SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK

Subject with Code: Advanced Structural Analysis (16CE2003)**Course & Branch**: M. Tech - Structural Engineering

Year & Sem:I M.TECH & I-Sem **Regulation:** R16

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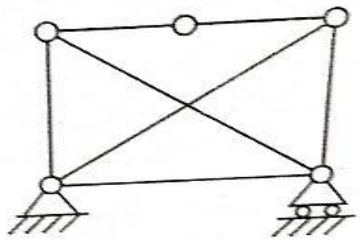
1. a) What are the difference between static and kinematic indeterminacies? Explain them withexamples.

b) Calculate the degree of redundancy and degree of freedom of pin-jointed plane frame as shown in fig.(1)

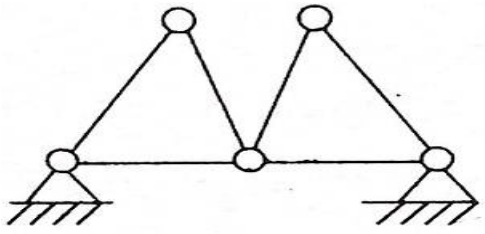


Fig(1)

2. a) Explain the structural idealization.

b) Distinguish between indeterminacy and kinematic indeterminacy of structure.

3. a) Calculate the degree of redundancy and degree of freedom of pin-jointed plane frame as shown in fig(2)



Fig(2)

b) Define flexibility and stiffness.

4. Calculate the degree of redundancy and degree of freedom for fig(3)

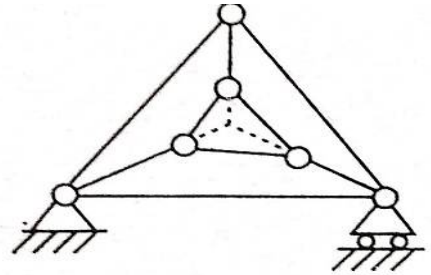


Fig (3)

5. a) Differentiate between DOF and DOR.

b) Calculate the degree of redundancy and degree of freedom for fig(4)

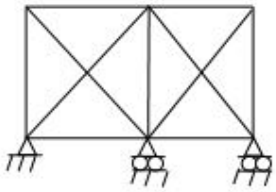


Fig (4)

6. a) Explain the classification of structures with examples.

b) Derive the expression F*k=1

7. Calculate the D_s and D_k for the following fig (5) & (6)

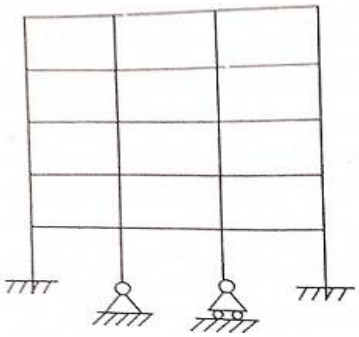


Fig (5)

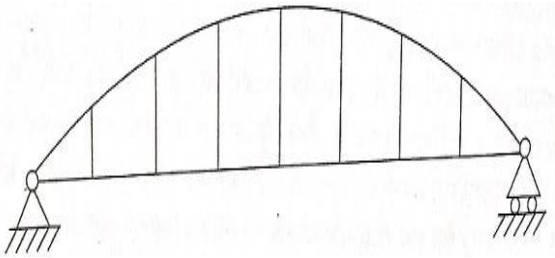


Fig (6)

8. Determine the static and kinematic indeterminacy of portal frame shown in fig. (7)

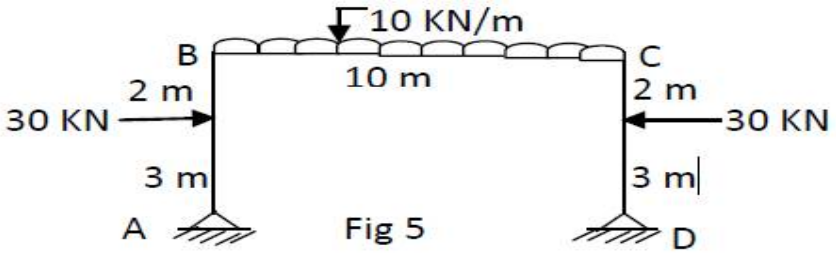


Fig (7)

