

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

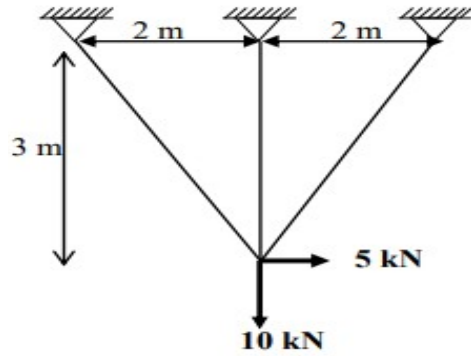
Course: Matrix methods of Analysis Program: M. Tech (Structures) Time: 03 hrs. Instructions:	Semester: I Max. Marks: 100 PAPER-I
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SECTION A

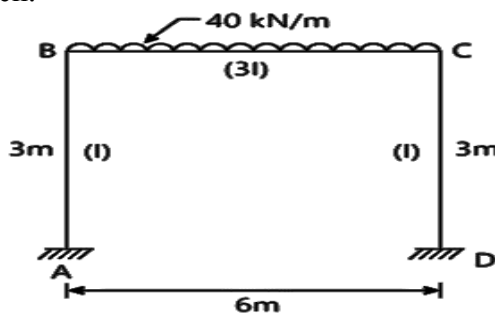
S. No.	Question	Marks	CO
Q.1	State Maxwell reciprocal theorem & its effect is evident in matrix method of structures.	4M	CO1
Q.2	Explain structure & element coordinates with suitable examples.	4M	CO2
Q.3	Obtain the force displacement equation of beam element .	4M	CO3
Q.4	What are Eigen values & Eigen vectors. Explain.	4M	CO4
Q.5	Prove that flexibility is inverse of stiffness matrix.	4M	CO3

SECTION B

Q.6	Using the flexibility matrix , Analyze the beam supported & loaded as shown in Figure below. Assume the flexural rigidity constant. Adopt element approach. <div style="text-align: center; margin: 10px 0;"> </div>	10M	CO3
Q.7	a. Derive the stiffness matrix for two noded truss element of length “L” and axial rigidity “AE” b. How are basic equations of stiffness matrix obtained.	10M	CO2
Q.8	Analyze the pin jointed steel plane truss supported & loaded as shown in figure below. The cross sectional area of each member is 1000mm ²	10M	CO4



Q.9 a. Portal frame ABC is loaded as shown in figure below. It subjects to 40kN/m UDL over span AB. Draw BMD taking EI constant for AB & BC. Use **stiffness method**. Adopt Element approach.



OR

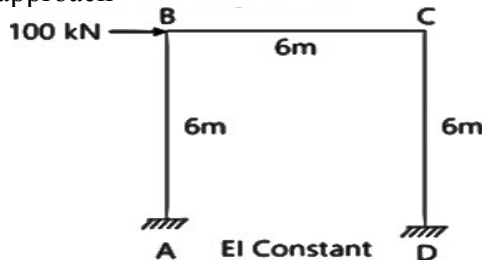
b. Define the stiffness coefficient & derive the stiffness matrix of a space truss element.

10M

CO1

SECTION-C

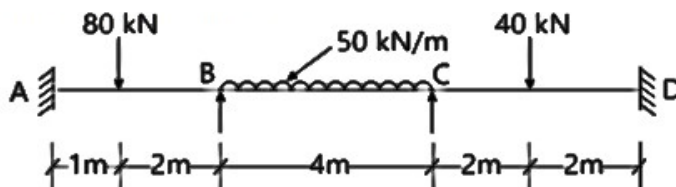
Q.10 Analyze the frame shown in figure below by **flexibility matrix**. Draw B.M.D for the frame. Adopt element approach



20M

CO3

Q.11 Analyze the fixed beam shown in figure below by stiffness method. Adopt element approach

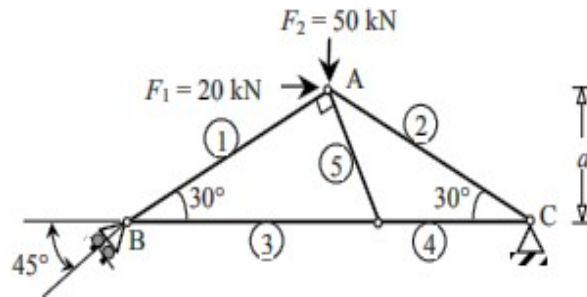


OR

20M

CO1
&
CO2

Q.11	Analyze the pin-jointed truss shown in figure below. Adopt Element approach	20M	CO4
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Max. Marks: 100
PAPER-II

