QUESTION BANK

STRUCTURAL ANALYSIS – II

Two marks Questions

1. Define Lack of fit.
2. What are statically indeterminate structures.
3. Differentiate between Pin-jointed & Rigid-jointed structures?
4. Briefly explain degree of freedom of a structure.
5. Differentiate between statically determinate structures & statically indeterminate structures.
6. Briefly explain degree of freedom of a structure.
7. What do you mean by Pure Sway & General Sway?
8. Give the slope deflection equations to calculate final end moments for both the ends, If both the ends of the beam are fixed.
9. Give the formula to calculate fixed end moments, if a fixed beam is applied by a moment at the centre.
10. If one end of a member is hinged or pinned and other end is fixed, than relative stiffness is taken as……..?
11. Give the slope deflection equations to calculate final end moments for both the ends, If both the ends of the beam are fixed.
12. Give the formula to calculate fixed end moments, if a fixed beam is applied by a moment at the centre.
13. Give the formula to calculate Rotation factor & Distribution factor.
14. Define

    (i) Distribution Theorem (ii) Carry over Theorem.
15. Name the approximate methods used in practice for the analysis of frames?
16. State the various assumptions of Cantilever method.
17. If an end of a member is hinged or pinned, relative stiffness is taken as……..?
18. Define Influence Line Diagram. Give any two uses of Influence Line Diagram?

19. Write clapeyron's theorem of three moments for point load & for uniformly distributed load.

20. Give the formula to calculate fixed end moments, if a fixed beam is applied by a moment at the centre.

21. The Relative stiffness of a member at a joint, whose farther end is hinged or simply supported is ……?

22. The Slope defection method is used to determine ……. (Statically Determinate structures / Statically Indeterminate structures).

23. Consider a simply supported beam of span 10 m carrying a point load of 5 KN at the center. Calculate reactions at supports and bending moment at centre.

24. Differentiate between static indeterminacy and kinematic indeterminacy .Explain in detail.

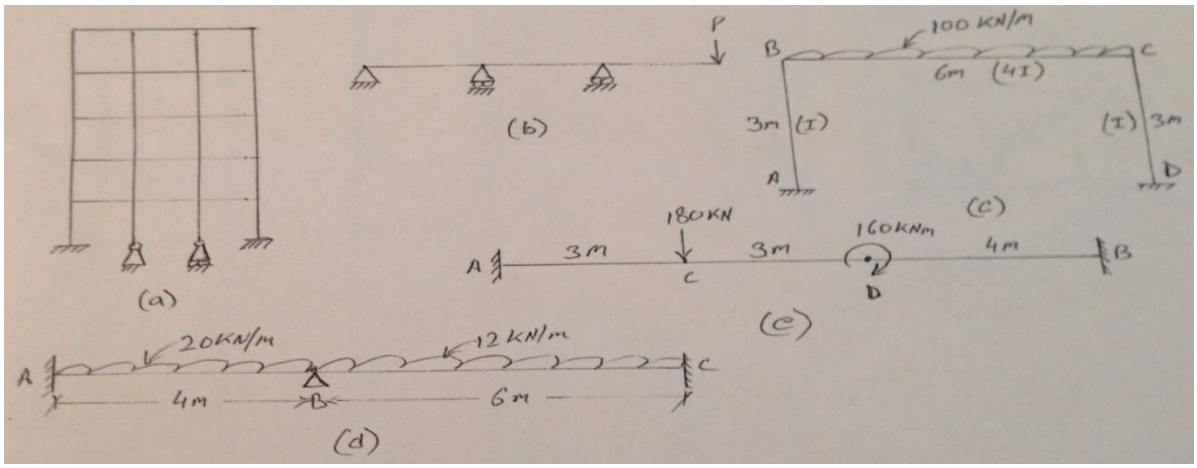
25. Draw Stress –Strain curve for Ductile, Brittle, Rigid material.

26. Explain in details with proper diagrams sway and non-sway types of frames.

27. Define Lack of Fit.

Three marks Questions

1. Determine the degree of static indeterminacy of the rigid jointed plane fame as shown in fig (a).
2. Determine the degree of freedom of the continuous beam as shown in figure (b).
3. State the following:
   (a) Carry over Theorem
   (b) Distribution Theorem
   (c) Distribution Factor
   (d) Relative Stiffness.
4. For the given beam find the moments and the reactions at the supports. Also draw bending moment & shear force diagrams for the beam using Moment Distribution method refer figure (c).
5. Using Moment Distribution method determine the support Moments at A,B,C & D for the continuous girder shown in figure (d).



