CIVIL ENGINEERING

(PAPER–I)

1.

What is the total degree of indeterminacy (both internal and external) of the triangular planar truss shown in the figure above?
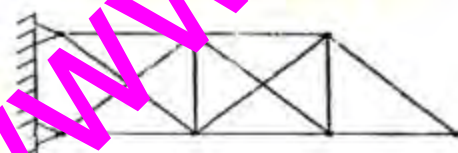
a. 2
b. 4
c. 5
d. 6

2.

What is the total degree of indeterminacy in the continuous prismatic beam shown in the above figure?

a. 1
b. 2
c. 3
d. 4
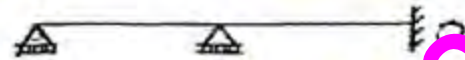
3.

What is the total degree of indeterminacy (both internal and external) of the cantilever plane truss shown in the above figure?

a. 2
b. 3
c. 4
d. 5
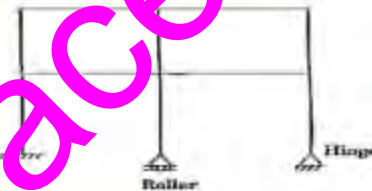
4.

What is the number of independent degrees of freedom of the two-span continuous beam of uniform section shown in the above figure?

a. 1
b. 2
c. 3
d. 4

5.

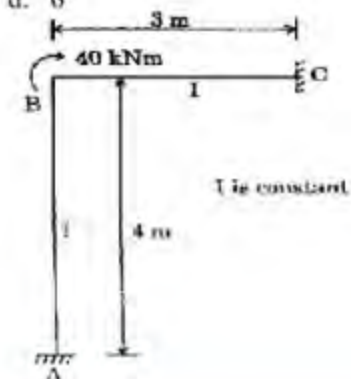What is the kinematics indeterminacy for the frame shown above? (member inextensible)

a. 6
b. 11
c. 12
d. 21

6. If the axial deformation is neglected, what is the kinematics indeterminacy of a signal bay portal frame fixed at base?
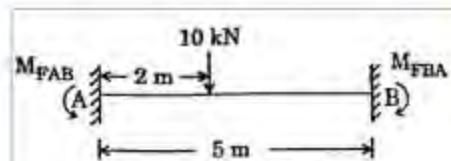
a. 2
b. 3
c. 4
d. 6

7.

For the rigid frame shown above, what is the moment reaction at A?

a. 5 kNm
b. 10 kNm
c. 12.33 kNm
d. 15 kNm

8. If the free end of a cantilever of span l and flexure rigidity EI undergoes a unit displacement (without rotation), what is the bending moment induced at the fixed end?

a. $\dfrac{3EI}{l^2}$

b. $\dfrac{4EI}{l^2}$
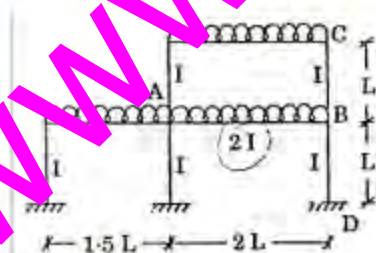
c. $\dfrac{5EI}{l^2}$

d. $\dfrac{6EI}{l^2}$

9.

A fixed beam AB, of constant EI shown in the above figure, supports a concentrated load of 10 kN. What is the fixed end-moment M_{FAB} at support A?

a. 4.8 kNm
b. 6.0 kNm
c. 7.2 kNm
d. 9.5 kNm

10.

In the portal frame shown above, what are the distribution factors for members BA, BC and BD respectively?

a. $\dfrac{1}{3}, \dfrac{1}{3}, \dfrac{1}{3}$

b. $\dfrac{1}{2}, \dfrac{1}{4}, \dfrac{1}{4}$

c. $\dfrac{2}{3}, \dfrac{1}{3}, 0$

d. $\dfrac{1}{4}, \dfrac{1}{4}, \dfrac{1}{2}$

11. Match List I with List II and select the correct answer using the code given below the lists:

List I
(Analysis Method)
A. Kane's method
B. Force method
C. Column method
D. Displacement method

List II
(Structure type)

Code:

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

12. Muller-Breslau Principle is applicable to get influence line for which one of the following?

a. Reaction at the ends of simple beam
b. Bending moment at a section
c. Shear force at a section
d. Forces and moments at any section

13. What is the number of plastic hinges formed if an indeterminate beam with redundancy R is to become determinate?
   a. R - 1
   b. R
   c. R + 1
   d. R + 2

14.

