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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fourth Semester, B.E. - Civil Engineering

Semester End Examination; June/July - 2015

Analysis of Structures - I

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each **Unit**.*
ii) Assume suitable missing data if any.

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UNIT - I

1. a. Determine the degree of static indeterminacy for the structures shown in Fig. Q1(a) 4

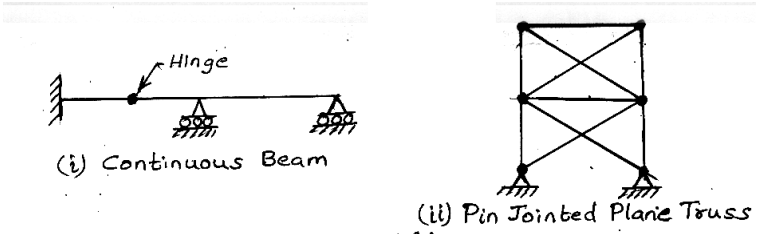

Fig.Q1(a)

b. Determine the degree of Kinematic indeterminacy for the structures shown in Fig. Q1(b) assume the members as inextensible. 4

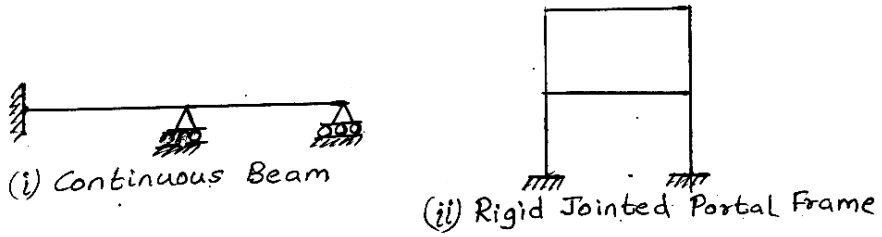

Fig.Q1(b)

c. Find the forces in the members of the pin-jointed plane truss shown in Fig. Q1(c). Use method of joints. 12

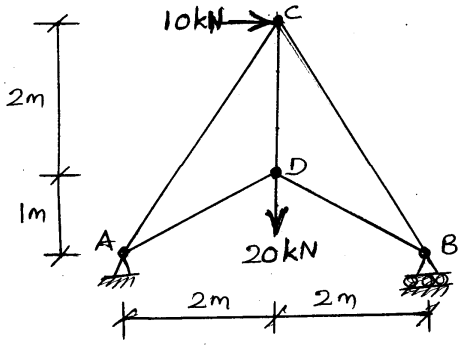

Fig.Q1(c)

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2 a. Find the maximum slope and maximum deflection in the cantilever beam shown in Fig. Q2(a). Use Moment Area method. Take; EI = 30,000 kN-m^2. 10

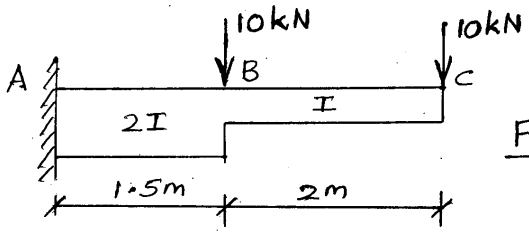

Fig. Q2(a)

b. Find forces in members DE, DG and FG in the pin jointed plane truss shown on Fig. Q2(b). Members AC, CD, DE and EB are of equal length. Use method of sections. 10

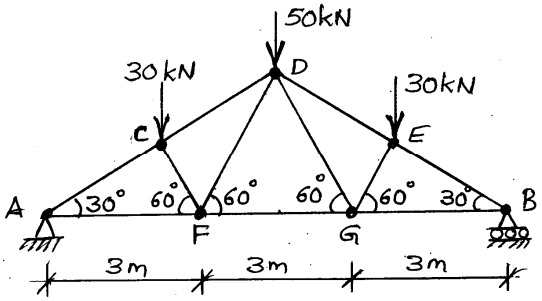

Fig. Q2(b)

UNIT - II

3 a. What is a Conjugate beam? Tabulate the relation between the various types of real support and conjugate support. 8

b. Find the maximum slope and maximum deflection in the simple supported beam shown in Fig. Q3(b) Take; E = 200 GPa and I = 8x10^7 mm^4. 12

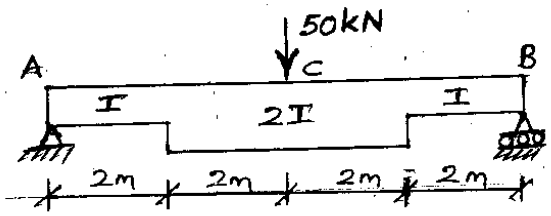

Fig. Q3(b)

4 a. State and explain Castigliano's strain energy theorem. 5

b. Find the maximum deflection and maximum slope in the cantilever beam shown in Fig. Q4(b). Use strain energy method. 15

