



# KALLAM HARANADHAREDDY INSTITUTE OF TECHNOLOGY

Affiliated to JNTU Kakinada; Approved by AICTE, New Delhi

Chowdavaram, Guntur-522019

Department of Civil Engineering

SA - I

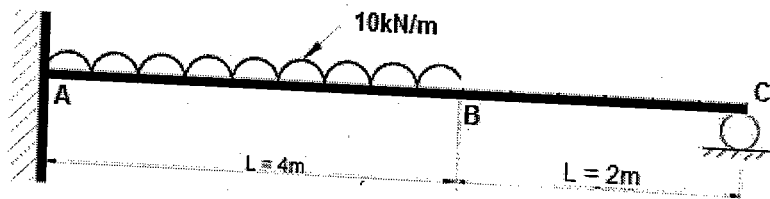
UNIT-I

## Short Answer Questions

- 1) What is a propped cantilever? Is it determinate or indeterminate?
- 2) What do you understand by the term prop?
- 3) Define sinking of prop, how does it differ from a rigid prop?
- 4) Differentiate between cantilever and propped cantilever.
- 5) Write the steps involved in finding a prop reaction. Or (How is the prop reaction determined, Explain the steps)
- 6) Explain the consistent deformation method of analyzing a propped cantilever?
- 7) What is the degree of indeterminacy of a propped cantilever?

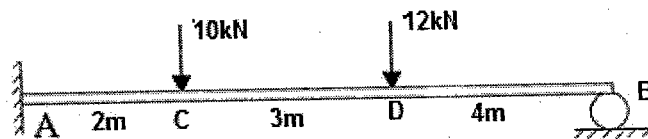
## Analytical Questions

- 1) Derive an expression for the prop reaction in a cantilever carrying an U.D.L. over the entire span and propped at the free end.
- 2) Derive an expression for the prop reaction in a cantilever beam carrying an U.D.L. over the entire span and a prop at the mid span.
- 3) A cantilever of length  $l$  carries a point load  $W$  at its free end. It is propped at a distance of  $\frac{1}{4}$  from the free end. Find out the prop reaction.
- 4) A cantilever ABC is fixed at A and propped at C is loaded as shown in the figure. Find the reaction at C.

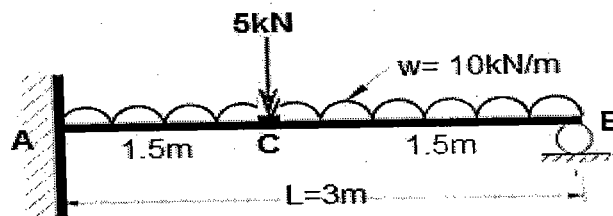


- 5) A cantilever of 6 m length carries an U.D.L. of 12kN/m over the full span. If the free end is supported by a prop, find the reaction at the prop and also draw the S.F.D. and B.M.D.
- 6) A cantilever of length 4 m carries a uniformly distributed load of 1kN/m length over the whole length. The free end of the cantilever is supported on a prop. If  $E=2 \times 10^5 \text{ N/mm}^2$  and  $I=1 \times 10^8 \text{ mm}^4$ , then
  - a) Find the prop reaction, and
  - b) Deflection at the center of cantilever.

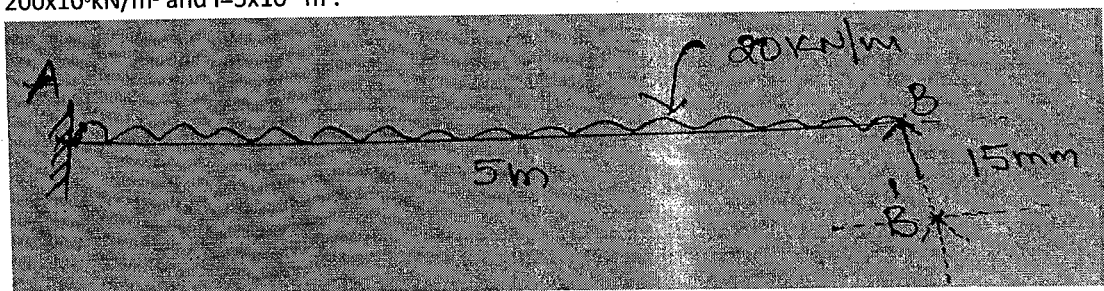
- 7) Determine the prop reaction in the beam shown below?  $EI$  is constant.



