JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

MAKEUP EXAMINATION- 2025

M.Tech 1st Semester (SE)

COURSE CODE (CREDITS): 25M1WCE114 (3) MAX. MARKS: 25

COURSE NAME: FINITE ELEMENT METHODS

COURSE INSTRUCTORS: DR SAURAV MAX. TIME: 1 Hour 30 Min

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c)Use of Non Programmable Scientific Calculator is allowed

Q.No	Question	CO	Marks
Q1	The following vector acting on a plane truss member is defined in member coordinate system. $\{A_M\} = \begin{Bmatrix} 1 \\ 1 \\ -1 \\ 1 \end{Bmatrix}$ If the member axis makes an angle of 30^0 with the structure axis, then define the vector in the structure coordinate system.	2	5
Q2.	Deduce the expression to compute strain displacement matrix [B] for a beam element.	2	5
Q3.	Determine the shape functions for a three noded bar element with natural coordinate system as shown in Fig. 1  **Fig. 1**	3	5

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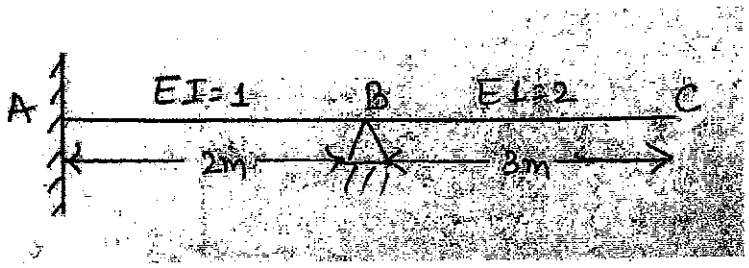
Q4.	Find the direct stiffness matrix for the continuous beam as shown in the Fig 2. EI for the beam AB = 1 and for the beam BC= 2  **Fig. 2**	3	5
Q5.	Explain the following terms clearly i) Nodes, primary nodes, secondary nodes and internal nodes ii) Local coordinates, global coordinates, natural coordinates and area coordinates. iii) Higher order elements and lower order elements. iv) Linear strain triangle (LST) v) Serendipity family members	3	5