Reg. No.														

B.Tech. DEGREE EXAMINATION, MAY 2023

OPEN BOOK EXAMINATION

Fourth Semester

18CEC205TZ

18CEC205T – STRUCTURAL ANALYSIS

(For the candidates admitted during the academic year 2018-2019 to 2021-2022)

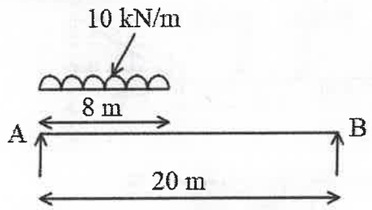
- Specific approved THREE text books (Printed or photocopy) recommended for the course
- Handwritten class notes (certified by the faculty handling the course / Head of the Department)

Time: 3 Hours | Max. Marks: 100

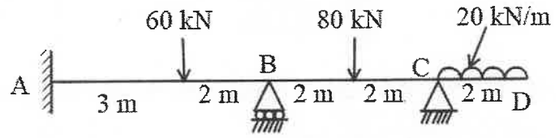
Answer **FIVE** questions

(Question: No 1 and 2 are compulsory)

		Marks	BL	CO	PO
1a.	1.i Draw the influence line diagram for shear force and bending moment for a section at 5 m from the left hand support of a simply supported beam, 20 m long. Hence calculate maximum bending moment and shear force at the section, due to an uniformly distributed rolling load of 8 m span and intensity 10 kN/m run.	18	3	1	2



b.	ii. Determine positive shear force at a section 5 m from A. (A) 33 kN (B) 44 kN (C) 55 kN (D) 66 kN	1	3	1	2
c.	iii. Determine the ILD ordinate, at the distance of 5 m from A, during calculating the bending moment. (A) 4.75 (B) 3.25 (C) 3.5 (D) 3.75	1	3	1	2
2a.	2.i. Analyze the continuous beam by slope deflection method. The support B sinks by 5 mm. Draw the bending moment and shear force diagram. Take $EI = 2\times10^4$ kN-mm^2.	18	3	4	2



2b.	ii. Determine the fixed end moment due to loading for the member BA. (A) 50.5 kN.m (B) 38.2 kN.m (C) 33.2 kN.m (D) 43.2 kN.m	1	3	4	2

iii. Arrive the final moment for the member AB, from the slope deflection equation. 1 3 4 2

(A) –59.275 kN.m (B) –42.275 kN.m
(C) –52.275 kN.m (D) –62.275 kN.m

3.i. A parabolic two hinged arch has a span of 40 m and a rise of 5 m, and a concentrated load of 10 kN acts at 15 m from the left support. The second moment of area varies as a secant of the inclination of the arch axis. Calculate the horizontal thrust and reactions at the hinge. Also calculate maximum bending moment at this section. 18 4 2 2

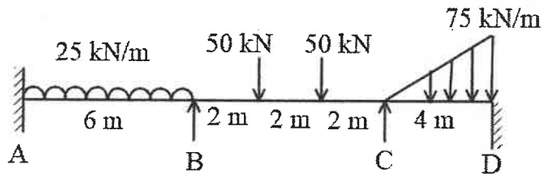
ii. Determine the vertical left support reaction for the arch, Span of 40 m 1 4 2 2

(A) 10 kN (B) 6.25 kN
(C) 8.0 kN (D) 12.5 kN

iii. Determine the rise distance at 15 m from the left support 1 3 4 2

(A) 5.12 m (B) 4.68 m
(C) 7.12 m (D) 3.52 m

4.i. Determine the end moments for the continuous beam by using moment distribution method. EI is constant. 18 4 4 2



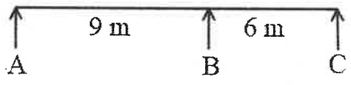
ii. Determine the distribution factor for the member CB 1 4 4 2

(A) 0.4 (B) 0.6
(C) 0.8 (D) 0.2

iii. Determine the fixed end moment for the member BA 1 4 4 2

(A) 55 kNm (B) 95 kNm
(C) 85 kNm (D) 75 kNm

5.i. Determine ILD ordinates for two span continuous beam for the interior support and plot the ordinates at 3 m interval. 18 3 1 2



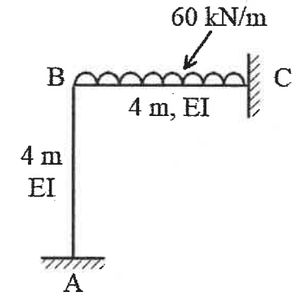
ii. Arrive at the left support reaction R_A for two span continuous beam. 1 3 1 2

(A) 1 kN (B) –0.8 kN
(C) –0.5 kN (D) –0.4 kN

iii. Determine the constant C_1 for two span continuous beam at interior support. 1 3 1 2

(A) 12.6 (B) 22.4
(C) 54.1 (D) 76.2

6.i. Formulate the flexibility matrix of the frame shown below treating the support reactions at A as redundants. 18 4 3 2



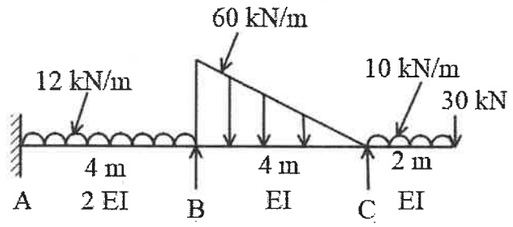
ii. Calculate the matrix value f_{11} for the frame 1 3 3 2

(A) –32/ EI (B) 85.33/ EI
(C) 21.33/ EI (D) –10/ EI

iii. What will be the limit for the span BC? 1 3 3 2

(A) 0 – 8 (B) 0 – 4
(C) 4 – 6 (D) 4 – 8

7.i. Determine the support reactions of the given continuous beam by using stiffness method. 18 4 5 2



ii. What will be the moment at support C due to overhanging load (UDL + Point load)? 1 3 5 2

(A) 40 kNm (B) 50 kNm
(C) 80 kNm (D) 30 kNm

iii. Calculate the net fixed moment for the support B. 1 3 5 2

(A) –32 kNm (B) +16 kNm
(C) –48 kNm (D) 64 kNm

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