

B. C. E. 3RD YR 1ST SEMESTER SUPPLEMENTARY EXAMINATION, 2017

THEORY OF STRUCTURE - II

Time 3 hours

Full marks 100

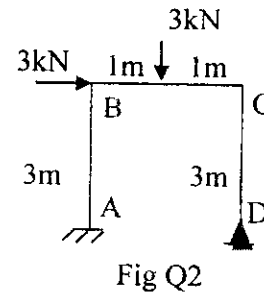
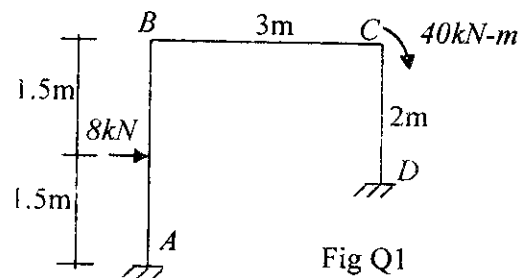
(50 Marks for each part)

Use separate answer scripts for each part

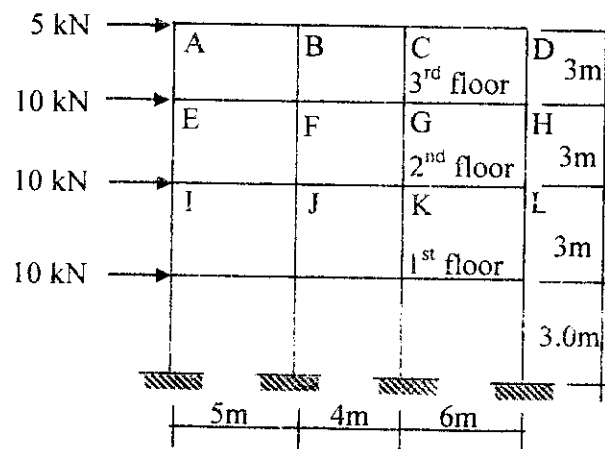
Part- I

Answer any two questions. Each question carries 25 marks.

1. Solve the frame shown in Fig. Q 1 using *slope deflection method*. Indicate the joint displacements. Draw neat BM and SF diagrams, along with the deflected shape. Assume EI to be constant all through.



2. Draw the bending moment diagram and the shear force diagram for the frame shown in Fig Q2 by applying *moment distribution method*. Assume EI to be constant although. D is a hinged support.
3. Stating *assumptions* and compute the axial forces, B.M. and S.F. for roof and third floor members of the frame shown in Fig Q3 using *cantilever method*. Assume that the outer columns have cross sectional area = A , and the central columns have cross sectional areas = $1.25A$.



B. C.E. Third Year , First Semester (Supplementary) , 2017

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(50 marks for each part)

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PART II

Answer any two questions

- 1 A fixed ended (at A and C) knee bow girder ABC having length of each arm (AB=BC) as 3m carries a uniformly distributed load of $3t/m$ throughout its length. Solve the girder using a single redundant and draw the complete bending moment, shear force and torsion moment diagrams of the girder. Take $EI / GJ = 2.0$. 25

- 2 Derive from the first principles of strain energy the expression for the horizontal reaction induced in the supports of a two hinged parabolic arch subjected to a point load P applied at an arbitrary distance from the left support and hence use the result to get the value of horizontal reaction induced in the supports of the arch being subjected to a uniformly distributed load of ω per unit run applied over the left half of the arch span . 25

- 3 A fixed –fixed frame ABCD has the following details . 25
The left support A is 1 m above the right support D . The column AB = 4 m , beam BC = 4 m and the column CD = 5 m . The flexural rigidities are EI , EI and $2 EI$ for AB , BC and CD respectively . A uniformly distributed load of $3t/m$ acts on BC .

Solve the frame by column analogy approach and hence draw the complete bending moment and shear force diagrams .