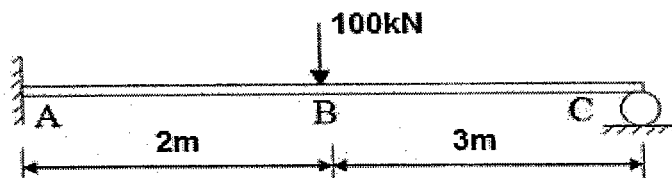
- 8) The Propped cantilever beam loaded as shown below. Draw S.F.D and B.M.D for the given beam.  $EI$  is constant.



- 9) A cantilever of length 6 m carries an U.D.L. of 2 kN-m over a length of 4 m starting from fixed end. The cantilever is propped rigidly at free end if  $E=2 \times 10^5 \text{ N/mm}^2$ , Moment of inertia  $I = 1 \times 10^8 \text{ mm}^4$ .
- Determine the reaction at rigid prop,
  - Find the deflection at the center of cantilever, and
  - Find the magnitude and position of maximum deflection.
- 10) In the beam shown below, the prop has sunk by 15 mm. Calculate the prop reaction. Take  $E = 200 \times 10^6 \text{ kN/m}^2$  and  $I = 5 \times 10^6 \text{ m}^4$ .



- 11) Find the support moment for the propped end when cantilever is loaded as follows, if support rotates clockwise by 0.003 rad.  $EI = 1 \times 10^6 \text{ kg-m}^2$ .





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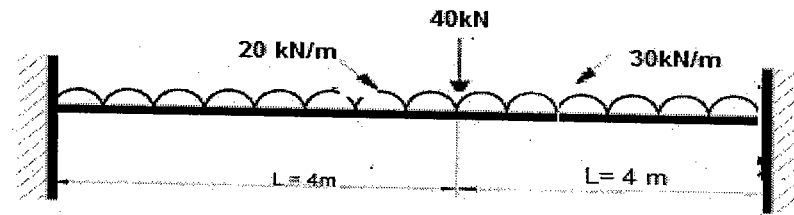
UNIT-II

## Short Answer Questions:

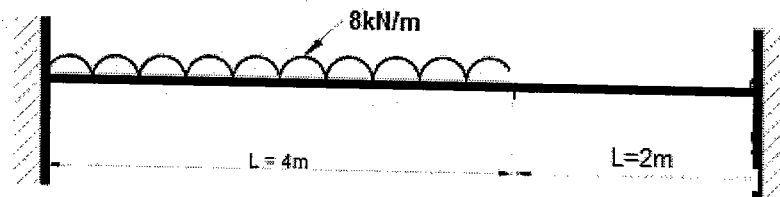
- 1) What are the advantages of fixed beams?
- 2) What is the degree of indeterminacy of a constrained beam?
- 3) Why the ends in a fixed beam are called "Direction-fixed ends"?
- 4) Draw the bending moment diagrams of fixed beams with different loadings.
- 5) A fixed beam of span 6 m is subjected to a point load of 5kN at the one-third of span from the left end. Find the moments at the supports.
- 6) If a fixed beam AB carries a central load P, what is the value of maximum deflection?
- 7) A fixed beam of span 6 m is subjected a UDL of 5kN/m over the entire span. Find the moments at the supports and net moment at the center of span.
- 8) How fixed beams can be statically determinate? Write down the compatibility conditions for a fixed beam.

## Analytical Questions:

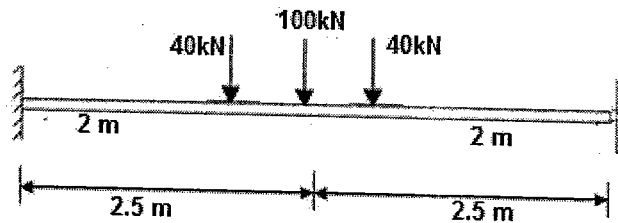
- 1) A fixed beam AB of 3m span is subjected to a point load of 15kN at a distance of span. Find the fixed end moments and deflection of the beam under the load. Take  $EI = 2 \times 10^3 \text{ kN-m}^2$ .
- 2) A fixed beam AB of span 6 m is carrying a uniformly distributed load of 4kN/m over the left half span. Find the fixed end moments and support reactions.
- 3) A fixed beam of 2 m span is carrying a point load of 50kN at its mid span. Find the fixed moments and deflection of the beam under the load. Take  $EI = 2 \times 10^3 \text{ kN-m}^2$ .
- 4) A fixed beam of span 6 m is subjected a UDL of 5kN/m on the left half of the span and a point load of 15kN at the middle of the right half of the span. Draw the S.F.D and B.M.D.
- 5) A fixed beam of span 8 m is subjected to a linearly varying load of 8kN/m from one support to 6kN/m to the other support. Find the support reactions and moments. Draw the S.F.D. and B.M.D.
- 6) A fixed beam AB of span 6 m is subjected to two point loads of 20kN and 15kN at a distance of 2m and 4m from A. Calculate the fixing moments at A and B.
- 7) A fixed beam is shown in figure, analyze the beam and draw the S.F.D and B.M.D.



