

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATIONS-2024

M.Tech-I Semester (SE)

COURSE CODE (CREDITS) : 13M1WCE131(3)

MAX. MARKS: 15

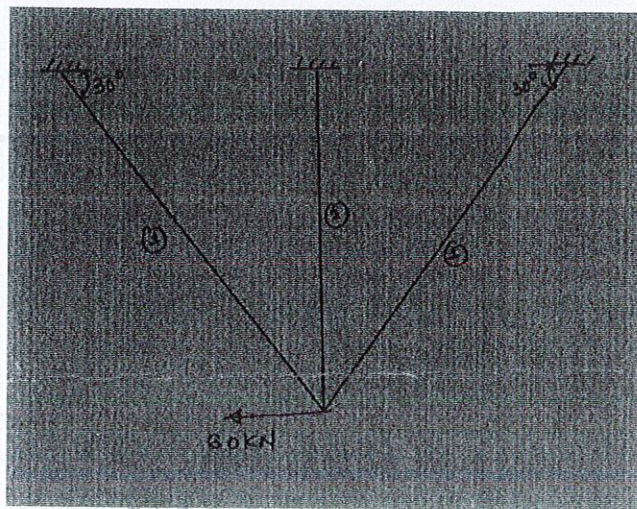
COURSE NAME: FINITE ELEMENT METHOD

COURSE INSTRUCTORS: DR. SAURAV

MAX. TIME: 1 Hour

*Note: All questions are compulsory. Marks are indicated against each question in square brackets.*

**Q1.** Using the concept of potential energy, compute the values of the forces in the members of the truss as shown in the Fig. 1. For member 1  $AE=2$  and for member 2  $AE=4$ . [5]



**Fig. 1**

**Q2.** Flexibility matrix is always symmetrical about its leading diagonal. Explain this statement with proper justification. [2]

**Q3.** What do you mean by degree of freedom of a member? With the help of a fig explain various degrees of freedom of a space frame member. Deduce direct stiffness matrix for a space frame member. [5]

**Q4.** The following vector acting on a plane truss member is defined in member coordinate system. If the member axis makes an angle of  $30^\circ$  with the structure axis then define the vector in the structure coordinate system. If the member axis makes an angle of  $30^\circ$  with the structure axis, then define the vector in the structure coordinate system [3]

$$\{A_M\} = \begin{Bmatrix} 2 \\ 1 \\ 1 \\ 2 \end{Bmatrix}$$