6. Find the support moments at A,B,C,D for the continuous beam as shown in figure using rotation contribution method. Fig. (a)

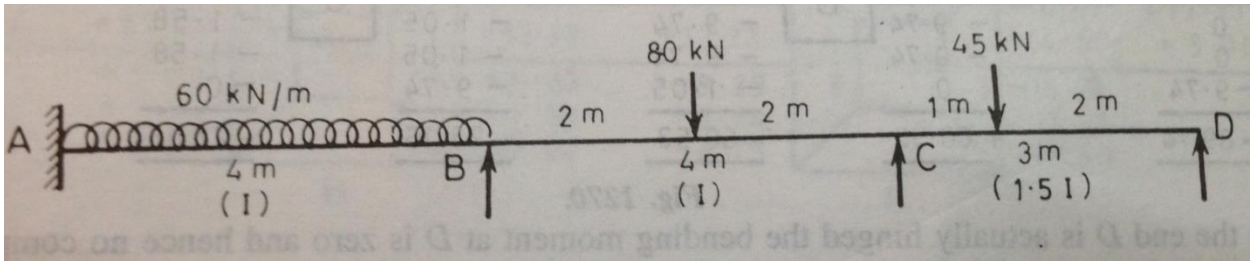
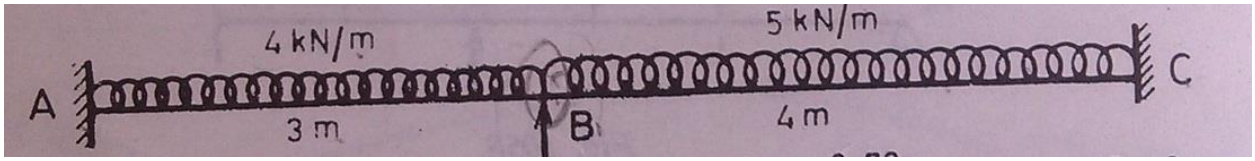


Fig. (a)

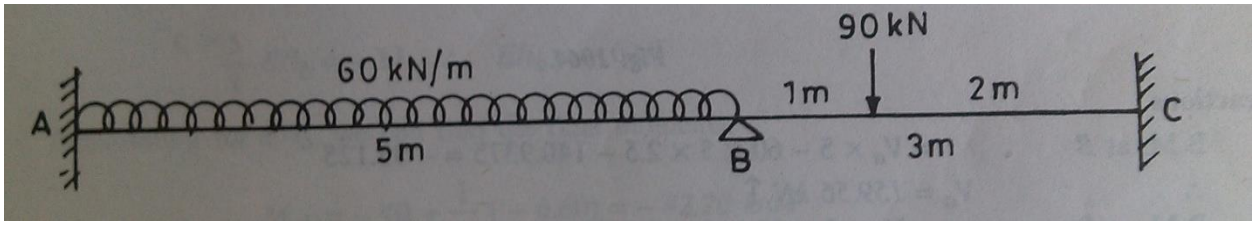
7. A live load of 80 KN per metre moves on a simply Supported girder of span 12 metres. Find the maximum bending moment which can occur at a section 4 metres from the left end. Using Influence line diagram.

8. A continuous beam ABC covers two consecutive spans AB and BC of lengths 4 m and 6 m carrying uniformly distributed loads of 60 KN/m and 100 KN/m respectively. If the ends A and C are Simply Supported find the support moments at A, B and C. Draw also B.M. and S.F. diagrams. Using method of three moments.

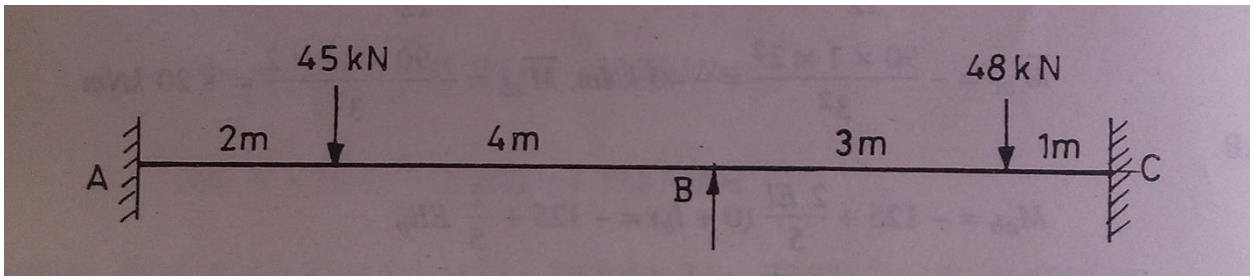
9. A continuous beam ABC consists of span AB=3m and BC = 4m , the ends A and C being fixed . AB and BC carry uniformly distributed loads of intensity 4kN/m and 5kN/m respectively. Find the support moments and draw the bending moment diagram for beam. The beam is of uniform section throughout.



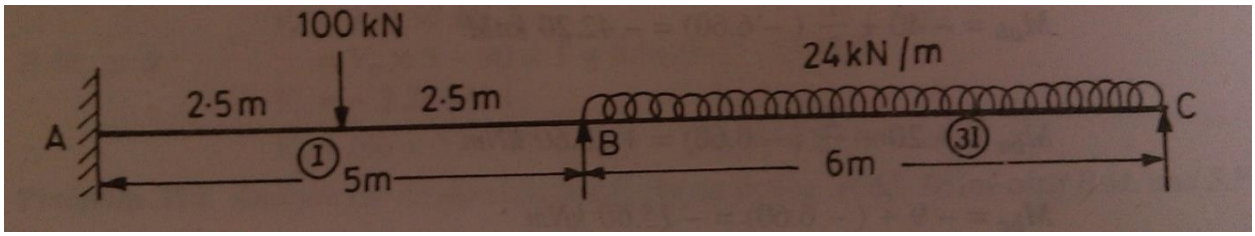
10. Determine the support moments and reactions for the continuous beam as shown in fig. Draw also B.M.diagram.



