Code No. 2023

FACULTY OF ENGINEERING

B.E. 4/4 (Civil) I-Semester (Main) Examination, November / December 2012

Subject : Matrix Methods and Numerical Techniques

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. Explain the static indeterminacy with an example. (2)
2. List out the advantages of matrix analysis. (3)
3. Develop the stiffness matrix for a 2-node 2-D truss element of length 4 m with c/s area 20 cm^2 and Young's modulus 200 GPa. (2)
4. Develop the flexibility matrix for a 2-node 2-D beam element with only flexural degrees of freedoms at both ends. (3)
5. What is the reason for symmetry of flexibility matrix? (2)
6. A structure has a stiffness matrix $EI\begin{bmatrix} 4 & 1 \\ 1 & 5 \end{bmatrix}$. Determine its flexibility matrix. (3)
7. What is meant by a banded matrix? What is its advantage? (2)
8. Explain briefly the Gauss-Jordon method for solution of simultaneous equation. (3)
9. What are the interior points in finite difference method? (2)
10. Explain briefly the Simpson's $1/3^{rd}$ rule. (3)

PART – B (50 Marks)

11. (a) Explain the Cholesky method for solution of simultaneous equation of the type A X = B, when A is symmetric. (5)

    (b) Determine the static and kinematic indeterminacies of the frame show in figure 1. (5)

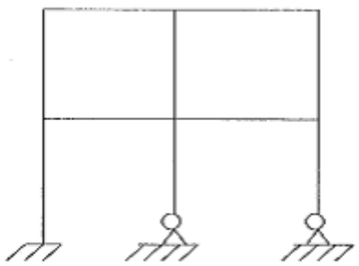

Fig. 1

12. Analyse the continuous beam shown in figure 2 by flexibility method and draw SFD and BMD. (10)

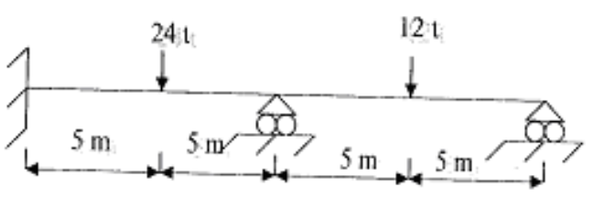

Fig. 2

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13. Analyse the portal frame show in figure 3 by flexibility method and draw SFD and BMD. (10)

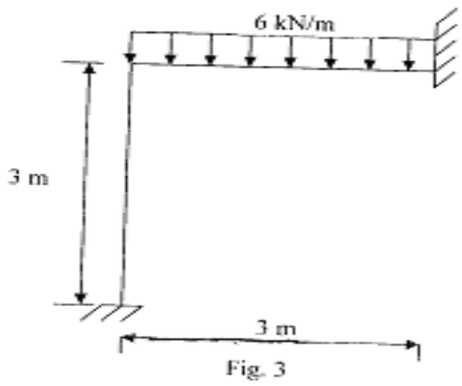

Fig. 3

14. Analyse the continuous beam show in figure 4 by stiffness method and draw SFD and BMD. (10)

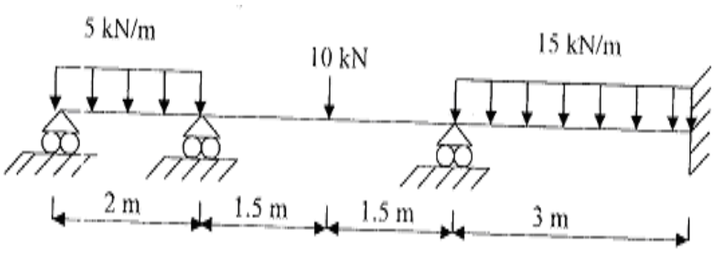

Fig. 4

15. Analyse the portal frame shown in figure 5 by stiffness method and draw SFD and BMD. (10)

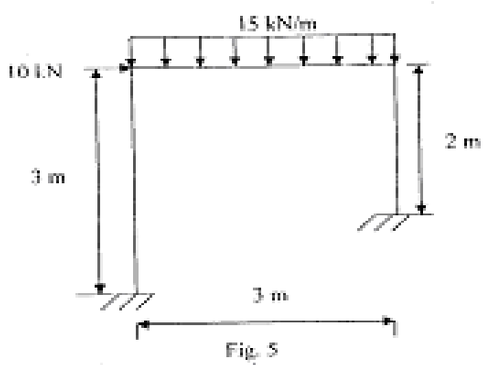

Fig. 5

16.(a) Explain the bisection method for solution of non-linear equations. (5)

(b) Solve the following set of equations by Gauss elimination method. (5)

$$x_1 + 2x_2 - x_3 = 2$$

$$2x_1 - x_2 + x_3 = 3$$

$$-x_1 - x_2 + x_3 = 0$$

17.(a) Solve the differential equation $\frac{dy}{dx} = x^2y$ by the Euler's method with the initial condition y(x=0)=1. Find y(x=1) using step size h =0.05. (5)

(b) Explain the finite difference formulation of hyperbolic equations. (5)

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