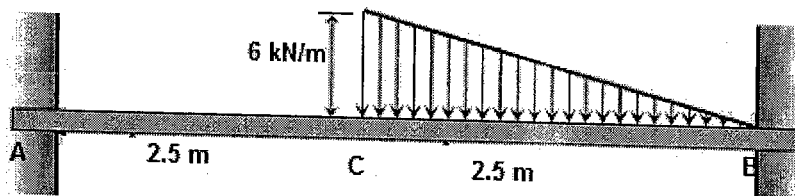
- 8) Find fixed end moments for the fixed beam shown in below figure and draw the S.F.D and B.M.D.



- 9) A fixed beam is shown in below figure. Solve the beam and also draw the B.M. and S.F. diagrams.

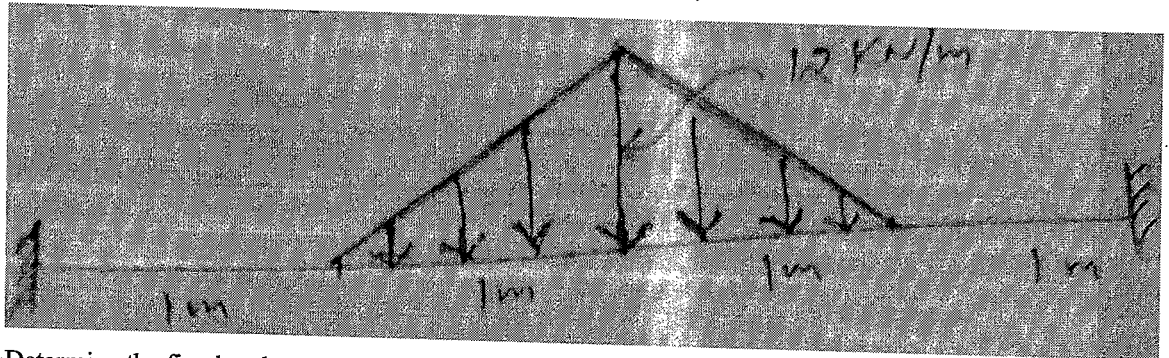


- 10) Evaluate the fixed end moments in the beam shown below?

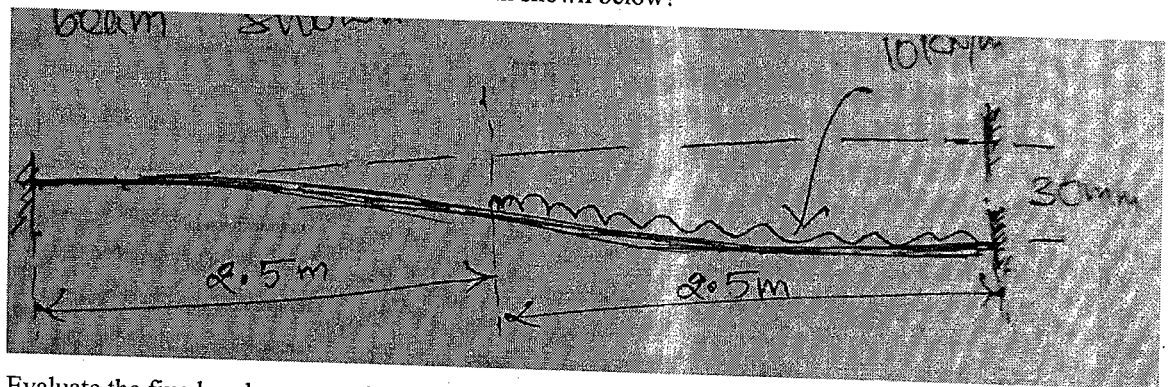


- 11) A fixed beam of 6 m span carries a UDL of 12 kN/m run over the whole span. The level of right hand support sinks by 8 mm below that the left hand end. Take  $E = 2.10 \times 10^8 \text{ kN/m}^2$  and  $I = 4.50 \times 10^5 \text{ m}^4$ . Find
- Support moments,
  - Support reactions, and
  - Deflection at center

- 12) Calculate the deflection at the center of the beam shown below?



- 13) Determine the fixed end moments in the beam shown below?



- 14) Evaluate the fixed-end moments in the beam shown below. Take  $EI = 11,000 \text{ kN-m}^2$ .