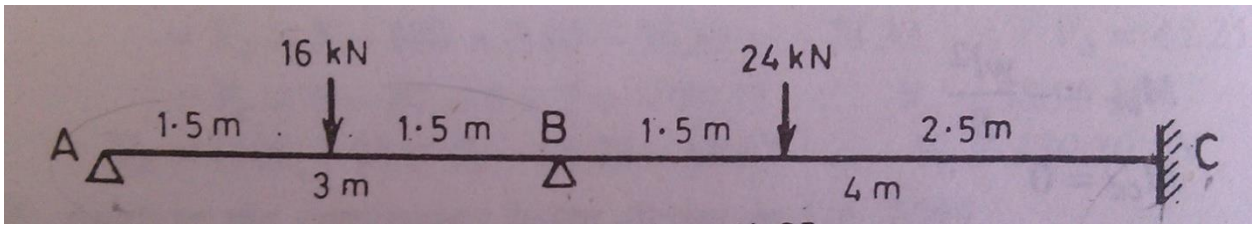
11. Analyse the continuous beam as shown in fig. Draw also B.M. & S.F diagram.



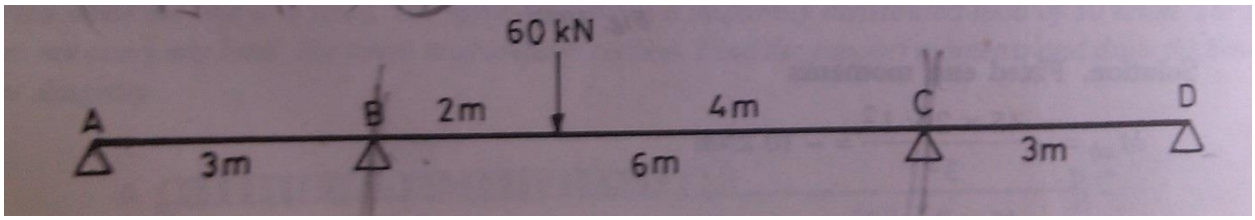
12. Analyse the continuous beam as shown in fig.



13. A continuous beam ABC consists of spans AB= 3m and BC= 4m.The end A is simply supported, while end C is fixed. The span AB carries a concentrated of 16 kN at the centre of span and the span BC carries a concentrated load of 24 kN at the distance of 1.5m from B. Find the support moments and draw the bending moment diagram for the beam.



14. Find the support moments and draw B.M. diagram for the continuous beam as shown in fig.



15. A beam AB of uniform section of span 9m and flexural rigidity EI= 36 kNm² is partially fixed at the ends. When the beam carries a point of 90kN at a distance of 3m from the left end A., the following displacements were observed:-

i. Rotation at A = 0.01 radians (clockwise)

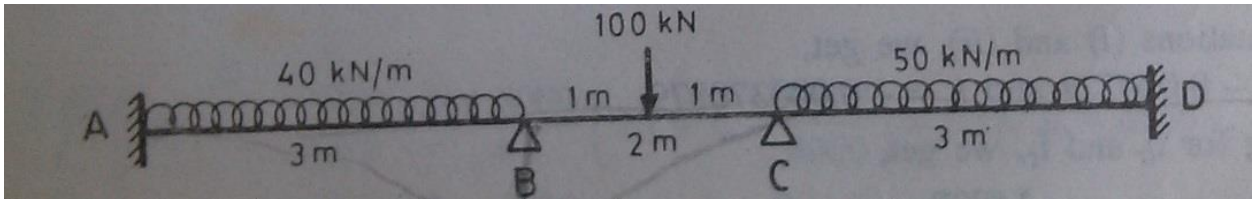
Settlement at A = 20mm

ii. Rotation at B = 0.0075 radians (anticlockwise)

