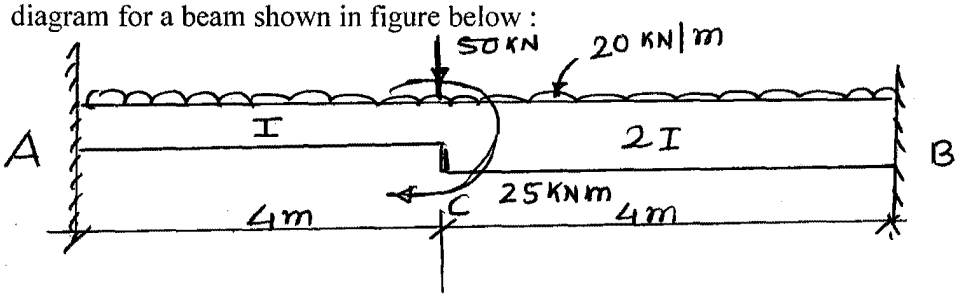
1T02212 - M.E.Civil Engg. Structural Engg Subject (Sem. II)(Choice Base) / 33301 - Finite Element Analysis.
(Revised Course)

(3 Hours) (Total Marks : 80)

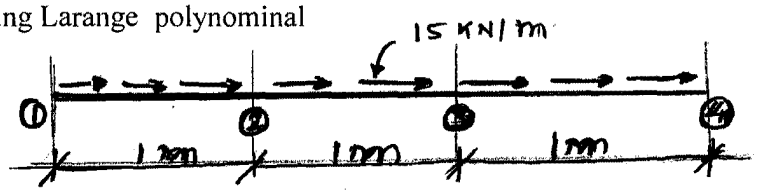
N.B.
1 Question No. 1 is compulsory.
2 Attempt any three question out of remaining five
3 Figures to the right indicate full marks.
4 Assume any suitable additional data if required
5 Draw neat sketches wherever required.

Q. No. 1
a) Explain C , C and C type continuity element. 4
b) The use of Pascal's triangle in FEM 4
c) Convergence and compatibility requirement of a finite element. 4
d) Use of Jacobean Matrix in FEM 4
e) The use of transformation matrix in FEM 4

Q. No.2 Determine unknown DOF , support reaction and draw shear force bending diagram for a beam shown in figure below : 20

