MADE EASY PUBLICATIONS

POSTAL BOOK PACKAGE 2025

CONTENTS

CIVIL ENGINEERING

Objective Practice Sets

Structural Analysis

1 CHAPTER
Determinacy and Indeterminacy

Q.1 The number of degrees of freedom of a point in space is
(a) 3 (b) 6
(c) 9 (d) unlimited number

Q.2 The minimum number of overall equilibrium equations for plane truss analysis must be equal to
(a) 2 (b) 3
(c) 6 (d) unlimited number

Q.3 The number of compatibility conditions needed in the analysis of a statically determinate structure are
(a) 0 (b) 2
(c) 3 (d) 6

Q.4 Compatibility conditions are primarily governed by
(a) strains (b) stresses
(c) temperature (d) forces

Q.5 Geometrically unstable structures can be used in
(a) pin-connected systems
(b) temporary systems
(c) long spans
(d) earthquake zones

Q.6 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-joined plane frame is given by
(a) $m + r + 2j$ (b) $m - r + 2j$
(c) $m + r - 2j$ (d) $m + r - 3j$

Q.7 A pin-jointed plane frame is unstable if
(a) $(m + r) < 2j$ (b) $m + r = 2j$
(c) $(m + r) > 2j$ (d) none of these
where m is number of members, r is reaction components and j is number of joints

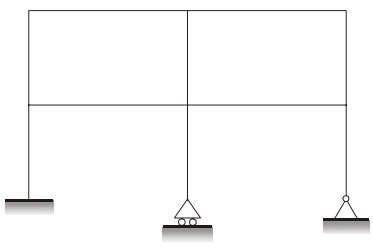
Q.8 A rigid-jointed plane frame is stable and statically determinate if
(a) $(m + r) = 2j$ (b) $(m + r) = 3j$
(c) $(3m + r) = 3j$ (d) $(m + 3r) = 3j$
(c) 1 and 4 (d) 2 and 4

Q.9 An statically indeterminate building frame may be converted to a statically determinate one by assuming
(a) hinges at mid-height of columns
(b) hinges at the mid-span of the beams
(c) hinges at both mid-height of columns and mid-span of beams
(d) one support as fixed at base and other support on rollers

Q.10 Consider the following statements:
1. An statically indeterminate structure is not economical from the material stand-point in comparison to a statically determinate structure.
2. If 'n' redundants in a statically indeterminate structure of 'n' degree of static indeterminacy are removed, the structure will become statically determinate but unstable.
3. In the rigid frame analysis, the axial effects are ignored as their influence is negligibly small compared to bending and shear effects.

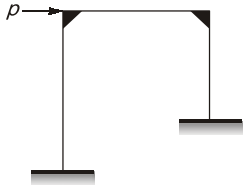
Which of these statements is/are correct?
(a) 1 only (b) 1 and 2
(c) 3 only (d) 2 and 3

Q.11 What is the kinematic indeterminacy for the frame shown below? (Members are in extensible)



(a) 6 (b) 11
(c) 12 (d) 21

Q.12



The portal frame shown in the above figure is statically indeterminate to the
(a) first degree (b) second degree
(c) third degree (d) None of the above

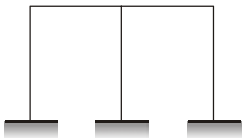
Q.13 Match **List-I** (Structure) with **List-II** (Degree of static indeterminacy) and select the correct answer using the codes given below the lists:

List-I

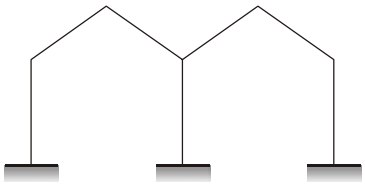
A.

B.

C.



D.



