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## B.Tech DEGREE EXAMINATION, DECEMBER 2023

Fourth Semester

### 18CEC205T - STRUCTURAL ANALYSIS

(For the candidates admitted during the academic year 2018-19 to 2021-22)

OPEN BOOK EXAMINATION

**Note:**

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

**Time: 3 Hours**

**Max. Marks: 100**

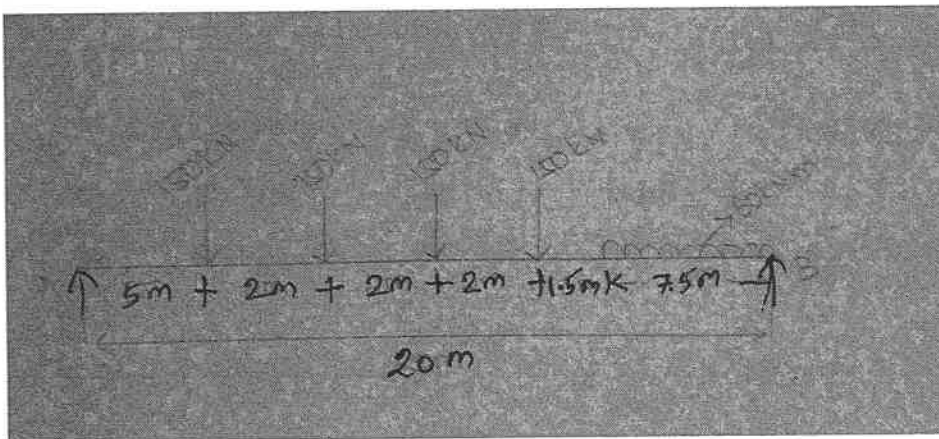
Answer **FIVE** Questions

Marks BL CO

Question 1 & 2 will be the compulsory question

- 1 i. A beam carries four equal loads of 150 kN each equally spaced at 2 m apart followed by a UDL of 60 kN/m as shown in the fig below. Using influence line, calculate shear force and bending moment at a distance of 8 m from left hand support, when the leading 150 kN load is at 5 m from the left hand support.

18 4 1



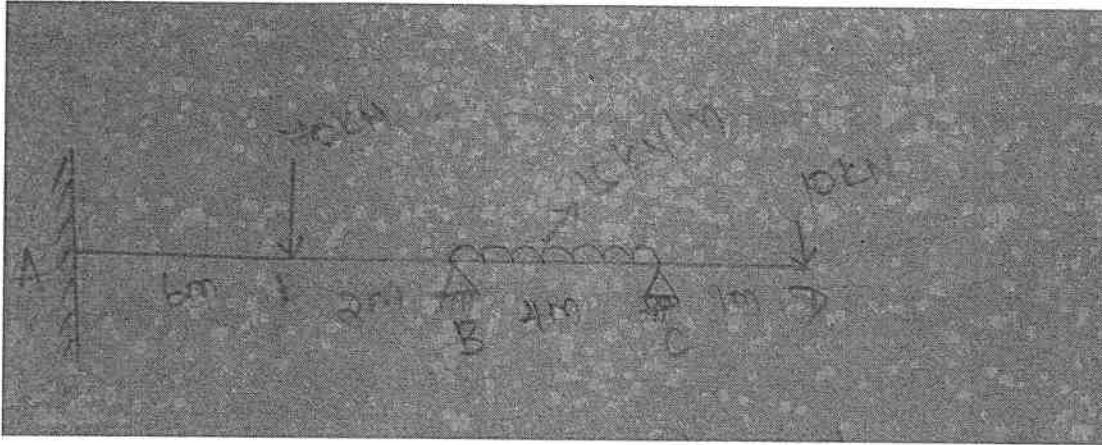
- ii. Determine the maximum shear force at a distance of 8m from A
- (A) 144.375kN (B) 180.385kN
- (C) 200.375kN (D) 125.375kN

1 4 1

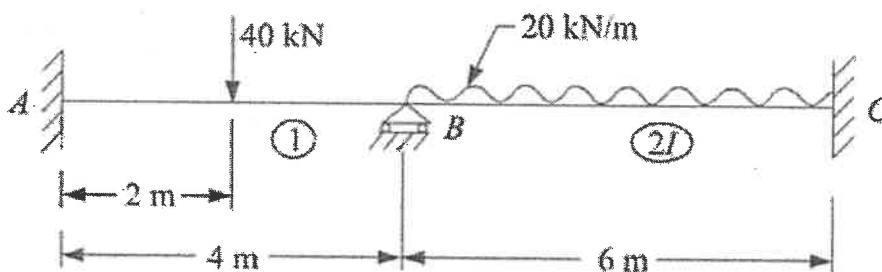
- iii. Determine the ordinate at a distance of 7.5m from B during calculating moment at a distance of 8m from A
- (A) 3.25 (B) 4.25
- (C) 3 (D) 2.75

1 4 1

- i. Analyze the beam by the moment distribution method support B sinks by 10mm,  $E=200\text{kN/mm}^2$ ,  $I=4000\times 10^4\text{ mm}^4$ . Draw BMD and SFD 18 3 4