Settlement at B = 15mm

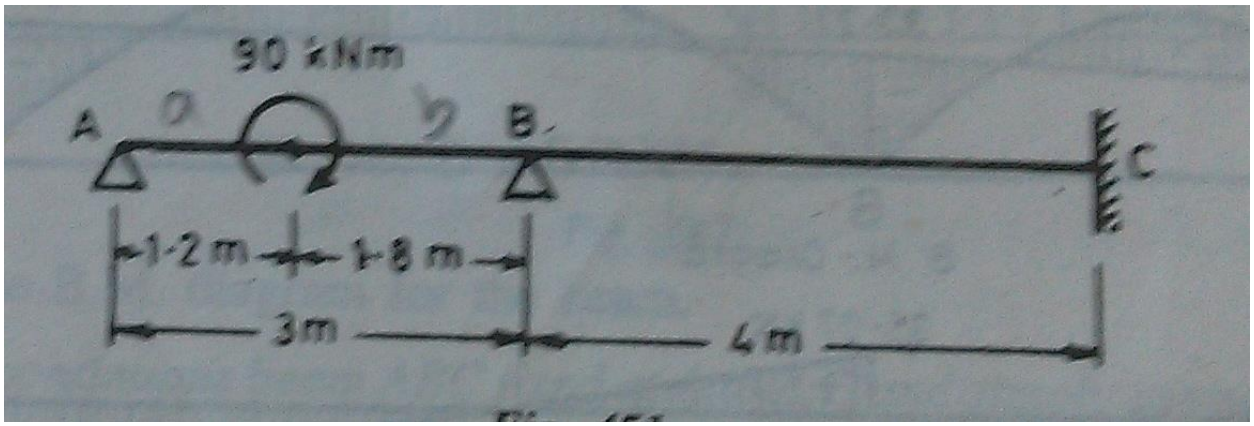
Find the support moments and the reactions at the supports and draw B.M. diagram.

16. Determine the support moments for the continuous girder shown in fig. if the support B sinks by 2.50mm. For all members, I = 3.50x10⁷mm⁴; E=200kN/mm²

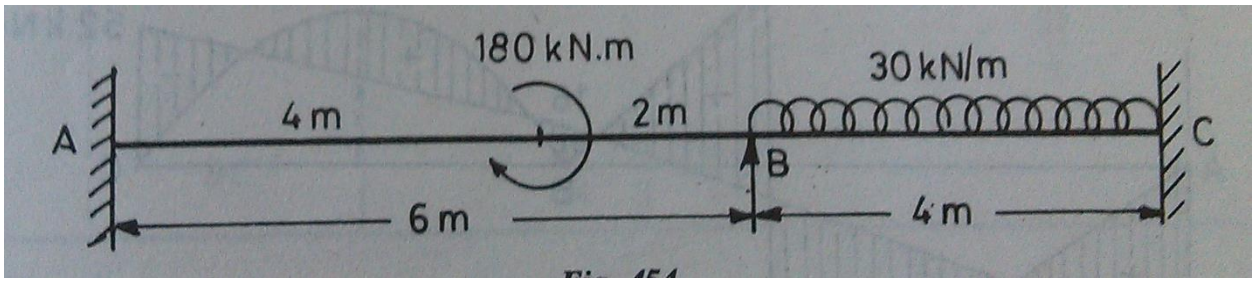


Solve the following questions by MOMENT DISTRIBUTION METHOD.

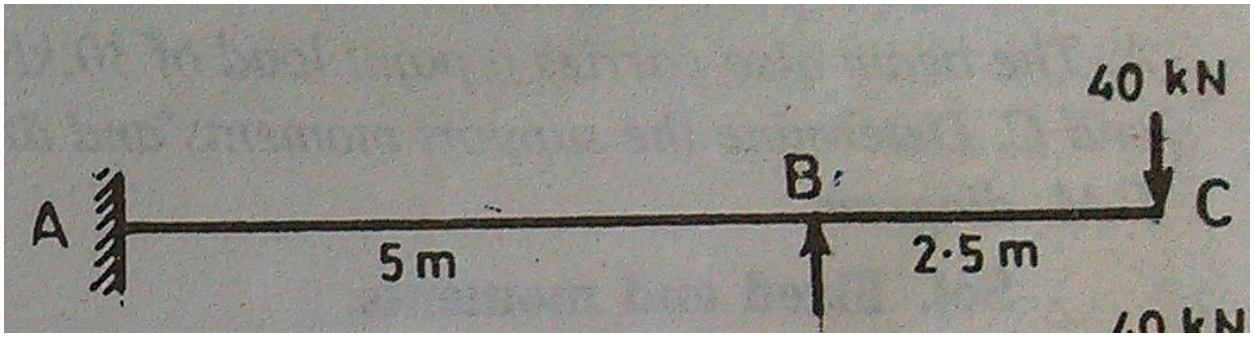
17. Find the support moments and draw the B.M. diagram for the beam shown in fig. Assume the section to be uniform.



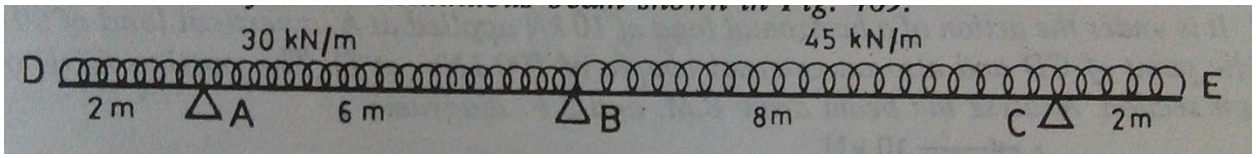
18. A continuous beam ABC is loaded as shown in fig. Find the support reactions and moments. Also draw the S.F. and B.M. diagrams.



