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10CV53

Fifth Semester B.E. Degree Examination, July/August 2021
Structural Analysis – II

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer any FIVE full questions.*
2. *Assume missing data suitably.*

1 a. What is influence line? State the importance of influence line diagram. **(04 Marks)**

b. Using influence line diagram, calculate shear force at a section 8 m from the left hand support of simply supported beam shown in Fig. Q1 (b). **(06 Marks)**

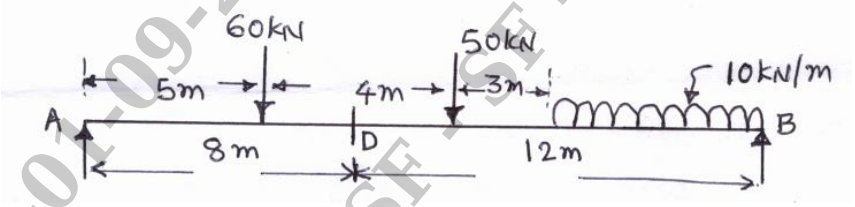

Fig. Q1 (b)

c. A system of wheel loads 80 kN, 140 kN, 160 kN, 50 kN and 40 kN crosses a beam of 15 m span with 80 kN load leading. The distances between the loads are 2.4 m, 3.0 m, 2.4 m and 1.6 m respectively. Find absolute maximum bending moment. **(10 Marks)**

2 Analyse the continous beam as shown in Fig. Q2 by using slope deflection method. Support 'B' sinks by 10 mm. Take $E = 2\times10^5$ N/mm^2, $I = 16\times10^7$ mm^4. Sketch the bending moment and shear force diagrams. **(20 Marks)**

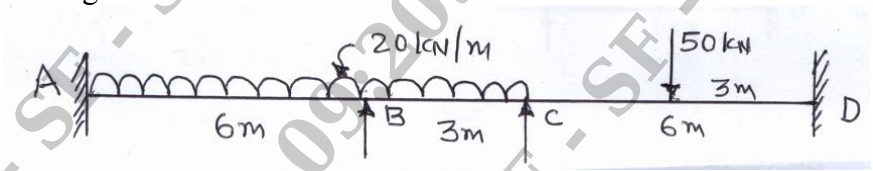

Fig. Q2

3 a. Define stiffness, carryover factor and distribution factor. **(03 Marks)**

b. Show that stiffness of far end hinged beam is 0.75 times the far end fixed beam. **(05 Marks)**

c. Analyse the frame shown in Fig. Q3 (c) by using moment distribution method. Draw BMD and deflected shape of the structure. **(12 Marks)**

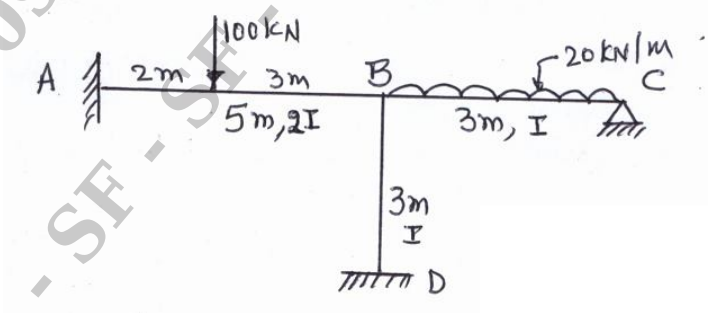

Fig. Q3 (c)

4 Analyse the frame shown in Fig. Q4 by using slope deflection method. Draw BMD and elastic curve. **(20 Marks)**

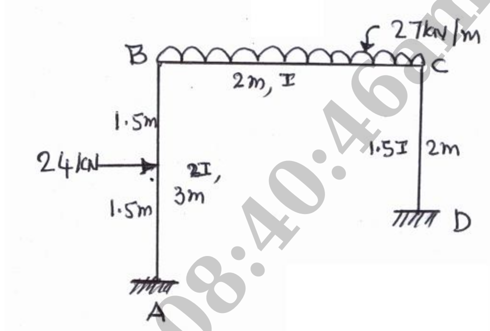

Fig. Q4

5 Analyse the continuous beam loaded as shown in Fig. Q5 by using Kani's method. Draw BMD and Elastic curve. **(20 Marks)**

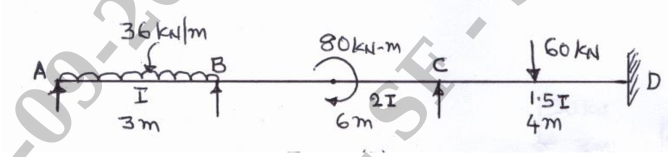

Fig. Q5

6 a. Derive the relationship between flexibility matrix and stiffness matrix. **(05 Marks)**

b. Analyse the Bent shown in Fig. Q6 (b) by using flexibility matrix method. Draw BMD. **(15 Marks)**

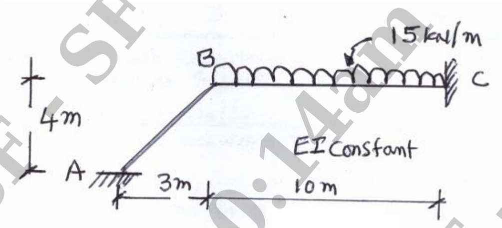

Fig. Q6 (b)

7 a. Compare the flexibility matrix method and stiffness matrix method. **(05 Marks)**

b. Analyse the frame shown in Fig. Q7 (b) using stiffness matrix method. Draw BMD. **(15 Marks)**

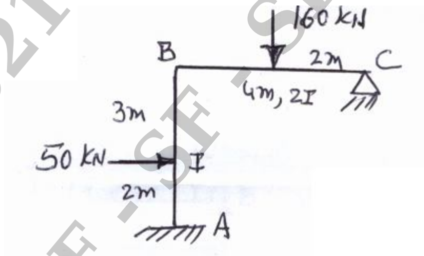

Fig. Q7 (b)

8 a. Define : Natural frequency, Free vibration and forced vibration. **(03 Marks)**

b. State different types of vibrations and explain. **(05 Marks)**

c. Explain mathematical modeling of an single degree of freedom system with neat sketches. **(04 Marks)**

d. A vertical Cantilever beam 3 m long supports a mass of 500 kg at its upper end. Find natural frequency and natural period

$E = 2.1\times10^{6}\ kg/cm^{2}$ and $I = 1300\ cm^{4}$ **(08 Marks)**

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