UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: Matrix methods of Analysis   **Semester: I**
Program: M. Tech (Structures)
Time: 03 hrs.   **Max. Marks: 100**
Instructions: NA   **CIVL 7003**

SECTION A

S. No.		Marks	CO
Q.1	State Maxwell reciprocal theorem & its effect in matrix method of structures	4	CO1
Q.2	Explain structure & element coordinates with suitable examples	4	CO2
Q.3	Prove that flexibility is inverse of stiffness matrix	4	CO3
Q.4	What are Eigen values & Eigen vectors ?	4	CO4
Q.5	Obtain the force displacement equation of beam element	4	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	10	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 ?	10	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	10	CO4

Q.9	a. Portal frame ABC is loaded as shown in figure below. It subject to point load over span BC. Draw BMD taking EI constant for AB & BC. Use **stiffness method**. Adopt Element approach.	10	CO1
	OR		
	b. Define the stiffness coefficient & derive the stiffness matrix of a space truss element.		

SECTION-C

Q.10	Analyze the frame shown in figure below by **flexibility matrix**. Draw B.M.D for the frame. Adopt element approach	20	CO3
Q.11	Analyze the overhang beam shown in figure below by stiffness method. Adopt element approach	20	CO1 & CO2
Q.11	**OR** Analyze the pin-jointed truss shown in figure below. Adopt Element approach		
		2	CO4