19. Draw the B.M. diagram for the beam shown in fig.

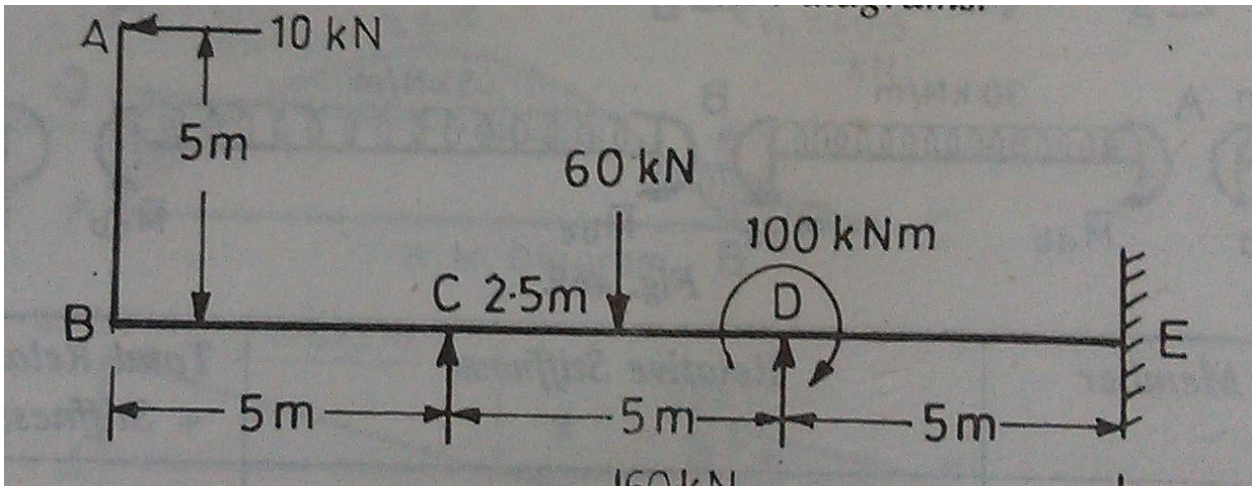


20. Analyse the continuous beam shown in fig.

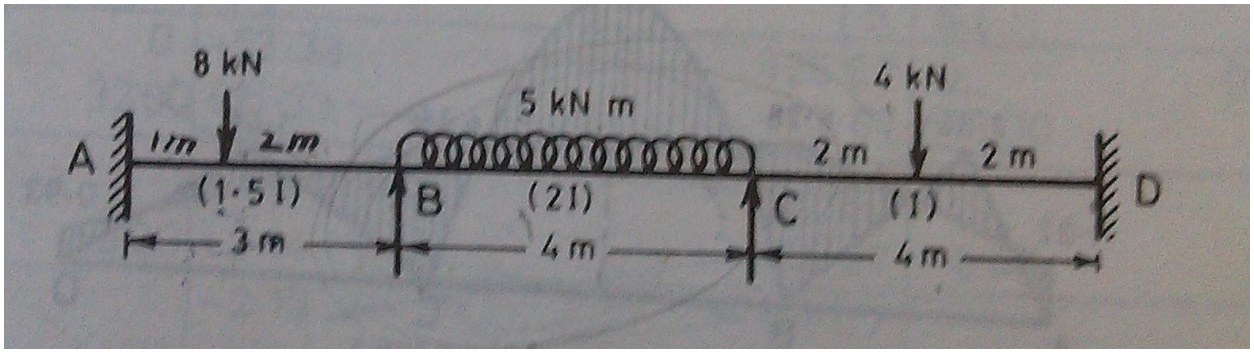


21. A continuous beam ABCDE is encastred at E and freely supported at C and D as shown in fig. It is under the action of horizontal load 10kN at A , a vertical load of 60kN at the mid point of CD and also an external couple of 100kNm at D. The portion CDE is of uniform section. Analyse the beam and draw S.F.

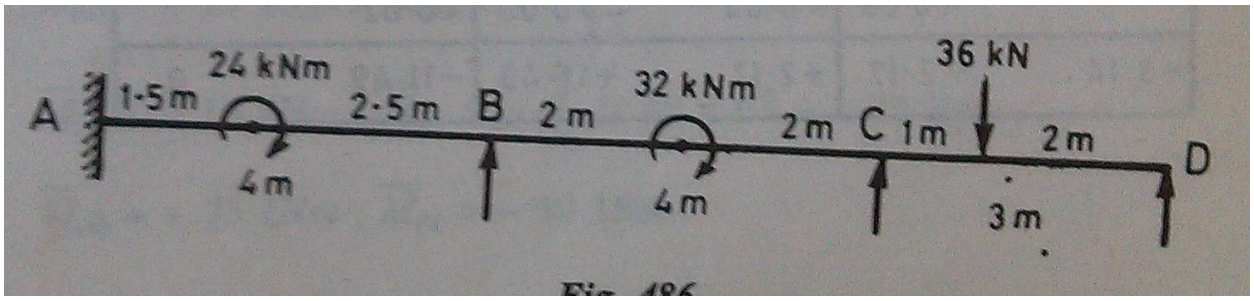
and B.M. diagram.