A portal frame has a collapse mechanism as shown above. What is the type?
   a. Pure portal mechanism
   b. Panel mechanism
   c. Combined mechanism
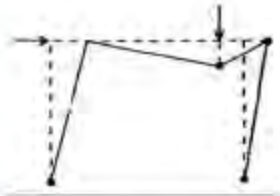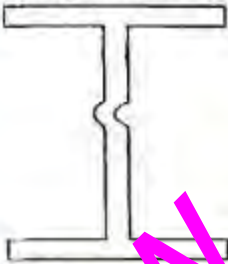   d. Dual beam mechanism

15. A steel beam is connected to a steel column by means of two angles placed on the two sides of the web of the beam. What is it called?
   a. Stiffened seat connection
   b. Unstiffened seat connection
   c. Framed connection
   d. Rigid connection

16.

What is the failure of a section in the figure above called?
   1. Web buckling
   2. Web crippling
   3. Web crimpling
   4. Column bucking
Select the correct answer using the code given below:
   a. 1 and 2
   b. 2 and 3
   c. 1 and 4
   d. 2 and 4

17. In the plastic analysis of a steel beam, which of the following assumptions is/are made?

1. Plane sections under bending remain Plane at all stages of bending.
2. The stress-stair, relation is bilinear, i.e. consisting of tow straight lines.
3. Shear deformations are neglected.
Select the correct answer using the code given below:
   a. 1 only
   b. 2 only
   c. 2 and 3 only
   d. 1, 2 and 3

18. A load P is applied at the middle of a simply supported beam of span l. If the beam is made of ductile material, and M_P is the plastic moment, what is the ultimate value of P?
   a. $M_P / (4l)$
   b. $2M_P /$
   c. $2M_P /$
   d. $M_P /$

19. What value of the shape factor is taken for a rectangular section in plastic design?
   a. 1.0
   b. 1.5
   c. 2.0
   d. 2.5

20. Plastic analysis of structures is applicable to the structures made of which one of the following?
   a. Ductile and brittle materials
   b. Any structural material
   c. Brittle material only
   d. Ductile material only

21. The effective length of an angle member in a riveted truss is equal to which one of the following?
   (Where l is the centre to centre between the joints).
   a. l
   b. 0.85 l
   c. 0.65 l
   d. 0.5 l

22. Which one of the following is correct:
The purling in the roof trusses are subjected to unsymmetrical bending because the loading
   a. is parallel to the minor principle axis, but doesn't coincide
   b. is perpendicular to the minor principle axis
   c. is inclined to the minor principal axis

d. coincides with the minor principal axis

23. Which one of the following is correct?
An intermediate vertical stiffener connected to the web is designed to withstand a shearing force of not less than

a. $\dfrac{100t}{h}$

b. $\dfrac{150t^2}{h}$

c. $\dfrac{125h}{t^2}$

d. $\dfrac{125t^2}{h}$

Where t is web thickness in mm and h is the outstand of stiffener in mm.

24. Which one of the following forces is used for the design of battens of a built-up column?
a. Axial load
b. Twisting moment
c. Vertical shear
d. Transverse shear

25. Which of the following parameters govern the permissible stress in compression in columns?
1. Modulus of section
2. Effective length
3. Radius of gyration
Select the correct answer using the code given below:
a. 1, 2 and 3
b. 1 and 3 only
c. 2 and 3 only
d. 1 and 3 only

26. What is the maximum permissible slenderness ratio of steel ties likely to be subjected to compression?
a. 400
b. 300
c. 250
d. 180

27. For field rivets, the permissible stresses are reduced by what percentage?
a. 10 %
b. 15 %
c. 25 %
d. $33\dfrac{1}{3}\%$

