

Name:

Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES  
ONLINE END SEMESTER EXAM, JAN-2021**

**Course: Matrix Methods of Analysis**  
**Program: M. Tech (Structures)**  
**Time: 03 hrs.**

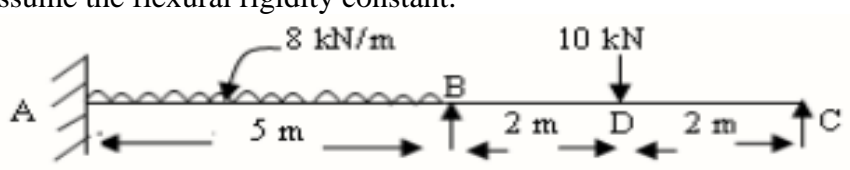
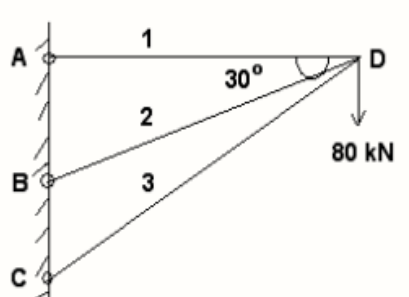
**Semester: I**

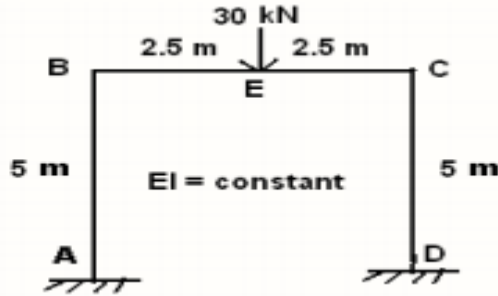
**Max. Marks: 100**

**SECTION A**

S. No.		Marks	CO
Q.1	State Maxwell reciprocal theorem & its effect in matrix method of structures	5M	CO1
Q.2	Explain structure & element coordinates with suitable examples	5M	CO2
Q.3	Prove that flexibility is inverse of stiffness matrix	5M	CO3
Q.4	What are Eigen values & Eigen vectors?	5M	CO4
Q.5	Obtain the force displacement equation of beam element	5M	CO3
Q.6	Explain difference between stiffness & direct stiffness method	5M	CO1

**SECTION B**

Q.7	Using the <b>flexibility matrix</b> , Analyze the beam supported & loaded as shown in Figure below. Assume the flexural rigidity constant. 	10M	CO3												
Q.8	a. Derive <b>the stiffness matrix</b> for two noded truss element of length “L” and axial rigidity “AE” b. How are basic equations of stiffness matrix obtained	10M	CO2												
Q.9	Analyze the <b>pin jointed steel plane truss</b> supported & loaded as shown in figure below. The cross sectional area of each member is 1000mm <sup>2</sup>  <table border="1" data-bbox="747 1365 1218 1575"> <thead> <tr> <th>Member</th> <th>AE</th> <th>L</th> </tr> </thead> <tbody> <tr> <td>AD</td> <td>400</td> <td>400</td> </tr> <tr> <td>BD</td> <td>461.9</td> <td>461.9</td> </tr> <tr> <td>CD</td> <td>800</td> <td>800</td> </tr> </tbody> </table>	Member	AE	L	AD	400	400	BD	461.9	461.9	CD	800	800	10M	CO4
Member	AE	L													
AD	400	400													
BD	461.9	461.9													
CD	800	800													
Q.10	Portal frame ABC is loaded as shown in figure below. It subjects to point load over span BC. Draw BMD taking EI constant for AB & BC. Use <b>stiffness method</b> . Adopt Element approach.	10M	CO1												

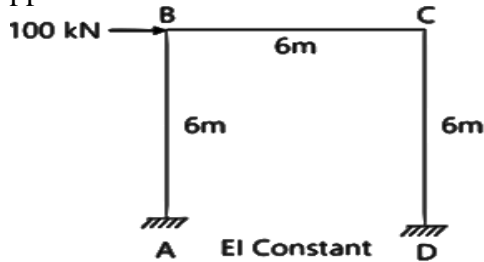


Q.11

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

10M

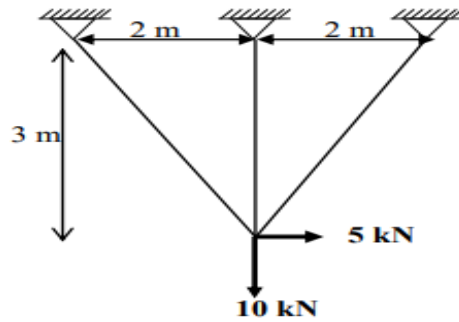
CO2



SECTION-C

Q.12

Analyze the **pin jointed steel plane truss** supported & loaded as shown in figure below. The cross sectional area of each member is  $1000\text{mm}^2$



OR

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

20M

CO4