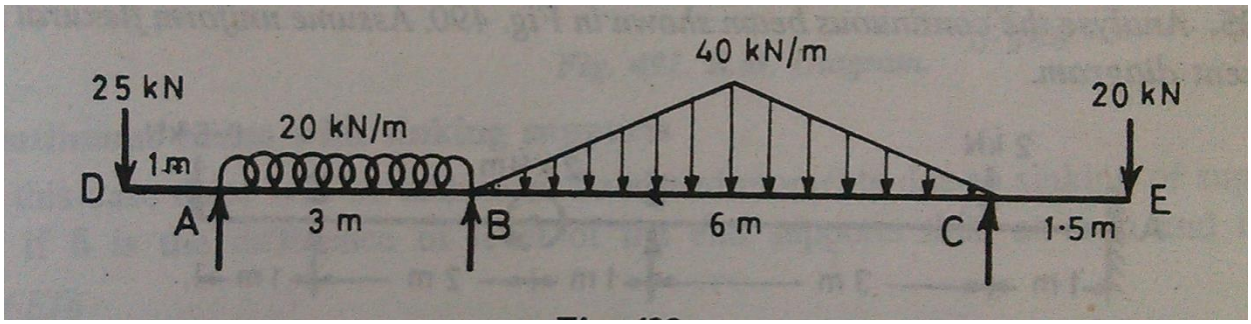
22. Determine the support moments A, B,C and D for the continuous beam shown in fig.



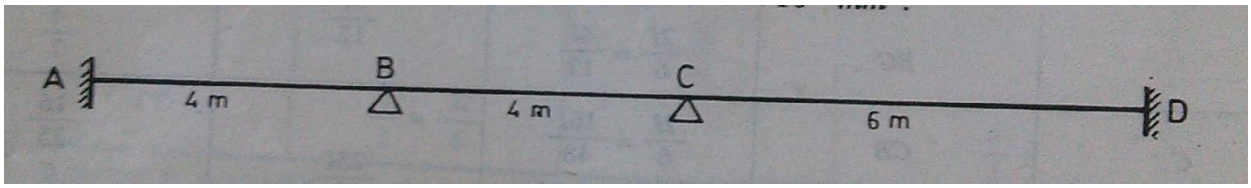
23. Determine the support moments for the beam shown in fig.



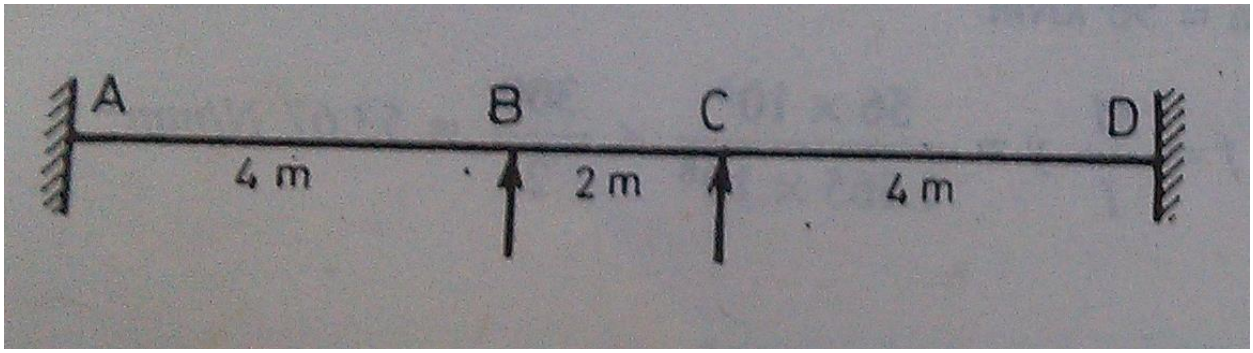
24. Analyse the continuous beam shown in fig.



25. Analyse the continuous beam shown in fig. Take I= $4x10^7$ mm^4 ; E = 200 kN/mm^2

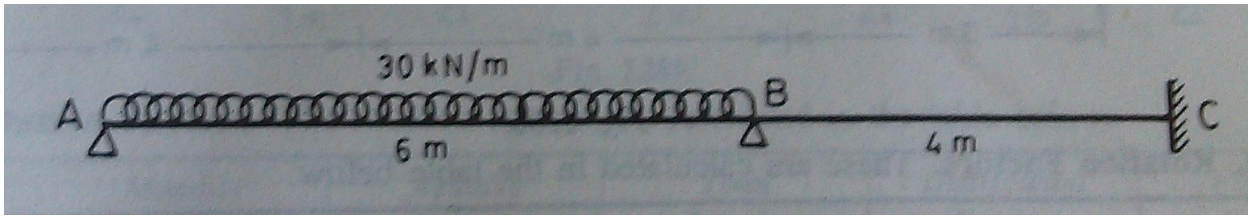


26. The following continuous beam has flexural rigidity EI = $2000x10^7$ $kNmm^2$. If end A rotates by 0.001 radians in the anticlockwise order, calculate the moments at A, B, C , D.