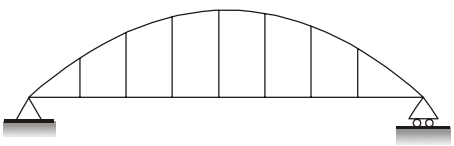
List-II

1. Three
2. Six
3. Two
4. Four

Codes:

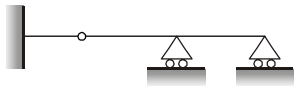
	A	B	C	D
(a)	1	3	2	2
(b)	3	1	2	4
(c)	3	1	4	2
(d)	1	3	4	2

Q.14 The static indeterminacy of the rigid frame shown is



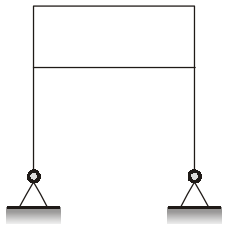
(a) 21 (b) 23
(c) 24 (d) 19

Q.15 The degree of indeterminacy of the beam given below is



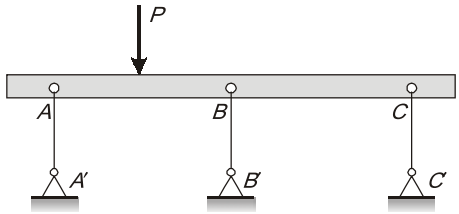
(a) zero (b) one
(c) two (d) three

Q.16 What is the degree of Kinematic indeterminacy of the frame shown in figure? Neglect axial deformation.



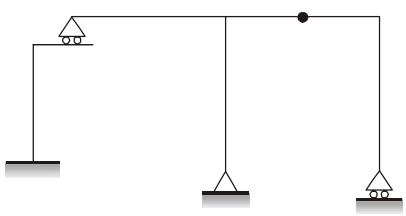
(a) 14 (b) 12
(c) 10 (d) 8

Q.17 The beam supported by 3 links and loaded as shown in the figure is



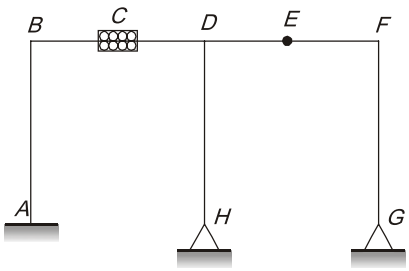
(a) stable and determinate
(b) unstable
(c) stable and indeterminate
(d) unstable but determinate

Q.18 A plane structure shown in the figure is



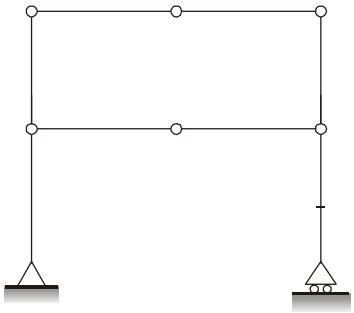
(a) stable and determinate
(b) stable and indeterminate
(c) unstable and determinate
(d) unstable and indeterminate

Q.19 A plane frame *ABCDEFGH* shown in figure has a clamp support at *A*, hinge supports at *G* and *H*, axial force release at *C* and moment release (hinge) at *E*. The static (d_s) and kinematic (d_k) indeterminacies respectively are



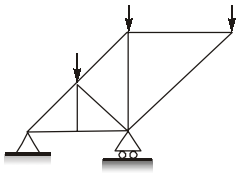
(a) 4, 9 (b) 3, 11
(c) 2, 12 (d) 1, 14

Q.20 The plane pin-jointed structure shown in figure below is



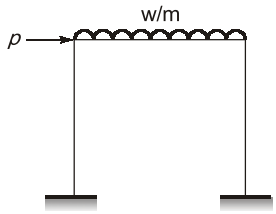
(a) externally indeterminate
(b) internally indeterminate
(c) determinate
(d) mechanism

Q.21 The pin-jointed frame shown in the figure is:



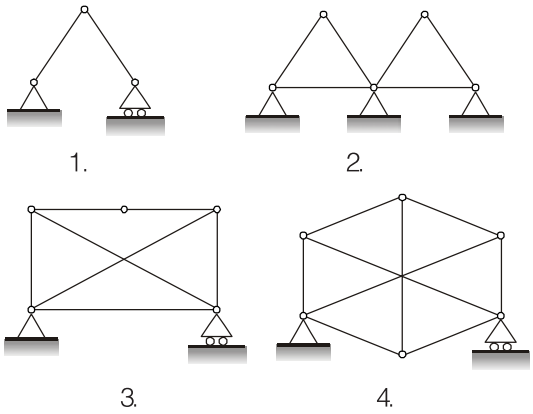
(a) a perfect frame
(b) a redundant frame
(c) a deficient frame
(d) None of the above