9. Determine degree of freedom and degree of redundancy for the following beam shown in fig.(8/)

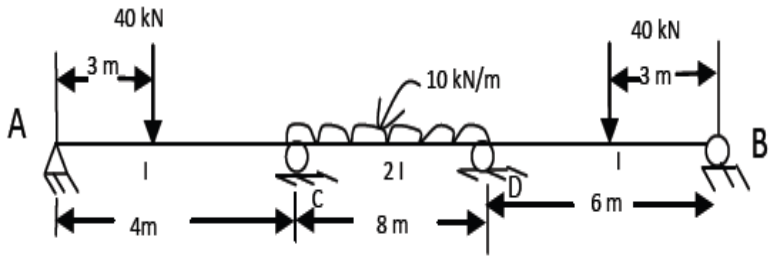


Fig (8)

10. a) What is static and kinematic indeterminacy?

b) What is degree of static and kinematic indeterminacy of the following frame shown in fig. (9)

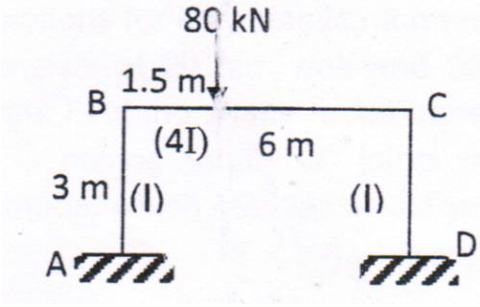


Fig (9)

11. Derive the relation between flexible and stiffness matrix

12. a) Write the procedure analyzing of structure by flexibility method.

b) Define force method and displacement method

13. Derive the flexibility and stiffness relations when the force gives to

(i) Force displacement

(ii) Bending or flexural displacement.

(iii) Transverse displacement

14. Calculate the flexibility matrix shown in fig (10)

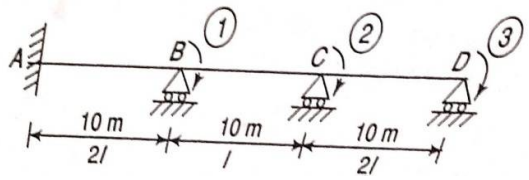


Fig (10)

15. For the simply supported beam shown in fig (11). Develop the flexibility matrix.

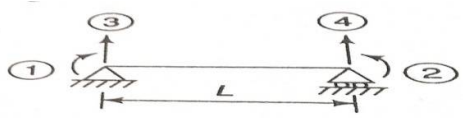


Fig (11)

16. Develop the flexibility matrix for the simply supported beam AB with reference to the coordinates shown in fig (12)

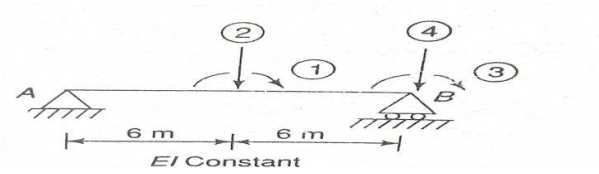


Fig (12)

17. Develop the stiffness matrix for the end-loaded prismatic member AB with reference to the coordinates shown in fig (13)

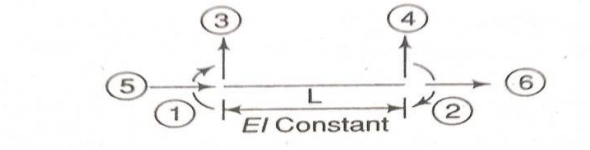


Fig (13)

18. Develop the flexibility matrix for the beam AB with reference to the coordinates shown in fig (14)

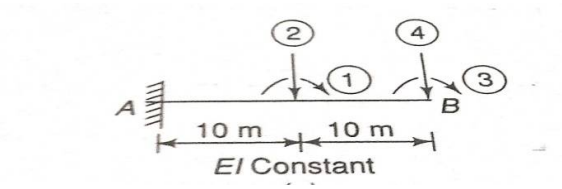


Fig (14)

19. Develop the flexibility matrix for the frame ABCD with reference to the coordinates as Shown in fig (15)

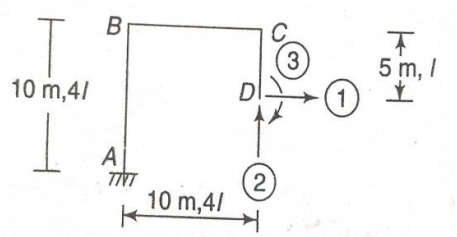


Fig (15)