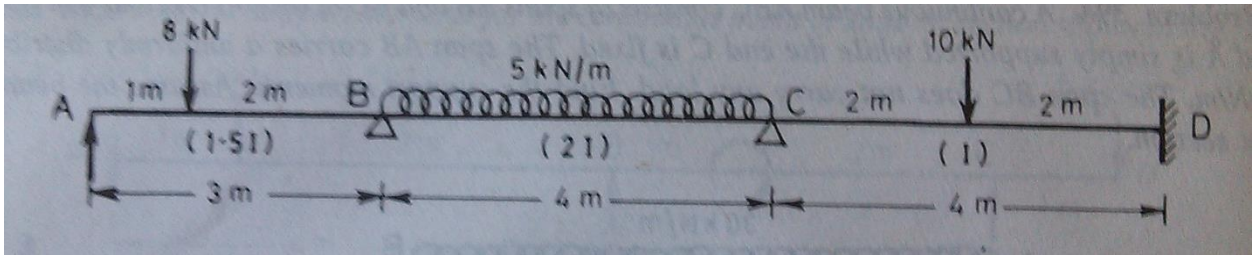


27 A continuous beam ABC consists of span AB and BC of lengths 3m and 4m, resp. End A is simply supported and C is fixed. The beam carries a point load of 16kN at the centre of span AB and a point load of 24 kN on span BC at a distance of 2.5m from end C. find the support moments. Assume uniform section of the beam.

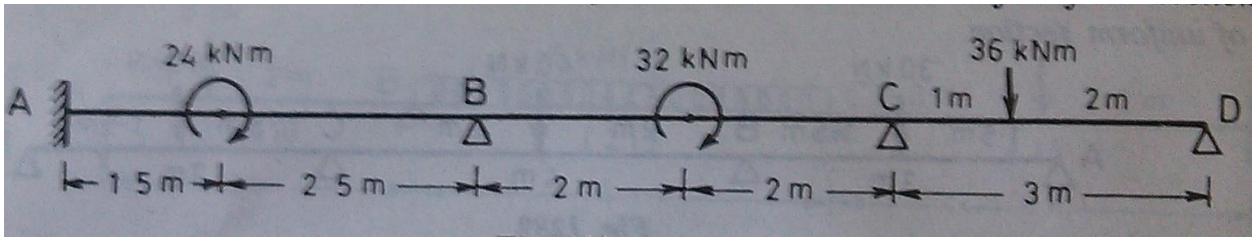
28. Find the support moments assuming the section to be uniform.



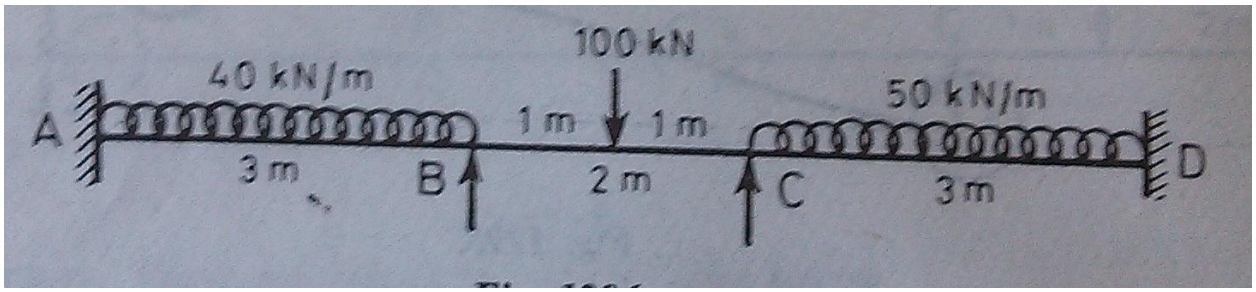
29. Find the moments at A, B, C and D in following fig.



30. Find the support moments in the following continuous beam.



31. Determine the support moment for the continuous girder as shown in fig. ; if the support B sinks by 2.5mm. Given I = 3.5x10 mm^4 ; E = 200 kN/mm^2 .

