



Work sheet(Unit wise Objective)

UNIT-III: Matrix Methods -Flexibility Matrix Method

Part A: Multiple Choice Questions (MCQs)

Introduction to Flexibility Matrix Method

1. The Flexibility Matrix Method is also known as:
a) Displacement Method
b) Force Method
c) Stiffness Method
d) Moment Distribution Method
Answer: b
2. In the Flexibility Method, the primary unknowns are:
a) Joint displacements
b) Member forces
c) Support reactions
d) Bending moments only
Answer: b
3. The flexibility coefficient represents:
a) Force required for unit displacement
b) Displacement due to unit force
c) Stress due to unit strain
d) Load due to unit moment
Answer: b
4. The flexibility matrix is generally denoted by:
a) [K]
b) [F]
c) [D]
d) [M]
Answer: b
5. The flexibility matrix relates:
a) Forces and displacements
b) Loads and stresses
c) Moments and rotations only
d) Strains and stresses
Answer: a
6. The Flexibility Method is based on:
a) Equilibrium conditions only
b) Compatibility conditions
c) Hooke's Law only
d) Graphical analysis
Answer: b
7. The order of the flexibility matrix depends on:
a) Number of members
b) Degree of static indeterminacy
c) Number of joints
d) Span length
Answer: b
8. The flexibility matrix is:
a) Symmetric
b) Antisymmetric
c) Diagonal only

d) Singular always

Answer: a

9. A statically determinate structure has a degree of indeterminacy:

a) 0

b) 1

c) 2

d) Infinite

Answer: a

10. The redundant force is:

a) An unknown force removed to make the structure determinate

b) A known load

c) A support settlement

d) A displacement

Answer: a

Continuous Beams and Frames

11. In the flexibility method, compatibility equations are written in terms of:

a) Forces

b) Displacements

c) Moments

d) Reactions

Answer: b

12. Support settlement introduces:

a) Additional compatibility conditions

b) No change

c) Additional loads only

d) Additional supports

Answer: a

13. The flexibility matrix method is most convenient for:

a) Highly indeterminate structures

b) Structures with low degree of indeterminacy

c) Trusses only

d) Arches only

Answer: b

14. The unit load method is used to determine:

a) Reactions

b) Flexibility coefficients

c) Shear forces

d) Stiffness coefficients

Answer: b

15. The compatibility matrix ensures:

a) Equilibrium

b) Geometry of deformation

c) Load distribution

d) Stress analysis

Answer: b

16. The inverse of the stiffness matrix is called:

a) Force matrix

b) Compatibility matrix

c) Flexibility matrix

d) Load matrix

Answer: c

17. Pin-jointed plane frames primarily carry:

a) Bending moments

b) Axial forces

c) Torsion

d) Shear only

Answer: b

18. In a pin-jointed frame, members are assumed to be connected by:

- a) Fixed joints
- b) Hinged joints
- c) Rigid joints
- d) Welded joints

Answer: b

19. The force method satisfies:

- a) Compatibility first, then equilibrium
- b) Equilibrium first, then compatibility
- c) Neither equilibrium nor compatibility
- d) Stress conditions only

Answer: b

20. The flexibility matrix method is particularly useful in understanding:

- a) Force-displacement relationships
- b) Load combinations
- c) Concrete mix design
- d) Soil behavior

Answer: a

Part B: Fill in the Blanks

- 1. Flexibility Matrix Method is also called the **Force Method**.
- 2. The primary unknowns in the flexibility method are **forces**.
- 3. Flexibility coefficient represents displacement due to a unit **force**.
- 4. The flexibility matrix is generally represented by **[F]**.
- 5. The flexibility method is based on **compatibility** conditions.
- 6. The order of the flexibility matrix depends on the degree of static **indeterminacy**.
- 7. A flexibility matrix is generally **symmetric**.
- 8. A statically determinate structure has zero degree of **indeterminacy**.
- 9. A redundant is an unknown **force** removed to make the structure determinate.
- 10. Compatibility equations are written in terms of **displacements**.
- 11. Support settlement introduces additional **compatibility** conditions.
- 12. The flexibility method is suitable for structures with low degree of **indeterminacy**.
- 13. The unit load method is used to calculate flexibility **coefficients**.
- 14. The inverse of the stiffness matrix is the **flexibility** matrix.
- 15. Pin-jointed plane frames primarily carry **axial** forces.
- 16. Members in pin-jointed frames are connected by **hinges**.
- 17. The force method satisfies **equilibrium** before compatibility.
- 18. The flexibility matrix establishes force-displacement **relationships**.
- 19. Continuous beams can be analyzed using the **flexibility** matrix method.
- 20. The flexibility method is one of the fundamental **matrix** methods of structural analysis.