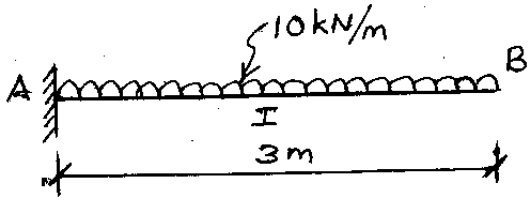

Fig. Q4(b)

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UNIT - III

5 a. A Cable of uniform cross section is suspended between two supports which are 100 m apart. The supports are at the same level. The cable carries a concentrated load of 50 kN at 60 m from left support. The maximum Sag in the cable is 8 m. Find tension in the various portions of the cable. Also find the total length of the cable. 8

b. A three hinged parabolic arch having hinges at supports and crown has a span of 40 m and a central rise of 6 m. It carries an UDL of 20 kN/m over the left half span. It also carries a concentrated load of 50 kN at 10 m from left support. Find Bending Moment, Normal Thrust and Radial shear at 10 m from left support. 12

6. a. A simply supported beam of span 10 m carries loads as shown in Fig. Q6(a). Find;
(i) Bending Moment at 3 m from left support and
(ii) Shear force at 3 m from right support. Use Influence Line Diagrams. 6

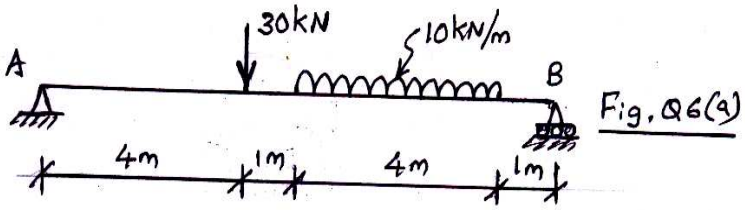

Fig. Q6(a)

b. Two Wheel loads of 120 kN and 80 kN spaced at 3 m crosses a simply supported beam of span 16 m from left to right with 120 kN load leading. Find;
(i) Maximum shear force developed at 6 m from left support, 14
(ii) Maximum bending moment developed under 80 kN load and
(iii) Absolute maximum bending moment developed in the beam.

UNIT - IV

7. Analyzed the propped cantilever beam shown in Fig. Q7 by consistent deformation method. Support B sinks by 10 mm. Assume EI = 30,000 kN-m^2. Sketch BMD, elastic curve and SFD. 20

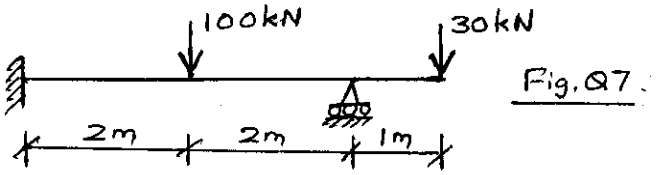

Fig. Q7

8. Determine the fixed end moments in the beam shown in Fig. Q8 by consistent deformation method. Sketch the BMD. 20

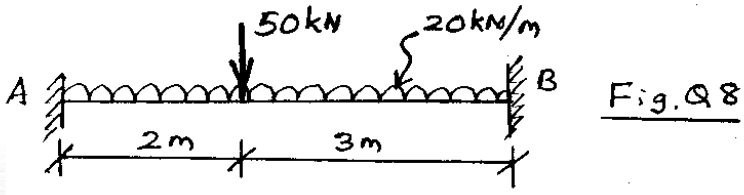

Fig. Q8

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UNIT - V

9 a. Analyze the propped Cantilever beam shown in Fig. Q9(a) by strain energy method. Sketch the BMD and elastic Curve. 10

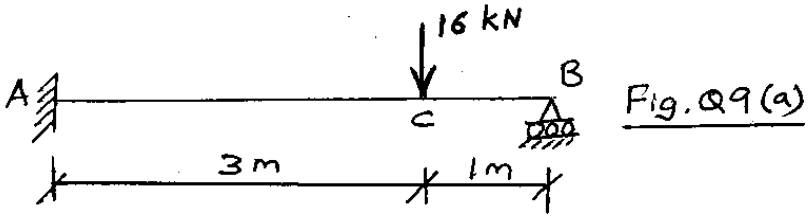

Fig. Q9(a)

b. A fixed beam of span 5 m carries an UDL of 20 kN/m over the entire span. Find the reactions at the supports. Use strain energy method. 10

10. Analyse the continuous beam shown in Fig. Q10 by three moments theorem. Supports B and C sink by 3 mm and 2 mm respectively. Assume EI = 27,000 kN-m^2. Sketch BMD elastic curve and SFD. 20

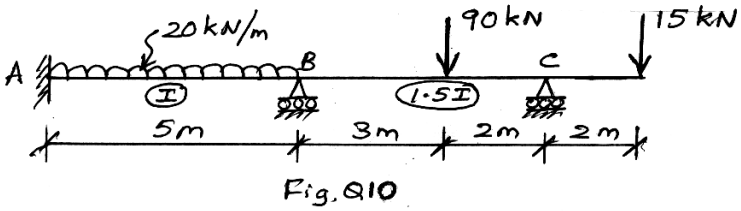

Fig. Q10

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