



Sample Question paper

**Part 01**

**1. In the slope deflection equations, the deformations are considered to be caused by**

- (i) Bending moment**
- (ii) Shear force**
- (iii) Axial force**

**The correct answer is**

- (A) Only (i)
- (B) (i) and (ii)
- (C) (ii) and (iii)
- (D) (i), (ii) and (iii)

**2. A single rolling load of 8kN rolls along a girder of 15 m span. The absolute maximum bending moment will be**

- (A) 8 kN.m
- (B) 15 kN.m
- (C) 30 kN.m
- (D) 60 kN.m

**3. The deformation of a spring produced by a unit load is called**

- (A) Stiffness
- (B) Flexibility
- (C) Influence coefficient
- (D) Unit strain

**4. Independent displacement components at each joint of a rigid-jointed plane frame are**

- (A) Three linear movements
- (B) Two linear movements and one rotation
- (C) One linear movement and two rotations
- (D) Three rotations

**5. If there are  $m$  unknown member forces,  $r$  unknown reaction components and  $j$  number of joints, then the degree of static indeterminacy of a pin-jointed plane frame is given by**

- (A)  $m + r + 2j$
- (B)  $m - r + 2j$
- (C)  $m + r - 2j$
- (D)  $m + r - 3j$

**6. The carryover factor in a prismatic member whose far end is fixed is**

- (A) 0
- (B) 1/2
- (C) 3/4
- (D) 1

**7. Effects of shear force and axial force on plastic moment capacity of a structure are respectively to**

- (A) Increase and decrease
- (B) Increase and increase
- (C) Decrease and increase
- (D) Decrease and decrease

**8. The degree of kinematic indeterminacy of a pin-jointed space frame is**

- (A)  $2j - r$
- (B)  $3j - r$
- (C)  $j - 2r$
- (D)  $j - 3r$

Where 'j' is number of joints and 'r' is reaction components

**9. The maximum bending moment due to a train of wheel loads on a simply supported girder**

- (A) Always occurs at centre of span
- (B) Always occurs under a wheel load
- (C) Never occurs under a wheel load
- (D) Never occurs at centre of span

**10. Consider the following statements:**

**Sinking of an intermediate support of a continuous beam**

1. Reduces the negative moment at support.
2. Increases the negative moment at support.
3. Reduces the positive moment at support.
4. Increases the positive moment at the centre of span.

**Of these statements**

- (A) 1 and 4 are correct
- (B) 1 and 3 are correct
- (C) 2 and 3 are correct
- (D) 2 and 4 are correct

**11. When a series of wheel loads crosses a simply supported girder, the maximum bending moment under any given wheel load occurs when**

- (A) The centre of gravity of the load system is midway between the centre of span and wheel load under consideration
- (B) The centre of span is midway between the centre of gravity of the load system and the wheel load under consideration
- (C) The wheel load under consideration is midway between the centre of span and the centre of gravity of the load system
- (D) The wheel load under consideration is at end system

**12. Castigliano's first theorem is applicable**

- (A) For statically determinate structures only
- (B) When the system behaves elastically
- (C) Only when principle of superposition is valid
- (D) When the system behaves non elastically

**13. Number of unknown internal forces in each member of a rigid jointed plane frame is**

- (A) 1
- (B) 2
- (C) 3

(D) 6

**14. To generate the  $j$ th column of flexibility matrix**

- (A) a unit force is applied at coordinate  $j$  and the displacements are calculated at all coordinates
- (B) a unit displacement is applied at coordinate  $j$  and the forces are calculated at all coordinates
- (C) a unit force is applied at coordinate  $j$  and the forces are calculated at all coordinates
- (D) a unit displacement is applied at coordinate  $j$  and the displacement are calculated at all coordinates

**15. To three moments equation is applicable only when**

- (A) The beam is prismatic
- (B) There is no settlement of supports
- (C) there is no discontinuity such as hinges within the span
- (D) The spans are equal

**16. If in a pin-jointed plane frame  $(m+r) > 2j$ , then the frame is (where 'm' is number of members, 'r' is reaction components and 'j' is number of joints)**

- (A) Stable and statically determinate
- (B) Stable and statically indeterminate
- (C) Unstable
- (D) Determinate

**17. Flexibility matrix is always**

- (A) symmetric
- (B) non-symmetric
- (C) anti-symmetric
- (D) depends upon loads applied

**18. Numerical accuracy of solution increases if flexibility coefficients with larger values are located**

- (A) near main diagonal
- (B) near edges
- (C) in between
- (D) near side middles

**19. How many compatibility equations should be written if we have  $n$  no. of redundant reactions?**

- (A)  $n - 1$
- (B)  $n$
- (C)  $n + 1$
- (D)  $n + 2$

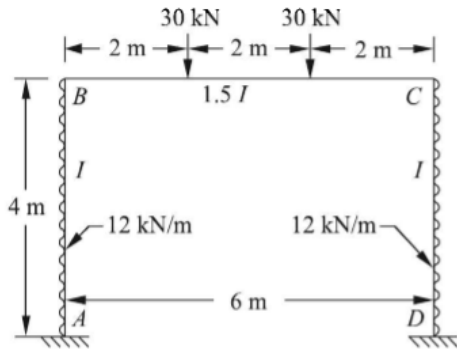
**20. Which of the following methods for solving indeterminate structures are easiest for computational purposes?**

- (A) Force method
- (B) Displacement method
- (C) Method of consistent deformation
- (D) Moment area method

## Part 02

### Q. 2 answer any four

1. Write the steps to be followed in performing a stiffness analysis
2. Write the formulae for degree of indeterminacy of different structure
3. Define internal and external indeterminacy with formulas
4. Determine fix end moment for all members

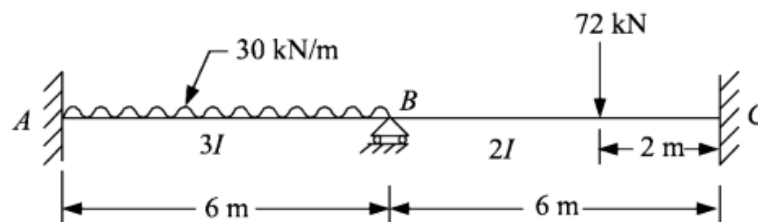


5. Explain methods of plastic analysis

## Part 03

### Q. 2 answer any one

1. Analyze following beam by slope deflection method



2. Analyze following beam by moment distribution method

