DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD -402 103
Regular Summer Semester Examination 2022 (M.Tech) II-Sem

Branch: M.Tech. (Civil Engineering with Specialisation in Structural Engineering)   Sem.:- II
Subject with Subject Code: CVSE202: Finite Element Method   Marks: 60
Date:- 18/10/2022   Time:- 3 Hr.

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Instructions to the Students

1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

(Marks)

Q.1 (a) State various approximate methods of analysis and explain any one in details.   **(04)**

Q.1 (b) Explain merits and demerits of Finite Element Method.   **(04)**

Q.1 (c) Explain method of point collocation under approximate methods of analysis.   **(04)**

Q.2 (a) What do you understand by transformation matrix? Obtain transformation matrix for truss element.

(04)

Q.2 (b) Analyse the rigid jointed plane frame as shown in figure 1 using FEA. Assemble element equations, global equations and introduce the boundary conditions. Use $E = 200\ GPa, I = 8 \times 10^6\ mm^4$.   **(08)**
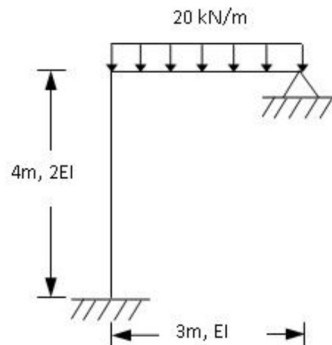

Figure 1

Q.3 (a) Explain stepwise the finite element formulation of CST element for Plane stress and Plane strain analysis.   **(06)**

Q.3 (b) Derive and Explain with neat diagrams, linear interpolation function for one dimensional line element using generalized factorial polynomial. Explain the same formulation using Lagrangian polynomial.

(06)

Q.4 (a) A simply supported beam of span 6 m, depth 0.45 m and width 0.23 m is subjected to a point load of 100 kN at mid span and vertically downward udl of 50 kN/m^2 over entire span. Draw finite element analysis

model, if the beam is to be analysed under plane stress condition using Seven number of four noded rectangular elements. Draw and show the equivalent loads at nodal points. **(08)**

Q.4 (b) What do you understand by static condensation? Explain static condensation procedure in details. Explain applications of the static condensation. **(04)**

Q.5. What do you understand by iso-parametric element? Explain necessity of iso-parametric element. **(12)**

Q.6 (a) Explain desirable requirements of the shape functions. **(06)**

Q.6 (b) Explain in detail the 'h-version' and 'p-version' of FEM. **(06)**