20. Develop the stiffness matrix for the portal frame with reference to the coordinate shown in fig (16)

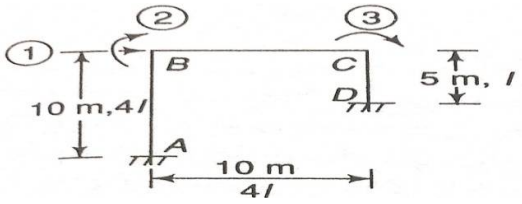
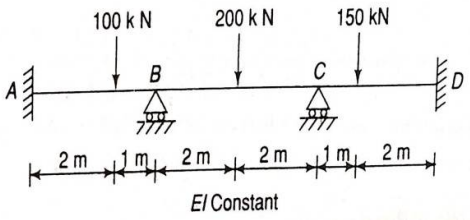


Fig (16)

21.Analyze the continuous beam shown in Fig(17) by displacement method



Fig(17)

22. Develop the flexibility matrix for the pin-jointed plane frame with reference to coordinates 1 & 2 shown in fig(18). The numbers in parentheses are the cross-sectional areas of the members in mm^2

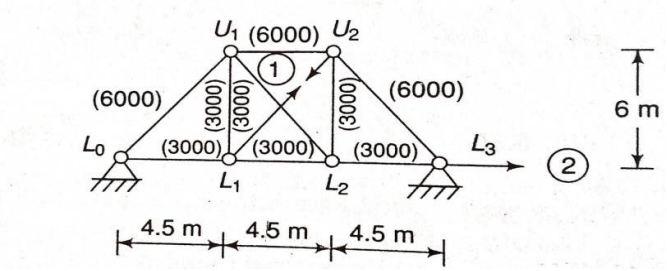


Fig (18)

23. Analyze the pin-jointed structure shown in fig(19) by force method. The area of each member is 200mm^2. TakeE=200KN/mm^2

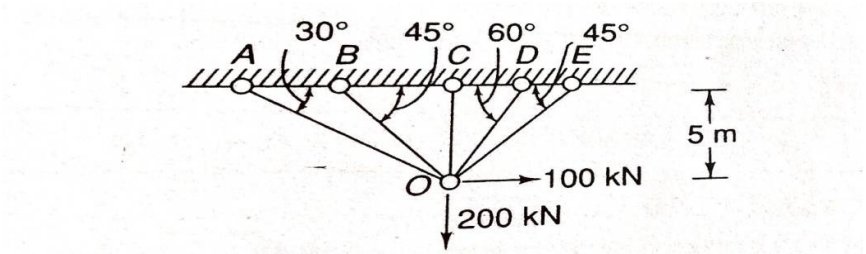


Fig (19)

24. Analyze the continuous beam shown in fig(20) by stiffness method. The downward settlement of supports B and C in KN-m are 1500/EI and 750/EI.

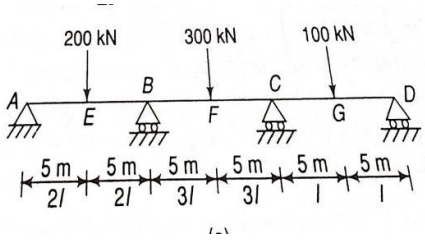


Fig (20)

25. Fig(21) shows a jip-Crane carrying vertical load of 10kN at A. Determine the deflection of Joint A. Hence calculate the forces in members AB& AC.The cross-sectional area in mm^2 .Take E=200kN-mm^2.

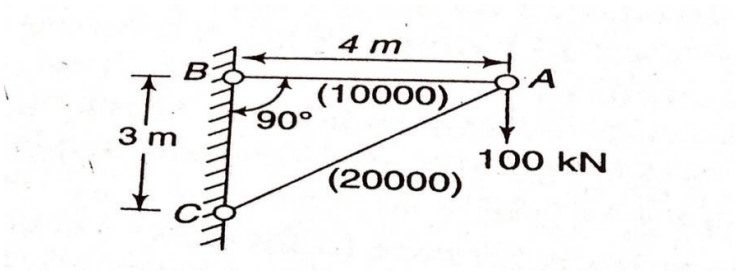


Fig (21)

26. Analyze the pin-jointed plane frame shown in fig(22), if there is no displacement at support L4.

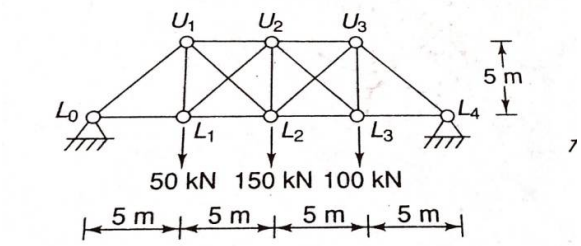


Fig (22)

27. Analyze the continuous beam shown in fig (23) by displacement method by and draw shear force and bending moment diagrams.