28. An equal angle of are A has been welded on one side of a Gusset plate and carries tension along the axis. What is the effective area of the angle?
a. 0.5 A
b. 0.75 A
c. 0.875 A
d. A

29. Which one of the following is correct?
The permissible stresses in a weld are usually taken as
a. less than those of the parent body
b. equal to those of the parent body
c. more than those of the parent body
d. any desired value

30. How are structural members composed of two angles back to back connected throughout their length?
a. By locking rivets
b. By spacing rivets
c. By gripping rivets
d. By tacking rivets

31. Which one of the following is correct?
Steel structures are ideally suitable for impact loads because they have high
a. toughness value
b. elastic modulus
c. design stress
d. plastic modulus

32. What is the allowable direct tensile stress in structural steel (approximately)?
a. $0.45\ f_y$
b. $0.6\ f_y$
c. $0.66\ f_y$
d. $0.80\ f_y$
Where f_y is the yield stress or proof stress.

33. Consider the following statements:
Compared to mild steal, aluminum has
1. lesser ductility
2. lesser value of Young's modulus.
3. lesser tensile strength.
4. no definite yield point.
Which of the statements given above are correct?
a. 2 and 3 only
b. 1, 3 and 3 only
c. 1, 2, 3 and 4
d. 1 and 4 only

34. Which one of the following is the correct range of fineness modulus of medium sand usable in preparing cement mortar?
a. 1.5 to 2.2

b. 2.6 to 2.9
c. 2.9 to 3.2
d. 5.5 to 6.5

35. Which of the following pairs are correctly matched?
1. Particle size: Affects workability
2. Absorption and surface moisture: Affects mix proportions
3. Grading: Maximizes cement
4. Bulk density: Significant for stability

Select the correct answer using the code given below:
a. 1 and 2
b. 2 and 3
c. 3 and 4
d. 1 and 3

36. Consider the following statements:
1. Rise in temperature does not cause any change in the color of cement concrete.
2. Curing minimizes the shrinkage of cement concrete when it sets.

Which of the statements given above is/are correct?
a. 1 only
b. 2 only
c. Both 1 and 2
d. Neither 1 nor 2

37. Consider the following statements:
1. In reinforced cement concrete, modular ratio is defined by ratio (modulus of elasticity of steel) (modulus of elasticity of concrete).
2. Modulus of rupture of cement concrete is a function of the characteristic compressive strength.
3. The characteristic compressive strength of M20 grade cement concrete at 7 days is 20 N/mm^2.

Which of the statements given above are correct?
a. 1 and 3
b. 1 and 2 only
c. 2 and 3 only
d. 1 and 3 only

38. What is the percentage of the fine aggregate of fineness modulus 2.6 to be combined with coarse aggregate of fineness modulus 6.8 for obtaining combined aggregate of fineness modulus 5.4?
a. 30 %

b. 40 %
c. 50 %
d. 60 %

39. Match List-I with List-II and select the correct answer using the code given below the lists:

List-I
(Admixture)
A. Calcium lignosulphonate
B. Aluminum powders
C. Tartaric acid
D. Sodium silicate

List-II
(Action in concrete)
1. Accelerators
2. Retarded
3. Air entertainer
4. Water reducer

Code:

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

40. Which factors influence the workability of concrete without sacrificing strength?
1. Fine aggregate
2. Quality of mixing water
3. Maximum size of coarse aggregate
4. Shape of coarse aggregate.

Select the correct answer using the code given below:
a. 1 only
b. 2 only
c. 1 and 2
d. 3 and 4

41. The workability of concrete can be increased by which of the following?
1. Increasing the quantity of coarse aggregate without altering the total aggregate quantity
2. Decreasing the quantity of coarse aggregate and at the same time correspondingly increasing the quantity of fine aggregate
3. Using round aggregate

Select the correct answer using the code given below:
a. 1 and 3 only
b. 1 and 2 only
c. 2 and 3 only

d. 1, 2 and 3

42. Consider the following statements regarding cement concrete:
   1. Bleeding indicates deficiency of coarser materials in the mix.
   2. Segregation generally indicates poor aggregate grading.
   Which of the statements given above is/are correct?
   a. 1 only
   b. 2 only
   c. Both 1 and 2
   d. Neither 1 nor 3