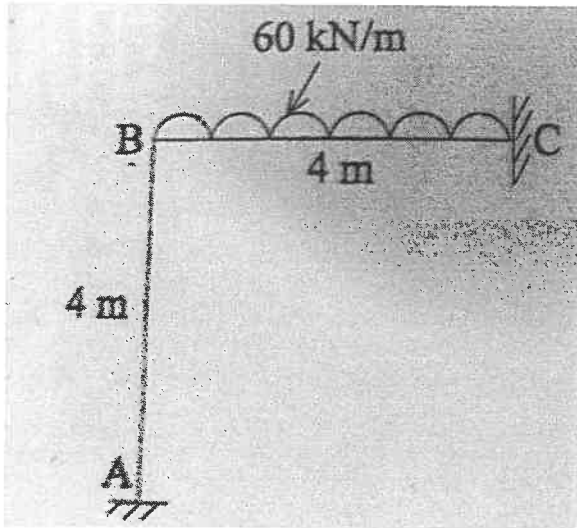


- ii. Determine the distribution factor for the member BA 1 2 4  
 (A) 0.41 (B) 0.38  
 (C) 0.47 (D) 0.53
- iii. Arrive the fixed end moment for member AB, is the addition of moment due to applied loading and due to settlement of supports 1 4 4  
 (A) -38.47 kN.m (B) -44.44 kN.m  
 (C) -55.55 kN.m (D) -66.66 kN.m
- 3 i. Determine ILD ordinates for two span continuous Beam for the interior support and plot the ordinates at 36m interval for the span AB = 9m and span BC = 6m 18 4 1  
 ii. Arrive the right support reaction  $R_C$  for two span continues beam 1 1 1  
 (A) -0.6 kN (B) -0.4 kN  
 (C) 1.0 kN (D) -0.8 kN  
 iii. Determine the constant  $C_2$  for two span continues beam at interior support 1 4 1  
 (A) 27.6 (B) 0  
 (C) 12.6 (D) 21
- 4 i. Analyse the two span continuous beam by slope deflection method and draw bending moment and shear force diagram. 18 4 4

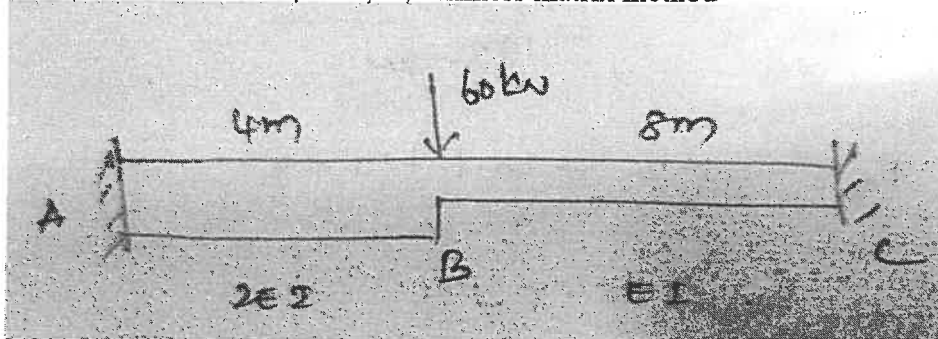


- ii. calculate the net fixed moment for the span BC 1 4 4  
 (A) 20 (B) -60  
 (C) -80 (D) -75
- iii. Write the equilibrium equation for Joint B 1 3 4  
 (A)  $M_{BA}=0$  (B)  $M_{BC}=0$   
 (C)  $M_{BA}+M_{BC}=0$  (D)  $M_{BA} - M_{BC}=0$

- 5 i. A parabolic arch hinged at ends has a span of 60m and a rise of 12m. A concentrated load of 8kN act at 15m from the left hinge. The second moment of area varies as the secant of the inclination of arch axis. calculate the horizontal thrust and the reaction at the hinge also calculate the net bending moment of the section 18 4 2
- ii. Calculate the Horizontal thrust for the two hinged arch 1 1 2  
 (A) 5.54 (B) 7  
 (C) 9 (D) 10
- iii. What is the reaction  $R_A$  for two hinged arch 1 1 2  
 (A) 8.16kN (B) 12kN  
 (C) 5.88kN (D) 10kN
- 6 i. Formulate the flexibility matrix of the frame shown below treating the support reactions at A as redundants. 18 4 3



- ii. What is the limit for span AB 1 1 3  
 (A) 0.6 (B) 0.8  
 (C) 4-8 (D) 0-4
- iii. Calculate the  $m_2$  value for span BC 1 4 3  
 (A) -4 (B) -6  
 (C) -8 (D) -10
- 7 i. Analyse the beam completely by stiffness matrix method 18 4 5



- ii. calculate the net fixed moment for the span AB 1 4 5  
 (A) 48kN.m (B) 64kN.m  
 (C) 0 (D) 33kN.m
- iii. what will be the net external force  $P_2$  for the beam 1 4 5  
 (A) 30kN (B) 80kN  
 (C) 50kN (D) 60kN

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