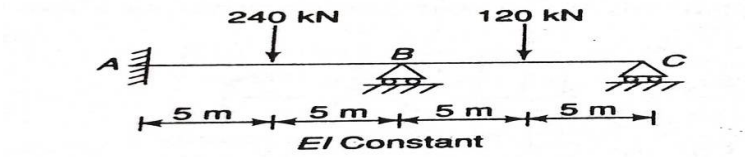


Fig (23)

28. Calculate the flexibility matrix for the beam shown in fig (24) and draw shear force and bending moment diagrams

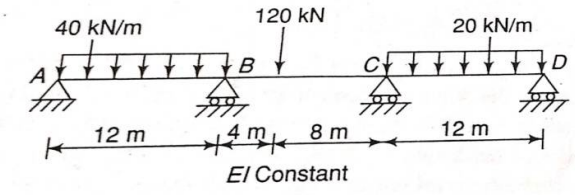


Fig (24)

29. Analyze the continuous beam shown in fig (25)using stiffness method and draw BMD.

10M

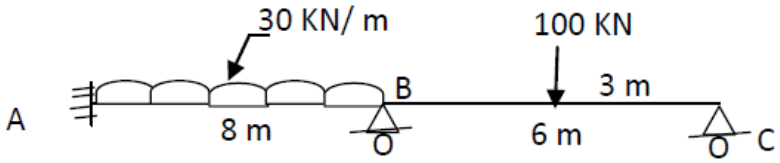


Fig (25)

30. Using displacement method, analyze the continuous beam as shown in figure (26) below. The SupportC sinks by 120/EI. Draw BMD. 10M

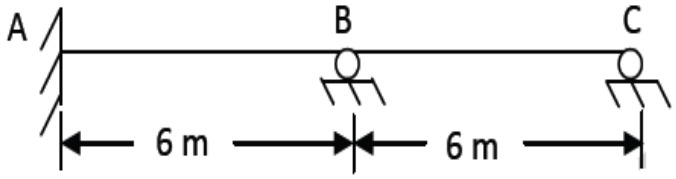


Fig (26)

31. Analyze the portal frame as shown in fig (27) by force method. If the downward settlement at C and D in KNm units are 1000/EI and 500/EI respectively.

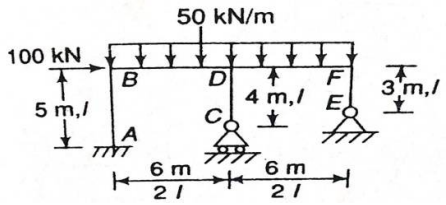


Fig (27)

32. Analyze the frame shown in fig (28) by force method.

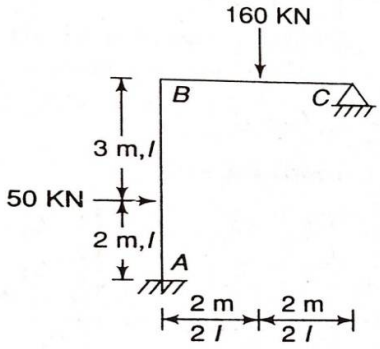


Fig (28)

33. Analyze the portal frame shown in fig (29)by displacement method

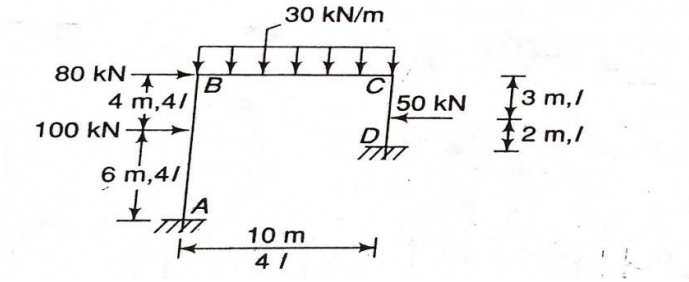


Fig (29)