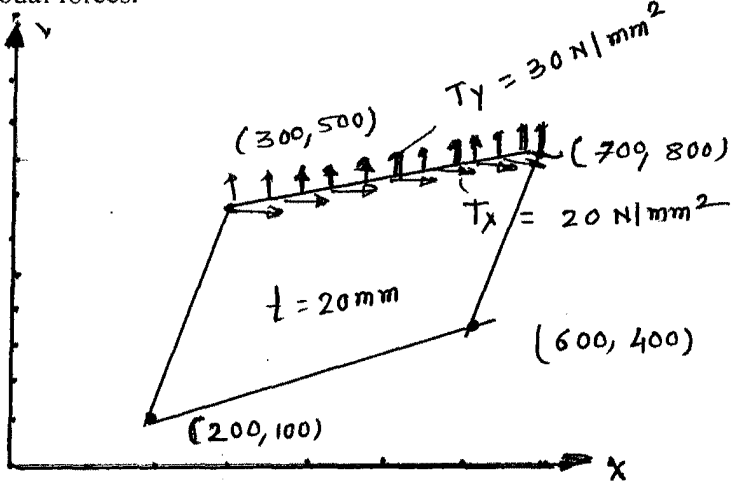


Q. No. 3
a) Determine equivalent nodal loads due to 15 kN/m length as shown fig using Larange polynominal 12



b) Derive dynamic equilibrium equation considering Hamiiton's Principle 08

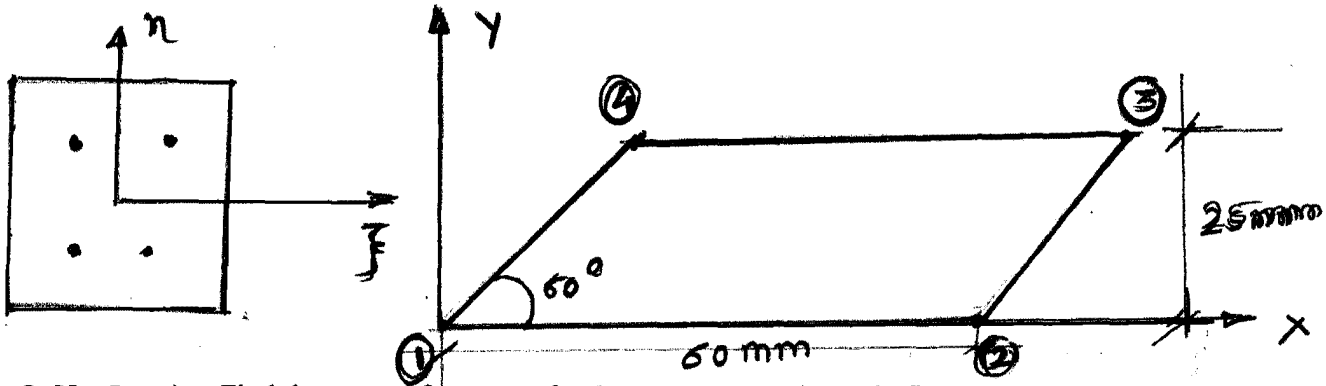
Q. No. 4
a) The quadrilateral element shown in fig is 20 mm thick and is subjected to surface force Tx and Ty . Determine expressions for its equivalent nodal forces. Tx =20 N/mm^2 and Ty =30 N/mm^2 determine the numerical values of the nodal forces. 12



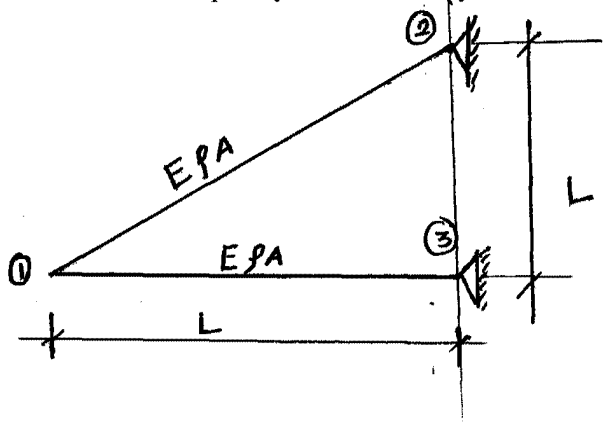
ALL LINEAR DIMENSIONS IN MM

TURN OVER

b) Assemble Jacobian matrix and strain displacement matrix corresponding to the Gauss point (0.57735, 0.57735) for the element shown in fig. 08

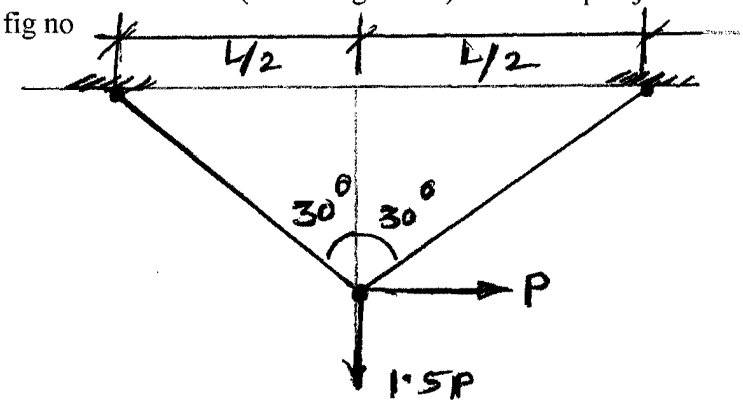


Q. No. 5 a) Find the natural frequency for the truss system shown in fig. 12



b) Starting with shape function of beam element derive geometric stiffness matrix for a 2-noded beam element. 08

Q. No. 6 a) Determine the critical load (buckling load) for the pin jointed frame shown in fig no 12



b) Derive shape functions for a 9-noded Lagrangian , 2- D element and show them by graphical representation. 08