[Total No. of Questions: 08] [Total No. of Pages: 2]
Uni. Roll No. ….....

Program / Course: M. Tech.
Subject: Finite Element Analysis

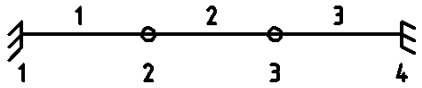
Paper ID: E0852

Time Allowed: 03 Hours Max. Marks: 100

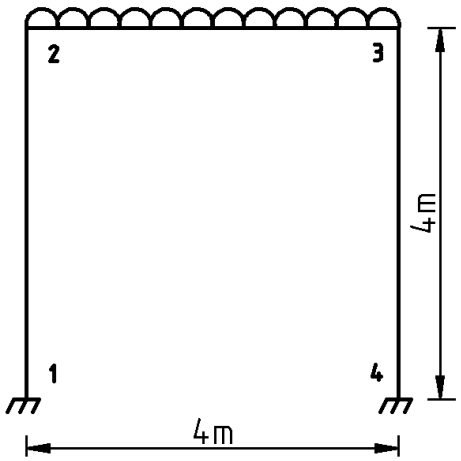
Note:

1. Attempt any five questions.
2. Any missing data may be assumed appropriately

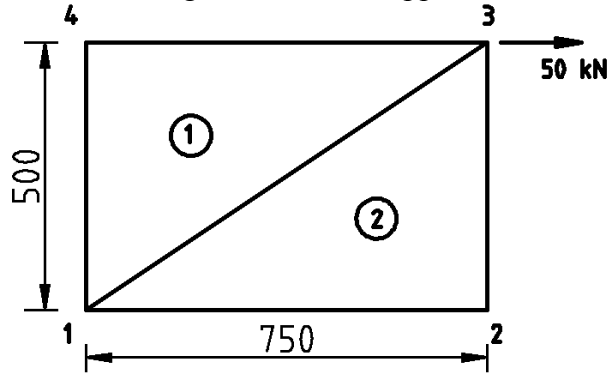
Q1. Find the displacements of nodes and the reactions at supports. A force of 20 kN is applied in the positive x direction at node 2. The length of each element is 750 mm. Let E (Young's modulus of Elasticity) = 200 kN / mm^2 and A (Area) = 600 mm^2 for elements 1 and 2, and let E = 100 kN / mm^2 and A = 1200 mm^2 for element 3. Nodes 1 and 4 are fixed. X axis is positive towards right. 20



Q2. Find displacements for the rigid plane frame shown below, using beam element. The frame is fixed at nodes 1 and 4, Uniformly Distributed Load on horizontal member is 40 kN/m (acting downward). The size of vertical members is 300 mm x 450 mm and that of horizontal member is 300 mm x 600 mm. Take E as 20 kN / mm^2 . 20



Q3. Find the element stresses in structure shown below, when horizontal displacement at node 2, horizontal and vertical displacements at node 3 are 0.537 mm, 0.118 and -0.010 respectively. The structure has been idealised into two CST elements having plane stress condition. Take μ = 0.25, E = 200 kN / mm^2 , Thickness = 15mm. Supports at Node 1 and 4 are hinges, while at 2 support is roller. 20



Q4.	Write down advantages and disadvantages of Finite Element Method. Explain procedure of analysis by Finite Element Method.	20
Q5.	Name various methods to derive stiffness matrix and explain any two methods in detail.	20
Q6.	Discuss three classes of displacement function for plate bending problems. What is Selective / Reduced Integration and how it affect behaviour of Plate Element.	20
Q7.	Review four popular software related to Finite Element Analysis, with respect to their popularity, capability, user-friendliness, affordability.	20
Q8.	Write down i) Convergence requirements, ii) Compatibility requirements and iii) Geometric Invariance for displacement function.	20

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