Q.22 The frame shown in the given figure has



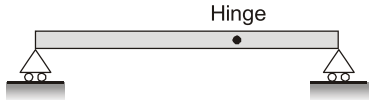
(a) one unknown reaction component
(b) two unknown reaction components
(c) three unknown reaction components
(d) six unknown reaction components

Q.23 Consider the following pin-jointed plane frames



Which of these frames are stable?
(a) 1, 2 and 3 (b) both 3 and 4
(c) 2, 3 and 4 (d) both 2 and 4

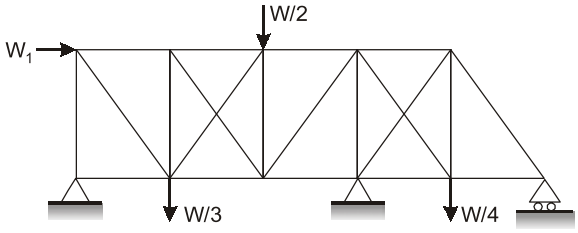
Q.24 A prismatic beam is shown in the figure given below.



Consider the following statements:
1. The structure is unstable.
2. The bending moment is zero at supports and internal hinge.
3. It is a mechanism.
4. It is statically indeterminate.

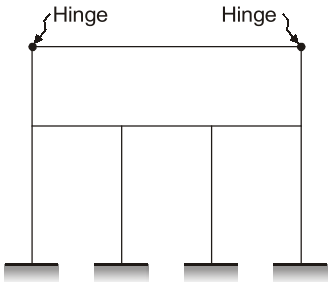
Which of these statements are correct?
(a) 1, 2, 3 and 4 (b) 1, 2 and 3
(c) 1 and 2 (d) 3 and 4

Q.25 The degree of static indeterminacy of the pin-jointed plane frame as shown in figure is



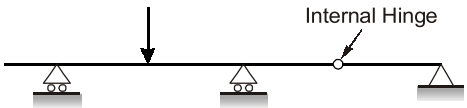
(a) 1 (b) 2
(c) 3 (d) 4

Q.26 What is the total degree of indeterminacy both internal and external of the plane frame shown below?

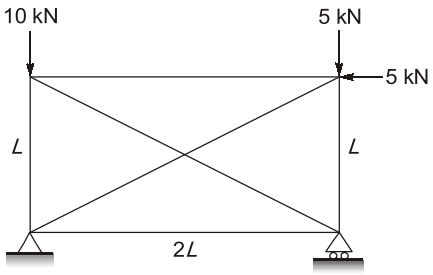


(a) 10 (b) 11
(c) 12 (d) 14

Q.27 The static indeterminacy of the two-span continuous beam with an internal hinge, shown below, is _____.

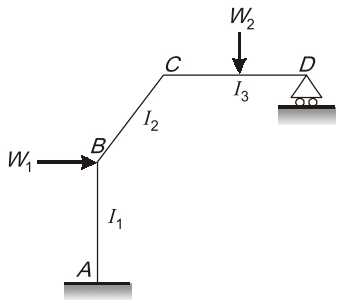


Q.28 The frame shown below is redundant to:



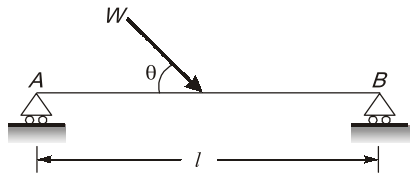
(a) single degree (b) two degree
(c) three degree (d) four degree

Q.29 The rigid plane frame *ABCD* has to be analyzed by slope deflection method. What is the number of unknown displacements/rotations for the frame as shown in the figure given below?