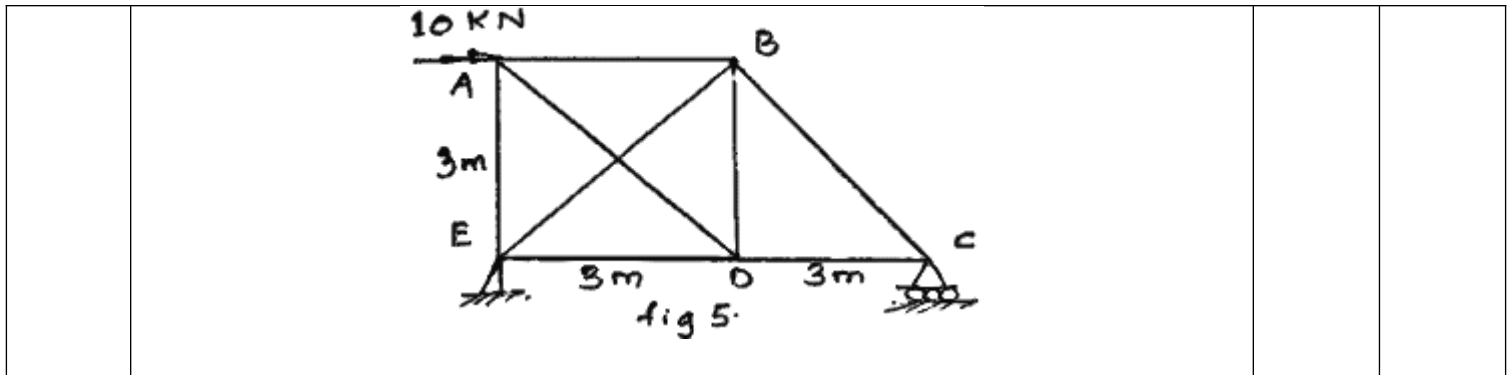
SECTION A

S. No.		Marks	CO
Q.1	List out the difference between flexibility & stiffness methods.	4M	CO1
Q.2	Explain the static & kinematic indeterminacy of structure with examples.	4M	CO2
Q.3	How are basic equations of stiffness matrix obtained.	4M	CO3
Q.4	State the importance of band width & measures to keep it minimum.	4M	CO4
Q.5	Explain the importance of Transformation matrix in Element approach.	4M	CO3

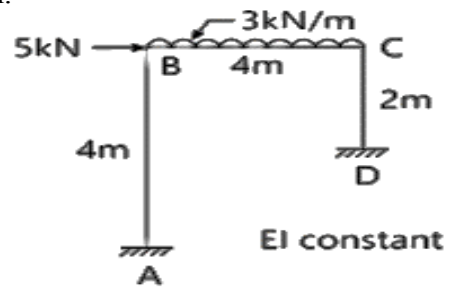
SECTION B

Q.6	Using the flexibility matrix , Analyze the beam supported & loaded as shown in Figure below. Assume the flexural rigidity shown. Adopt element approach	10M	CO3
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Q.7	a. Derive the stiffness matrix for three noded truss element of length “ $3L$ ” and axial rigidity “ $2AE$ ” b. Obtain the force displacement equation of beam element.	10M	CO2
Q.8	Analyze the pin jointed steel plane truss supported & loaded as shown in figure below. The cross sectional area of each member is 1000mm^2	10M	CO4



Q.9 a. Portal frame ABC is loaded as shown in figure below. It subjects to 40kN/m UDL over span AB. Draw BMD taking EI constant for AB & BC. Use **stiffness method**. Adopt Element approach.



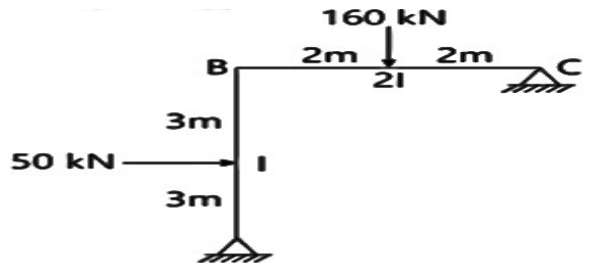
OR

b. Define flexibility coefficient & derive the stiffness matrix of a Grid truss element.

10M CO1

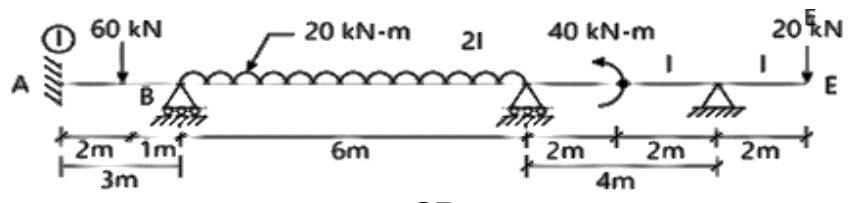
SECTION-C

Q.10 Analyze the bent shown in Figure below by flexibility method. Adopt Element approach.



20M CO3

Q.11 Analyze the fixed beam shown in figure below by stiffness method. Adopt element approach



OR

Q.11 Analyze the pin-jointed truss shown in figure below. Adopt Element approach

20M CO1 & CO2

CO4