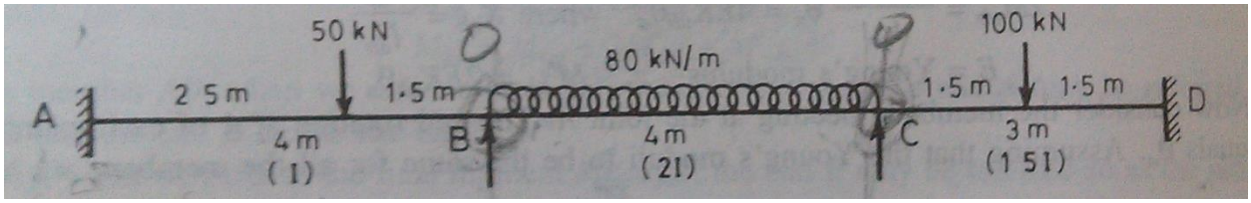


Ten marks Questions

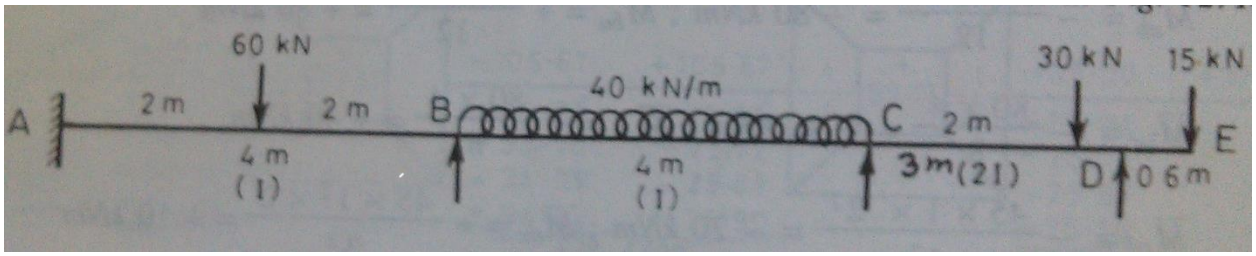
1. A continuous beam ABCD 16 m long is simply supported at A,B,C,D. the beam consists of spans AB,BC, & CD of lengths 4 m, 6m, & 6m respectively. It carries a point load of 64 KN on the span "AB" at a distance of 1m from "A", a load of 45 KN on the span "BC" at a distance of 2 m from "B" and a UDL of 12 KN/m on the span "CD". Find the support moments & reactions. Also draw "BMD" & "SFD". Use theorem of three moments. s

Solve the following questions by ROTATION CONTRIBUTION METHOD.

2. Determine the support moments at A, B, C D for the continuous beam shown in fig



3. Find the support moments of continuous beam shown in fig.



4.

5. Explain in detail with proper diagram various component parts of a diversion head works?

6. What are the five possibilities on which location of jump depends & give energy dissipation arrangements?

7. Design a vertical drop weir on the basis of Bligh's theory (only hydraulic calculations along with top & bottom width of weir) for the following data:

Maximum flood discharge = 2585 cumec

H.F.L. before construction = 255.0 m

Minimum water level = 248.0 m

F.S.L. of canal = 254.0 m

Allowable afflux = 1 m

Coefficient of creep ‘C’ = 12

Silt factor = 1

Head loss through regulator = 0.5 m

8. What are the five possibilities on which location of jump depends & give energy dissipation arrangements for all five possibilities.

9. Design a cross regulator for a channel which takes off from the parent channel with the following data:

Discharge of parent channel = 140 cumecs ; Discharge of distributary = 140 cumecs ; F.S.L of parent channel, u/s = 210 m ; F.S.L of parent channel, d/s = 210 m ; Bed width of parent channel, u/s = 52 m ; Bed width of parent channel, d/s = 46 m ; Depth of water in the parent channel u/s & d/s =2.5 m ; F.S.L of distributary = 209.10 m ; Silt factor = 0.8 ; Assume safe exit gradient = 1/5 ; Assume Y1 & Y2 = 0.8 & 1.8m.

10. Design a 1.5 metres sarda type fall for a canal having a discharge of 40 cumecs with the following data:

Bed level u/s = 105 m ; Side slope of channel = 1:1 ; Bed level d/s = 103.5 m ; F.S.L u/s = 106.8 m; F.S.L d/s = 105.3 m ; Berm level u/s = 107.4 m ; Bed width u/s & d/s = 30 m ; Safe exit gradient for Khosla’s Theory = 1/5.

11. Design an unflumed non meter baffle fall for the canal having the following data:

Full supply discharge = 30 cumecs ; Bed level u/s = 203 m ; Bed level d/s = 201.2 m

FSL u/s = 204.3 m ; FSL d/s = 202.5 m ; Bed width =28 m ; Drop (HL) = 1.8 m ; Side slopes of channel = 1:1

12. Design a cross regulator for a channel which takes off from the parent channel with the following data:

Discharge of parent channel = 140 cumecs ; Discharge of distributary = 140 cumecs ; F.S.L of parent channel, u/s = 210 m ; F.S.L of parent channel, d/s = 210 m ; Bed width of parent channel, u/s = 52 m ; Bed width of parent channel, d/s = 46 m ; Depth of water in the parent channel u/s & d/s =2.5 m ; F.S.L of distributary = 209.10 m ; Silt factor = 0.8 ; Assume safe exit gradient = 1/5 ; Assume Y1 & Y2 = 0.8 & 1.8m.

13. Design a suitable cross drainage work at the crossing of a canal & a drainage for the following data:

    CANAL

    Full Supply Discharge = 32 Cumecs

Full Supply Level = 213.5 m

Canal Bed Level = 212 m

Canal water depth = 1.5 m

Bed width = 20 m

Trapezodial canal section with 1.5H : 1V Slopes

DRAINAGE

High Flood Discharge = 300 Cumecs

High Flood Level = 210 m

High Flood Depth = 2.5 m

General Ground level = 212.5 m

14. Explain in detail the various types of canals outlets?
15. Design a pipe outlet for the following data:

Full Supply discharge at the head of water course = 90 lit/sec

Full Supply level in distributary = 205 m

Full Supply level in canal = 204 m

16. Explain in detail with neat sketches various types of cross drainage works?