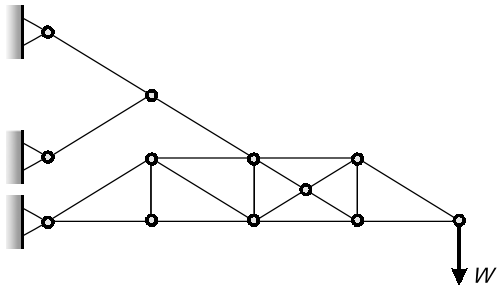
(a) 4 (b) 3
(c) 5 (d) 2

Q.30 The simply supported beam shown in the figure



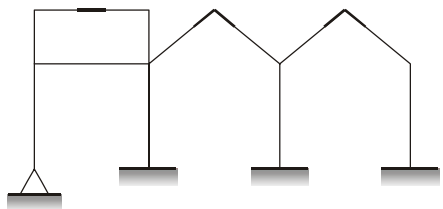
is
(a) determinate and stable
(b) determinate and unstable
(c) indeterminate and stable
(d) indeterminate and unstable

Q.31 The total (both external and internal) degrees of indeterminacy of the pin-jointed structure shown in the figure is



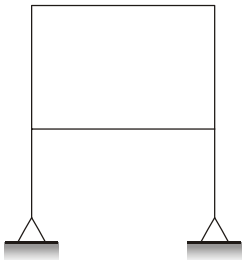
(a) 4 (b) 3
(c) 2 (d) 1

Q.32 The statical indeterminacy for the given 2*D* frame is



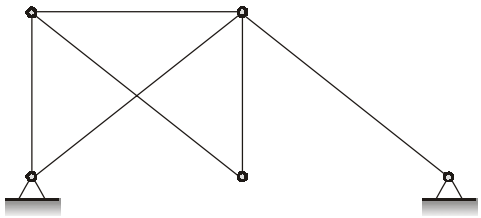
(a) 8 (b) 6
(c) 9 (d) 11

Q.33 The degree of kinematic indeterminacy of frame shown in the figure ignoring the axial deformation is



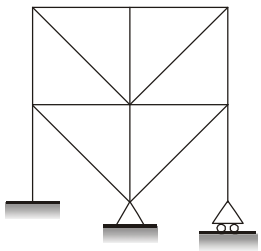
(a) 8 (b) 10
(c) 12 (d) 14

Q.34 The total degree of indeterminacy of the pin-jointed truss shown below is



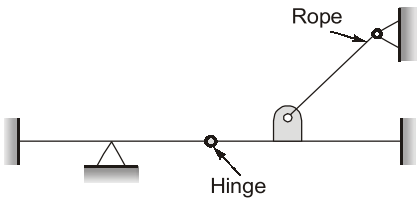
(a) 0 (b) 1
(c) 2 (d) 3

Q.35 What is the degree of kinematic indeterminacy of the plane structure shown in the figure below? (Members are inextensible)



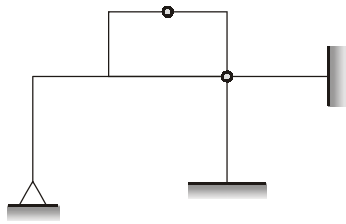
(a) 6 (b) 7
(c) 8 (d) 10

Q.36 The degree of static indeterminacy for the beam as shown in figure is



(a) 1 (b) 4
(c) 5 (d) 3

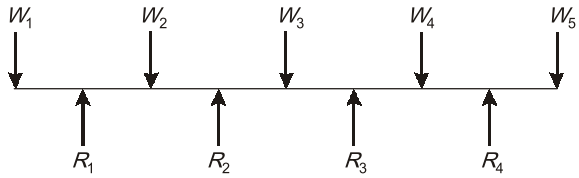
Q.37 For the skeletal frame shown in the figure,



the static and kinematic indeterminacies, if all the members are inextensible, are

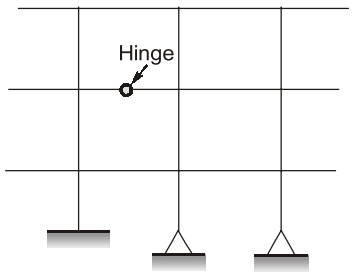
(a) 3 and 13 (b) 4 and 13
(c) 3 and 14 (d) 4 and 14

Q.38 The above figure shows a continuous beam with cantilevered ends. It is

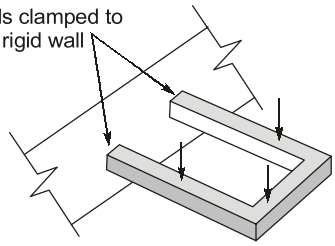


(a) statically determinate
(b) statically indeterminate to the first degree
(c) statically indeterminate to the second degree
(d) statically indeterminate to the third degree