34. Analyze the frame shown in fig (30) by displacement method.

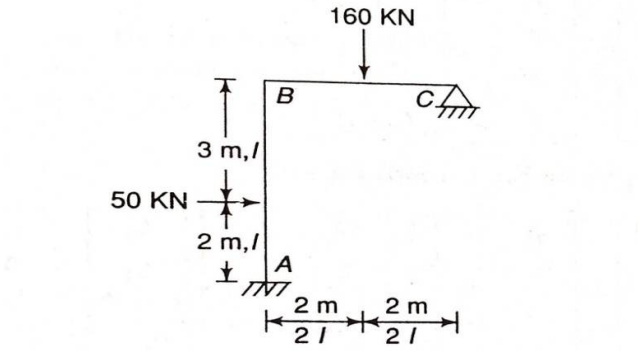


Fig (30)

35. Analyze the portal frame shown in fig (31) by force method.

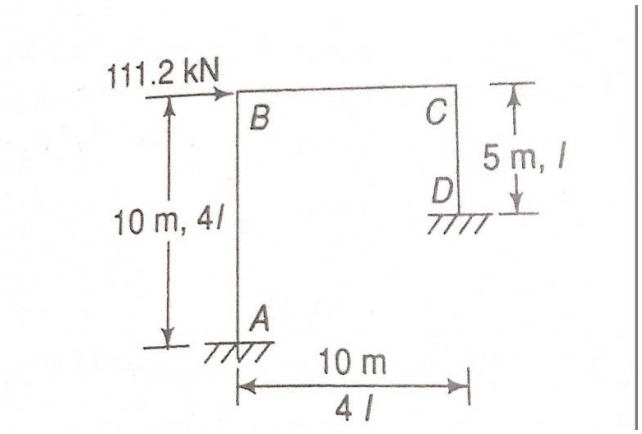


Fig (31)

36. Determine the stiffness matrix for the portal frame shown in fig. (32)

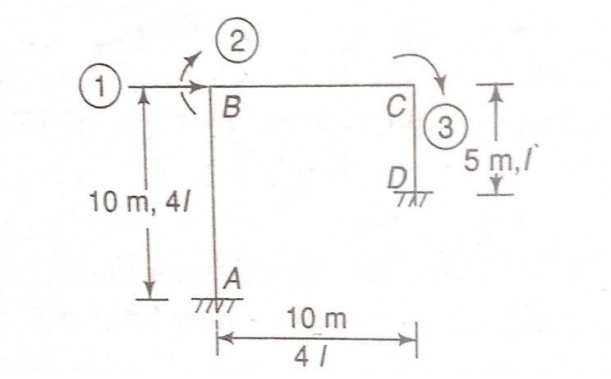


Fig. (32)

37. Analyze the frame shown in fig (33) by displacement method.

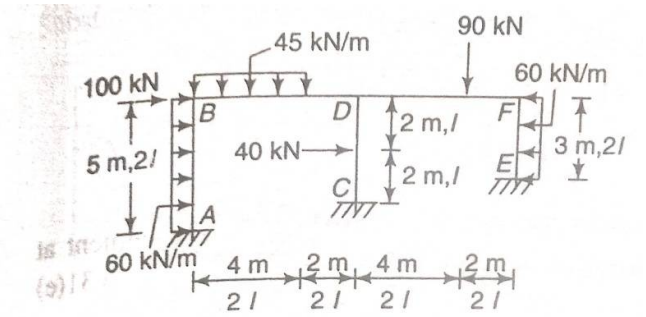


Fig (33)

38. Analyze the portal frame shown in fig (34) by flexibility method.

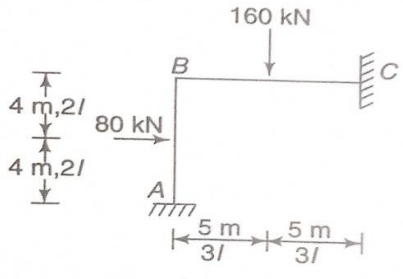


Fig (34)

39. Calculate the force matrix and also draw the bending moment diagram for the following frame shown in fig (35)

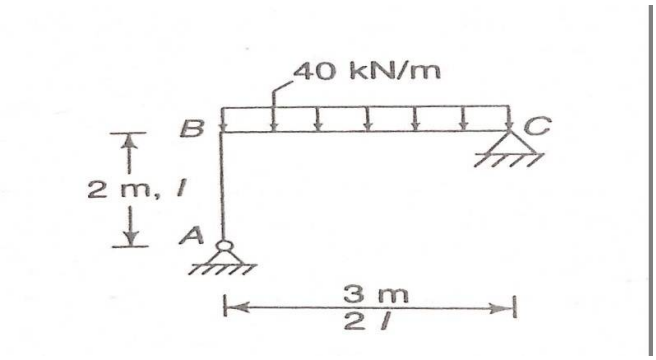


Fig (35)

40. Calculate the displacement matrix for the following frame shown in fig (36). And also draw the bending moment diagram.

