R5942

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: CE303

Course Name: STRUCTURAL ANALYSIS -11

Scheme of Valuation

(Scheme of evaluation (marks in brackets)and answers of problems/key)

PART A

		Answer any two full questions, each carries 15 marks.	Marks
1		Apply three moments equation for ABC (1.5 marks), Substitution (1 mark) Apply three moments equation for BCD (1.5 marks), Substitution (1 mark) Equilibrium equations at B and C (2 marks) Solving, M_B= -84.582 kNm, M_C= -55.873kNm (2 marks); M_D= -60kNm (1mark) BMD (2 marks) SF_A=41.2kN, SF_B=153.09 kN, SF_C=147.91 kN, SF_D=159.1 kN, SF_E=48 kN ; (1 mark); SFD (2 marks)	(15)
2	a)	Two points (2×1=2 marks) one example each (2×0.5=1 mark)	(3)
	b)	Fixed end moments for span AB and BC (2×1=2 marks) Slope deflection equations for span AB and BC (4×1=4 marks) Equilibrium equations at support B (1 mark) Solving, M_{AB}= -22.5 kNm, M_{BA}= 45kNm, M_{BC}= -45kNm, M_{CB}= 67.5kNm (3 marks) BMD (2 marks)	(12)
3	a)	Any four points (4×1=4 marks)	(4)
	b)	Four steps (4×1=4 marks)	(4)
	c)	Fig. (1 mark) Assume imaginary spans A'A, apply three moments equation for A'AB (2 marks) Apply three moments equation for ABC (1 mark) Consider imaginary spans CC', apply three moments equation for BCC' (2 marks) Equilibrium eqns. and solution. (1 marks)	(7)

PART B

Answer any two full questions, each carries 15 marks.

4		Fixed end moments for spans AB, BC and CD (3×1=3 marks) Stiffness factors at B and C (2×1=2 marks) Distribution factor at B, C (2×0.5=1 mark) ;	(15)

		Balancing at A and D (1 mark), Iteration table (3 marks) M_B= -84.582 kNm , M_C= -55.873kNm (2 marks);BMD (1 mark), SF_A=41.2kN, SF_B=153.09 kN, SF_C=147.91 kN, SF_D=159.1 kN, SF_E=48 kN (1 mark) SFD (1 mark);	
5	a)	Fixed end moments span AB and BC (2×1=2 marks) Rotation factor B (2 marks) Iteration table (5 marks) Final moments Eqn. (1 mark) M_{AB}= -22.5 kNm, M_{BA}= 45kNm, M_{BC}= -45kNm, M_{CB}= 67.5kNm (3×1=3 marks) BMD (2 marks)	(15)
6	a)	Basic concept (2 marks); steps to get final moment (2 marks), procedure to obtain rotation contributions (3 marks) and iteration procedure (3 marks)	(10)
	b)	Any two points with Figs. (2×2.5=5 marks)	(5)
		PART C	
		Answer any two full questions, each carries 20 marks.	
7	a)	Definition (4× 2=8 marks)	(8)
	b)	Plastic section modulus, elastic section modulus, shape factor (3×2=6 marks)	(6)
	c)	BMD (1 marks) Moment at any section (1 marks) For maximising the moment – Eqns. (3 marks) Location - One at the fixed end and the other at 0.414L from the propped end (1 marks)	(6)
8	a)	Mechanism 1, plastic hinges at the fixed ends and at 1.25W- (Fig. 1 mark) collapse load=8Mp/L (3 marks) Mechanism 2, plastic hinges at the fixed ends and at W- (Fig. 1 mark) collapse load=8Mp/L (3 marks) Final collapse mechanism and load (2 marks)	(10)
	b)	Fig. (1 mark) Expression for shear force, bending moment and twisting moment at any section (3 marks) Strain energy Eqn. (1 mark) Deflection = derivative of strain energy with applied load (1 mark) Integration and final expression for deflection at free end (4 marks)	(10)
9		Fig. (1 mark) Support reactions -shear (1 mark), moment (3 marks)	(20)

		Bending moment at any section (6 marks) and twisting moment (9 marks)	
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