43. Consider the following statements:
   Curing of concrete by steam under pressure
   1. increases the compressive strength of concrete.
   2. reduces the shear strength of concrete.
   3. increases the speed of chemical reaction.
   Which of the statements given above is/are correct?
   a. 1, 2 and 3
   b. 1 only
   c. 2 and 3 only
   d. 3 only

44. Match the sequence of determination of components of a concrete mix as per Indian standard method of mix design and select the correct answer using the code given below the lists:
   List-I
   A. Cement content
   B. Aggregate content
   C. Water content
   D. Water cement ratio
   List-II
   1. First step
   2. Second step
   3. Third step
   4. Fourth step
   Code:

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

45. In a body loaded under plane stress conditions, what is the number of independent stress components in order to completely specify the state of stress at a point?
   a. 3
   b. 4
   c. 6
   d. 9

46. The value of modulus of elasticity for a material in 200 GN/m² and Poisson's ratio is 0.25. What is its modulus of rigidity?
   a. 250 GN/m²
   b. 320 GN/m²
   c. 125 GN/m²
   d. 80 GN/m²

47. A stepped column carries loads as shown above. What is the maximum normal stress in the column at B in the larger diameter column?
   a. $\dfrac{P}{1.5A}$
   b. $\dfrac{P}{A}$
   c. $\dfrac{2P}{1.5A}$
   d. $\dfrac{2P}{A}$

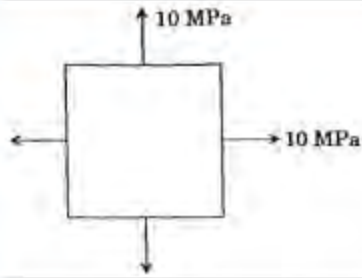48. A composite system where the components are of equal lengths is subjected to temperature rise. Which one of the following stresses will be developed in the component having highest coefficient of linear expansion?
   a. Compressive stress
   b. Tensile stress
   c. Shear stress
   d. Zero stress

49. What is the nature of stress in a ceiling fan rod?
   a. Bending
   b. Tensile
   c. Compressive
   d. Shear

50.

What is the diameter of Mohr's circle of stress for the state of stress shown above?

a. 20

b. $10\sqrt{2}$

c. 10

d. Zero

51. In a plane strain situation in xy plane, the displacements at a point are given as:

$u = (-2x + 8y) \times 10^{-6}$ unit.

$v = (-3x + 5y) \times 10^{-6}$ unit

What is the shearing strain?

a. 9×10^{-6}

b. 7×10^{-6}

c. 5×10^{-6}

d. 3×10^{-6}

52. If a body carries two unlike principal stresses, what is the maximum shear stress?

a. Half the difference of magnitude of the principal stresses.

b. Half the sum of the magnitude of principal stresses.

c. Difference of the magnitude of principal stresses.

d. Sum of the magnitude of principal stresses

53. In a bi-axial strain system ε_x and ε_y, what is the maximum engineering shearing strain?

a. $\varepsilon_x \cdot \varepsilon_y$

b. $\varepsilon_x \cdot \varepsilon_y$

c. $\dfrac{\varepsilon_x + \varepsilon_y}{2}$

d. $\dfrac{\varepsilon_x - \varepsilon_y}{2}$

54. A symmetrical I section is subjected to shear force.

The chear stress induced across induced across the section is maximum at which location?

a. Extreme fibers

b. At the bottom of flanges in flanges

c. At the bottom of flanges in web portion

d. At the neutral axis

55. A simply supported beam AB of span L carries two concentrated loads W each at points L/3 from A and B. What is the S.F. in the middle one-third portion of the beam?

a. W/2

b. 2W

c. W

d. Zero

56. A beam is made of two identical metal flats soldered together. What is the ratio of stiffness of the beam to the stiffness of a beam in which the two flats are not soldered and which acts independently?

a.

b. 4

c.

d. 8

57. A circular shaft is subjected to a bending moment M_b and a twisting moment M_t. What is the ratio of maximum shear stress and the maximum bending stress?

