# FORMULATION OF MEMBER STIFFNESS MATRIX FOR BEAM

| V | R | V | R | |
|---|---|---|---|---|
| $12EI/L^3$ | $6EI/L^2$ | $-12EI/L^3$ | $6EI/L^2$ | V |
| $6EI/L^2$ | $4EI/L$ | $-6EI/L^2$ | $2EI/L$ | R |
| $-12EI/L^3$ | $-6EI/L^2$ | $12EI/L^3$ | $-6EI/L^2$ | V |
| $6EI/L^2$ | $2EI/L$ | $-6EI/L^2$ | $4EI/L$ | R |

**SIMPLIFIED FORM**

**TAKE EI/L AS COMMON FROM BRACKET**

| | | | |
|---|---|---|---|
| $12/L^2$ | $6/L$ | $-12/L^2$ | $6/L$ |
| $6/L$ | $4$ | $-6/L$ | $2$ |
| $-12/L^2$ | $-6/L$ | $12/L^2$ | $-6/L$ |
| $6/L$ | $2$ | $-6/L$ | $4$ |

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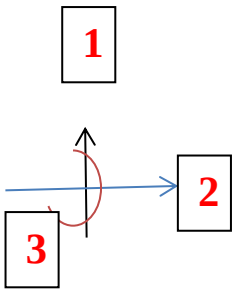
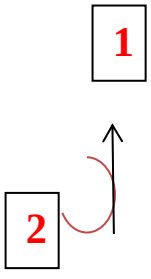
## STEP BY STEP PROCEDURE FOR ANALYSIS OF BEAM SING DIRECET STIFNESS METHOD

1) IDENTIFICATION OF DOKI (DEGREE OF KINAMETIC INDETERMENANCY) FROM FIG.
2) MARKING OF UNKNOWN AND KNOWN DOF AT EACH NODAL POINT USING SYMBOLS 1, 2, 3 ETC
3) REMEMBER, ALWAYS START WRITING THE SYMBOLS WITH UNKOWN DOF FIRST THEN KNOWN DOF AND IN THAT REPRESENTAION IS LIKE THIS




**ALSO AS IN BEAM AXIAL DEFORMATION IS NEGLECTED SO SYMBOL 2 WILL BE SKIP THEN WILL GET**



4) FORMULATION OF MEMBER STIFFNESS MATRIX FOR BEAM OF 2 NODAL POINTS AT A TIME.

| V | R | V | R | |
|---|---|---|---|---|
| $12EI/L^3$ | $6EI/L^2$ | $-12EI/L^3$ | $6EI/L^2$ | V |
| $6EI/L^2$ | $4EI/L$ | $-6EI/L^2$ | $2EI/L$ | R |
| $-12EI/L^3$ | $-6EI/L^2$ | $12EI/L^3$ | $-6EI/L^2$ | V |
| $6EI/L^2$ | $2EI/L$ | $-6EI/L^2$ | $4EI/L$ | R |

**SIMPLIFIED FORM**

**TAKE EI/L AS COMMON FROM BRACKET**

| | | | |
|---|---|---|---|
| $12/L^2$ | $6/L$ | $-12/L^2$ | $6/L$ |
| $6/L$ | $4$ | $-6/L$ | $2$ |
| $-12/L^2$ | $-6/L$ | $12/L^2$ | $-6/L$ |
| $6/L$ | $2$ | $-6/L$ | $4$ |

5) FORMULATION OF GLOBAL STIFFNESS MATRIX

K MATRIX BASED ON UNKOWN DOF

6) CALCULATION OF GLOBAL LOAD MATRIX

7) DISPLACEMENT CALCULATION
(K) (D.F) = (A.FC)

8) CALCULATION OF FINAL MEMBER FORCES
(A.M) = (AML) + (SM) (D.M)

9) PLOTING OF BMD AND SFD