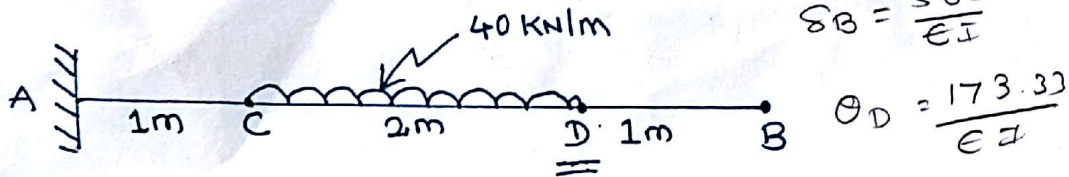




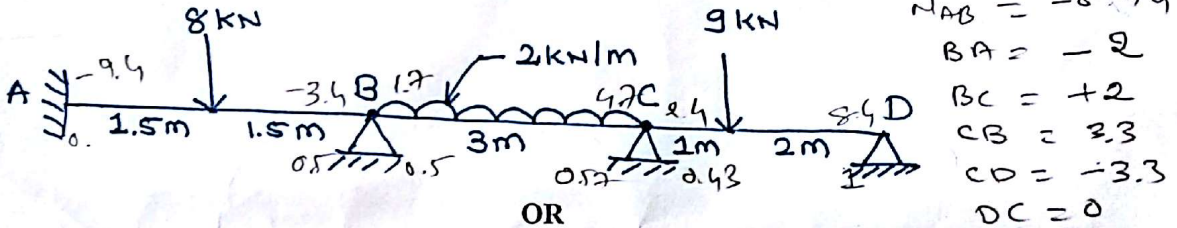
**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

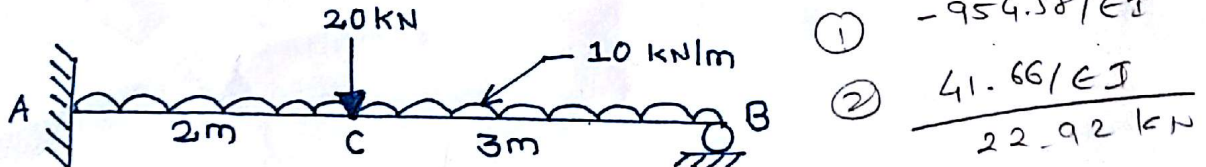
- QUE.1** (A) State CASTIGLIANO'S FIRST and SECOND THEOREM. 2  
 (B) Using Castigliano's First theorem find the slope at D. EI constant 4



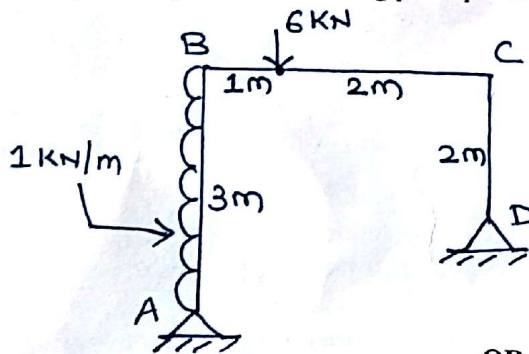
- QUE.2** (A) Analysis the beam by Moment Distribution Method. Support A is settles by 10 mm, B is settles by 30mm and C is settles by 20mm. EI=480 kNm<sup>2</sup> 7



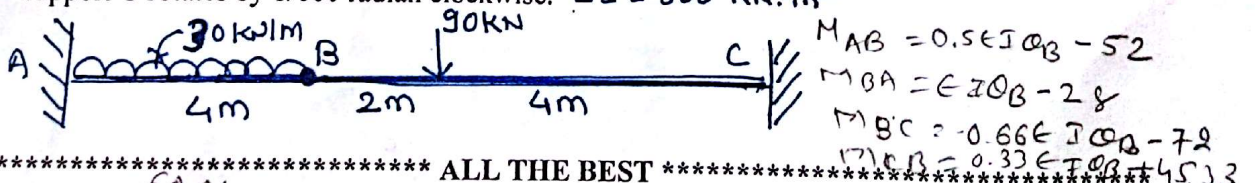
- (A) Determine reaction at prop B using unit load method



- QUE.3** (A) Analysis the portal frame using principle of least work. EI = constant. 7



- (A) Using slope deflection method. Find only moments. If support B sinks by 40 mm and support C rotates by 1/100 radian clockwise. EI = 800 kN.m<sup>2</sup> 7



\*\*\*\*\* ALL THE BEST \*\*\*\*\*

$\theta_B = \frac{60.24}{EI}$  (D)

$M_{AB} = -21.88$   
 $M_{BA} = 32.24$   
 $M_{BC} = -32.24$   
 $M_{CB} = 65.20$