Finite Element Analysis & Simulation (New)
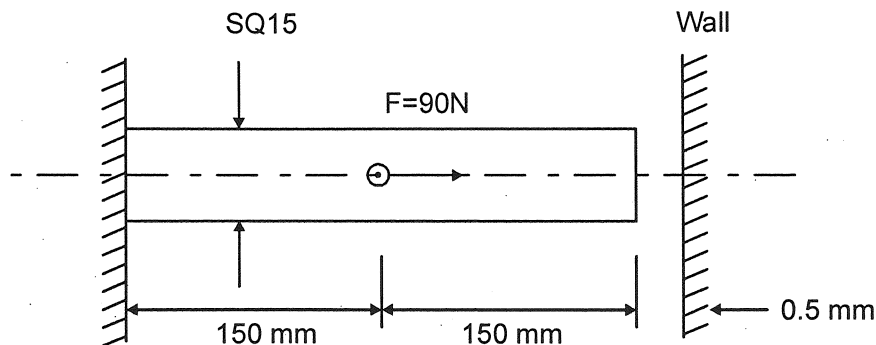## (1280)

P. Pages : 3

Time : Four Hours

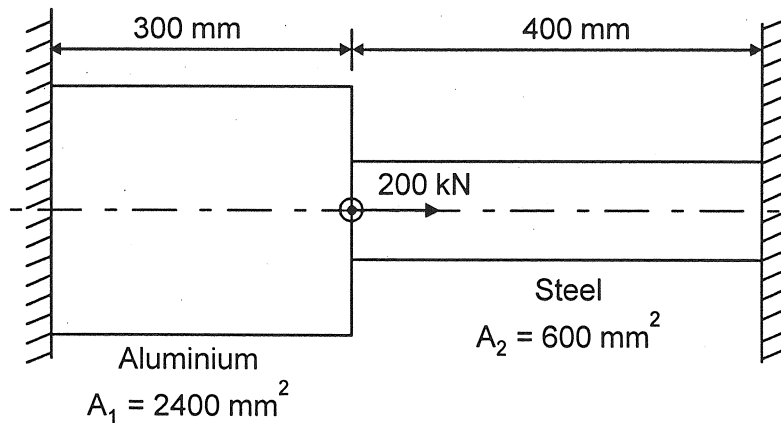Max. Marks : 100

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figures to the right indicate full marks.
5. Solve **any two** sub-questions from each question.
6. Use of non-programmable calculator is allowed.
7. Assume suitable data if necessary.

1. a) Explain finite element process with respect to physical problem, mathematical models and finit element solution using block diagram. **10**

   b) Define finite element analysis. Write finite element formulation steps with going from part to whole approach. **10**

   c) Justify the statement - "finite element as a integral part of computer aided design" with neat sketch. **10**

2. a) Determine the displacement, stresses and support reactions for the system shown in figure. Assume modulus of elasticity as $80 \times 10^3 \, N/mm^2$ **10**

SQ15   Wall

F=90N

150 mm   150 mm   0.5 mm

b) A stepped bimetallic bar as shown in figure is subjected to axial load of 200 kN at 25°C. The temperature is raised to 50°C. The co-efficient of expansion for aluminium and steel are 23×10^{-6} and 11.7×10^{-6} per °C respectively. Using finite element method determine
   i) Nodal displacement.
   ii) The stresses in each material.
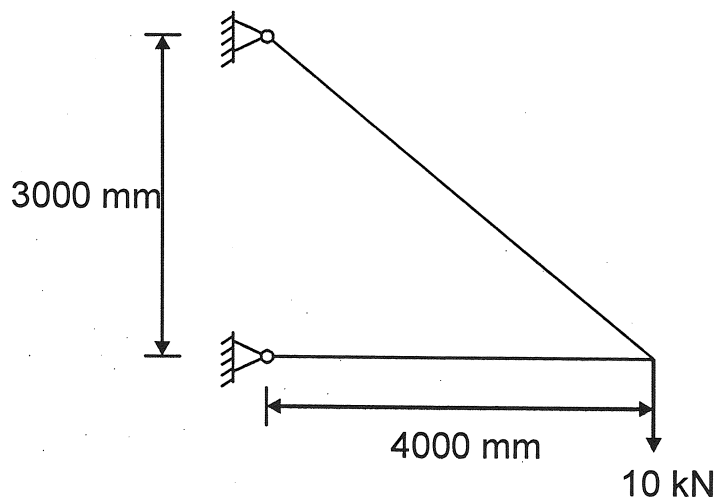   iii) Reaction forces at support. **10**

c) Explain FEA softwares. Describe the terms preprocessor, processor and post-processor, in finite element analysis. **10**
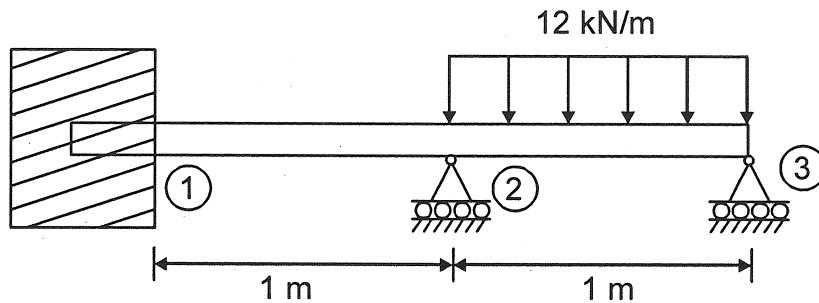
3. a) A two member truss is shown in figure. The cross sectional area of each member is 200 mm^2 and modulus of elasticity of 200 GPa. Determine deflections, reaction and stress in each member. **10**

b)   For the beam loading shown in figure determine
   i)   Slopes at 2 and 3
   ii) The vertical deflection at the mid point of distributed load at E=200 GPa,
        $I = 4 \times 10^6$ mm^4.   **10**

c)   Explain mesh generation and imposition in finite element analysis.   **10**

4. a)   Describe torsion of prismatic shaft.   **10**

b)   Explain fluid in flexible container using finite element mesh and vibration
     mode shapes.   **10**

c)   Write a note on flow of viscous fluid.   **10**

5. a)   Explain in detail types of model.   **10**

b)   Write a note on techniques of simulation.   **10**

c)   Describe growth models in simulation.   **10**

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