9	A cylindrical vessel whose ends are closed by means of rigid flange plates made of steel plate 3 mm thick. The length and the internal diameter of the vessel are 50 cm and 25 cm respectively. Determine the longitudinal and hoop stresses in the cylindrical shell due to an internal fluid pressure of 3 N/mm^2. Also calculate the increase in length, diameter and volume of the vessel. Take E = 2x10^5 N/mm^2 and μ= 0.3.	L4	CO5	14 M
	OR			
10	A steel tube of 300 mm external diameter is to be shrunk on to another steel tube of 150 mm internal diameter. The diameter at the junction after shrinking is 220 mm. The radial pressure at the common junction is 28 N/mm^2. Find the final stresses setup across the section, when compound cylinder is subjected to an internal fluid pressure of 90 N/mm^2.	L4	CO5	14 M