

DEPARTMENT OF CIVIL ENGINEERING

V SEMESTER B.TECH.

End Semester exam

SUBJECT: Analysis of Indeterminate Structures (CIE 3151)

DATE: XX-11-2023

TIME: XX

Q. No		Μ	CO	BL
1a	A two hinged parabolic arch has a span of 12m and rise of 6m. A concentrated load of 20kN acts at 3m from the left support. Calculate the reactions at the support, maximum and minimum bending moment.	5	CO1	3
1b	Develop stiffness matrix for the beam element with one degree of freedom.	3	CO5	6
1c	List out the assumptions made for plastic analysis.	2	CO4	1
2a	Analyse the continuous beam shown in figure by using three moment theorem method. The support <i>B</i> settles by 5mm below <i>A</i> and <i>C</i> . Assume <i>EI</i> to be constant for all members and <i>E</i> = 200 GPa , $I = 8 \times 10^6 \text{ mm}^4$. Draw BMD.	5	CO2	4
2b	Derive the relation between flexibility and stiffness of a material considering the elastic spring example.	3	CO5	6
2c	Define: (a) Relative stiffness, (b) Carry over factor.	2	CO3	1







5a	Determine the structural displacement matrix for the frame shown in the figure using displacement method. 30 kN/m $120 \text{ kN} \xrightarrow{\textbf{B}}_{41} \xrightarrow{1.51}_{41} \xrightarrow{\textbf{8m}}_{\textbf{M}}$	5	CO5	3
5b	A simply supported beam has a span of 15 m and subjected to an UDL of 30 kN/m, 5 m long travelling from left to right. Draw the ILD for shear force and bending moment at a section 6 m from the left end. Use these diagrams for calculating the maximum BM and SF at this section.	3	CO6	4
5c	Illustrate the reason for differentiating the frames as unsymmetrical frames. What mechanisms are used to analyze it?	2	CO4	4