Q.39 The degree of static indeterminacy of the plane frame as shown in the figure is_____

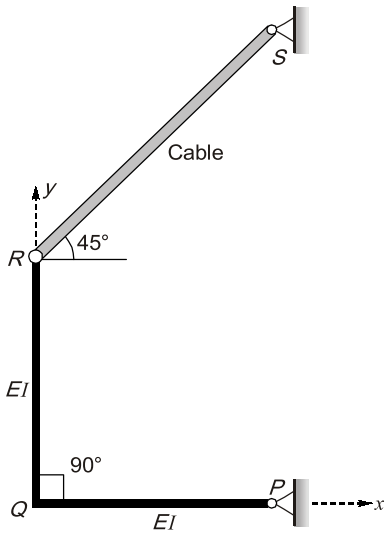


Q.40 The degree of static indeterminacy of a rigidly jointed frame in a horizontal plane and subjected to vertical load only, as shown in figure below, is



(a) 6 (b) 4
(c) 3 (d) 1

Q.41 The degree of static indeterminacy of a rigid jointed frame *PQR* supported as shown in figure is

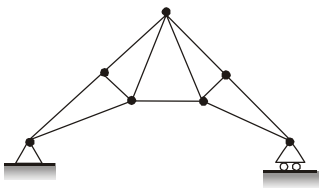


(a) zero (b) one
(c) two (d) unstable

Q.42 A guided support as shown in the figure below is represented by three springs (horizontal, vertical and rotational) with stiffness k_x, k_y and k_θ respectively. The limiting values of k_x, k_y and k_θ are

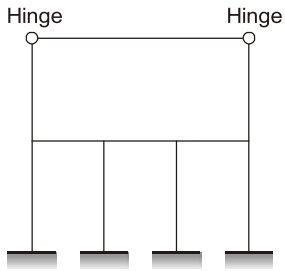
(a) ∞, 0, ∞ (b) ∞, ∞, ∞
(c) 0, ∞, ∞ (d) ∞, ∞, 0

Q.43 The kinematic indeterminacy of the plane truss shown in the figure is



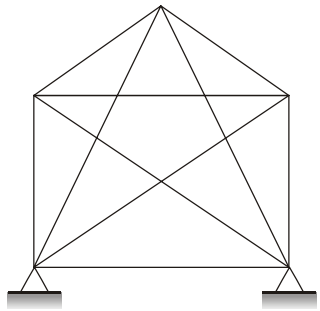
(a) 11 (b) 8
(c) 3 (d) 0

Q.44 Determine the total degree of static indeterminacy of the plane frame given below:



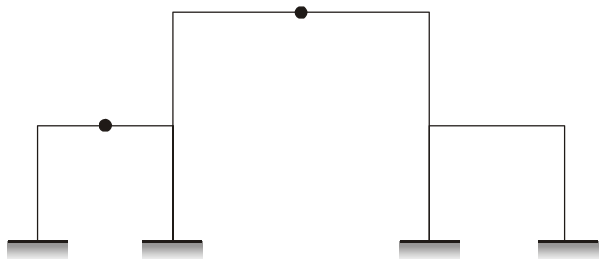
(a) 4 (b) 9
(c) 10 (d) 11

Q.45 Determine the degree of static indeterminacy of the plane structure given below:



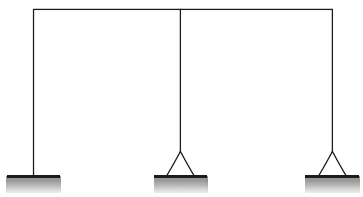
(a) 2 (b) 4
(c) 6 (d) 8

Q.46 What is the static indeterminacy of the frame shown below?



(a) 5 (b) 7
(c) 9 (d) 11

Q.47 The degree of static indeterminacy N_s and the degree of kinematic indeterminacy, N_k for the plane frame as shown neglecting axial deformation are given by:



(a) $N_s = 6$, $N_k = 11$ (b) $N_s = 4$, $N_k = 6$
(c) $N_s = 6$, $N_k = 6$ (d) $N_s = 4$, $N_k = 4$