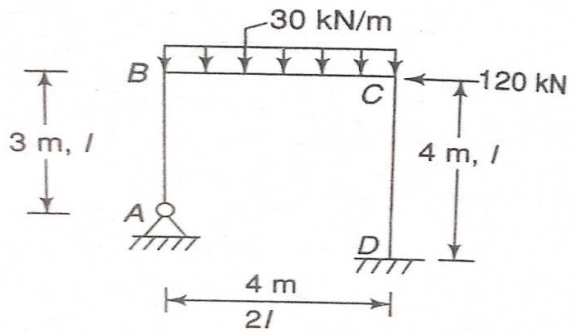


Fig (36)

41. Analyze the continuous beam shown in fig (37) by using force method. Use matrix transformations method.

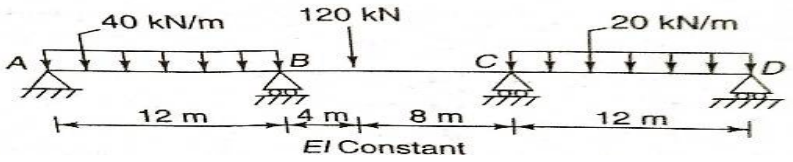


Fig (37)

42. Analyze the continuous beam shown in fig (38) by using displacement method. Use matrix transformations method.

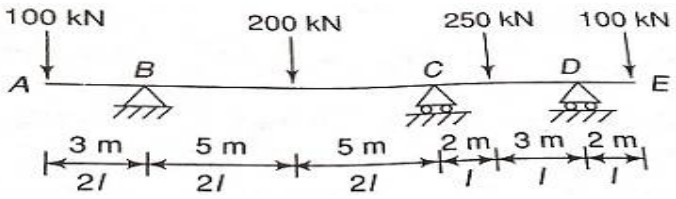


Fig (38)

43. Analyze the rigid- jointed plane frame as sown in fig (39) by force method. Use matrix transformation method.

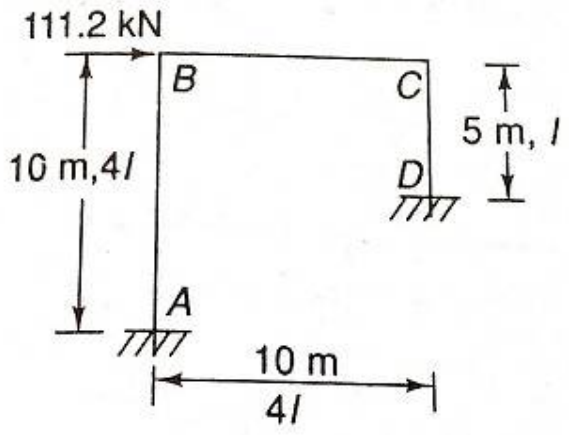


Fig (39)

44. A system of linear algebraic equations is given below. Obtain the solution by Cholesky method.

$$x+2y-3z = 7$$
$$3x+2y+2z = -5$$
$$4x - y+5z = 5$$

45. Solve the following system of equations using Gauss elimination method.

$$-4x+ y + 10z =21$$
$$5x – y + z = 14$$
$$4x+ 6y + 7z = 12$$

46. List and explain the direct methods for solving linear equations.

47. Determine the solution by using Gauss elimination method.

$$2x_1 – 2x_2 +4x_3 = -3$$
$$2x_1 + 3x_2 +2x_3 = 5$$
$$-x + x_2 - x_3 = 1$$

48. Write short notes on
    (i) Cholesky Method
    (ii) Band Matrix and Semi band width

49. Write short notes on
    (i) Gauss elimination method.
    (ii) Solution of linear simultaneous equations.

50. Write short notes on
    (i) Matrix inversion method.
    (ii) Static Condensation.