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Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth semester B.Tech examinations (S), September 2020

Course Code: CE202

Course Name: STRUCTURAL ANALYSIS – I (CE)

Max. Marks: 100

Duration: 3 Hours

Answer any two full questions from each part. Assume any missing data suitably.

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) Differentiate the 'method of sections' and 'method of joints' for the analysis of truss. 5
- b) Analyse the truss shown in Fig.1 and tabulate the member forces. 10

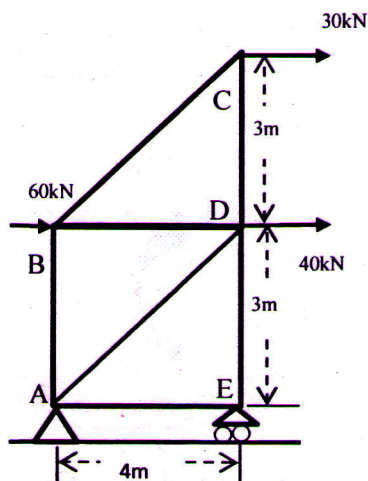
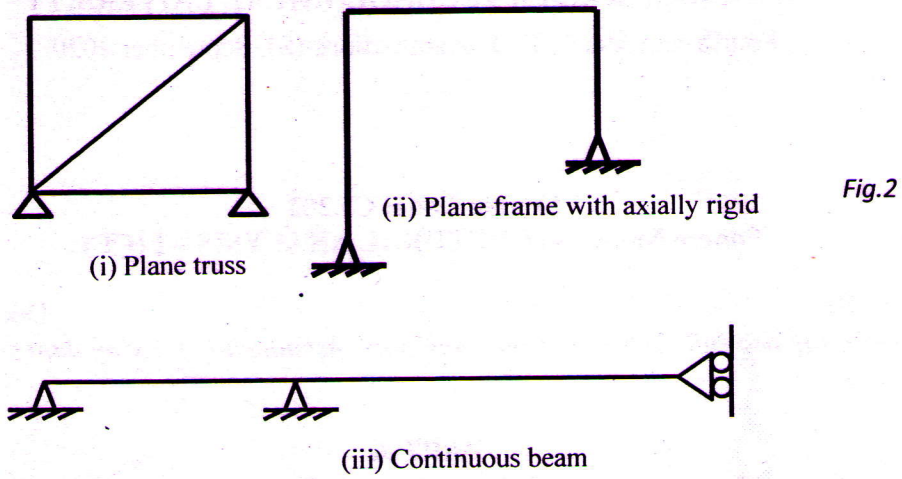
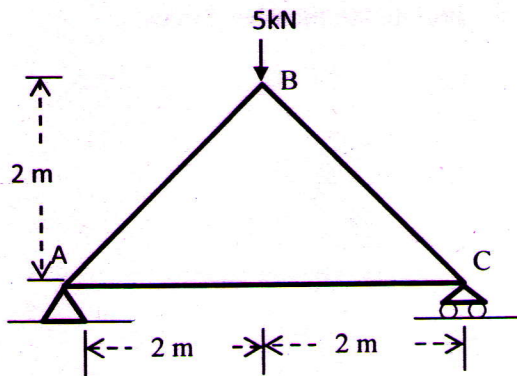


Fig.1

- 2 a) State Castigliano's first theorem and derive the relation between strain energy and displacement. 9
- b) Determine the static indeterminacy and kinematic indeterminacy of the structures shown in Fig.2. 6



- 3 a) For the pin jointed plane truss given in Fig.3, determine the vertical deflection at B by unit load method. Given $E = 200 \text{ GPa}$. Cross section of horizontal member is 150 sq.mm and of inclined members is 200 sq.mm . 12

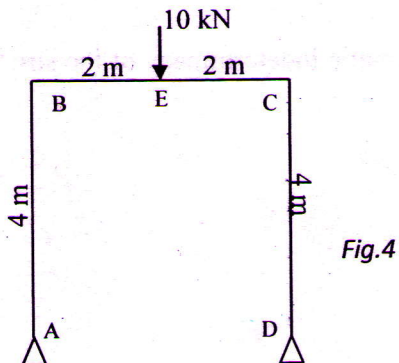


- b) With an example, explain the effect of lack of fit in a statically determinate truss. 3

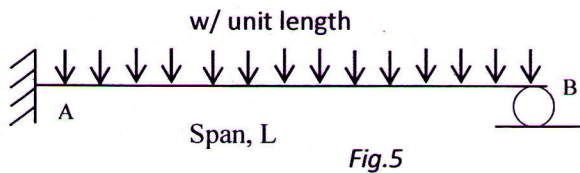
PART B

Answer any two full questions, each carries 15 marks.

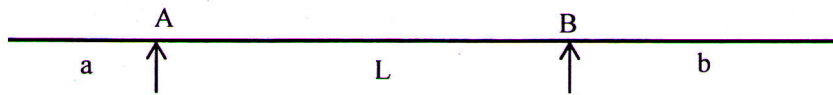
- 4 Analyse the frame in Fig.4 by strain energy method and calculate all support reactions. 15



- 5 a) Using the method of consistent deformation, determine the reaction at the prop in a propped cantilever shown in Fig.5. 10



- b) Draw Influence line diagrams of the support reactions at A and B for the beam shown in Fig.6. 5



- 6 A UDL 60kN/m, 8m long crosses a girder of 30m span. Calculate the maximum shear force and bending moment at a section 12m from left support. Also find the absolute maximum bending moment in the beam. 15

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) A light cable is supporting a load of w per unit run on the horizontal span L . Ends of the cable are supported at points which are at the same level. If h is the dip, calculate reactions at the supports. 7
- b) A cable AD of span 7 meter is supporting two concentrated loads 10kN, 20kN at points B and C which are 2m and 5m from left support. Support A and D are at the same level. Dip of point C is 2.2 m. Calculate the support reactions and dip of point B. Also calculate the tension in the cable in different segments. 13
- 8 a) A three-hinged parabolic arch of span 20m and a rise 4m carries a uniformly distributed load of 20kN per meter over the left half of the span. Find the maximum bending moment in the arch. 12
- b) A 3-hinged semicircular arch of radius R carries a uniformly distributed load of w per unit run over the whole span. Find the location and magnitude of the maximum bending moment for the arch. 8
- 9 a) A cable of span 100 meter hangs between two supports at the same level. It carries a UDL of 25kN/m over the entire span. Determine the reactions on the 10

top of the supporting tower where the cable passes over a frictionless pulley.
Given: dip of the cable: 12m and the anchor cable makes an angle 30° with the horizontal.

- b) A three hinged parabolic arch has a span of L and a rise of h . Draw the 10 influence line diagram for the following.
- i) Horizontal thrust, ii) Bending moment at a point 'a' distance from the left support.