a. $\dfrac{2M_t}{M_b}$

b. $\dfrac{M_t}{M_b}$

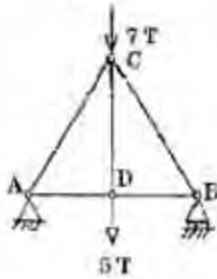c. $\dfrac{M_t}{2M_b}$

d. $\dfrac{1.5M_t}{M_b}$

58. A thin cylinder of unit length, thickness 't' and radius 'r' is subjected to internal pressure 'p'. What is the circumferential stress?

a. $\dfrac{pr}{2Et}$

b. $\dfrac{pr}{2t}$

c. $\dfrac{pr}{t}$

d. $\dfrac{2pr}{t}$

59.

What is the force in the vertical member CD of the pin-jointed frame shown above?
a. 12 T (tension)
b. 2 T (compression)
c. 7 T (compression)
d. 5 T (tension)

60. What if the ratio of load carrying capacity of a fixed beam to the of a cantilever beam of same span, having same maximum bending moment and loaded with uniformly distributed load throughout the span?
a. 6
b. 4
c. 3
d. 2

61. Match List-I with List-II and select the correct answer using the code given below the lists:

List-I
(Chart)
A. Bar chart
B. Milestone
C. W.B.S
D. Linked Bar chart

List II
(Facilitation)
1. Activity dependencies can be implied
2. Resource requirement can be depicted
3. Higher level of authority can effect monitoring and control
4. Trade based site supervision can be assigned

Code:

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

62. Fill factor range of a power shovel when used for well blasted rock is
a. 0.9 – 1.0
b. 0.8 – 0.9
c. 0.6 – 0.75
d. 0.4 – 0.5

63. Which of the following are the advantages of a crawler mounted power shovel over a rubber-typed equipment?
1. It can operate of soft and hard soil
2. It is less expensive than rubber-tyred equipment.
3. It works faster than rubber-tyred equipment,

Select the correct answer using the code given below:
a. 1, 2 and 3
b. 1 and 2 only
c. 2 and 3 only
d. 1 and 3 only

64. The strain of the boom of a hoist is minimum when it is in the
a. Vertical position
b. Horizontal position
c. Inclined position general
d. 45° inclined position

65. Match List-I with List-II and select the correct answer using the code given below the lists:

List –I
(Equipment)
A. Clamshell
B. Designation S
C. Designation E
D. Centralized production

List –II
(Used as with)
1. Paving mixer
2. Aggregate storage bins at batching and mixing plant
3. Transit mixer
4. Construction mixer

Code:

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

66. For high class brick masonry, which area the proper bricks?
a. Refractory bricks

b. Jhumb bricks

c. Bull nose bricks

d. Modular bricks

67. Which one of the following is correct?
Fully priestesses concrete beams

    a. resist all the working loads by priestess

    b. resist the full live load by priestess

    c. resist the part of the load by priestess

    d. resist only the dead loads

68. What is the assumption in the steel beam theory of doubly reinforced beams?

    a. Only steel bars will resist tension

    b. Only concrete will resist tension

    c. Stress in tension steel equals the stress in compression steel

    d. Both concrete and steel will resist compression

69. Consider the following statements regarding CPM technique of project planning:

    1. The critical path consists of those activities for which the total float is zero.

    2. Independent float is expressed as the difference between total float and the slack at the head event.

    3. It is not possible to complete an activity earlier than the crash time.

Which of the statements given above are correct?

    a. 1, 2 and 3

    b. 1 and 2 only

    c. 2 and 3 only

    d. 1 and 3 only

70. A compounded bar consists of material A encased in material B. It is tightly secured at the ends. The coefficient of thermal expansion of is more than of B. If the temperature of the bar is increased, the stress induced will be

    a. tensile in both materials

    b. compressive in both materials

    c. tensile in material B and compressive in material A

    d. compressive in material B and tensile in material A

71. Match List-I with List-II and select the correct answer using the code given below the lists:

List-I

(Equipment)

A. Derrick crane

B. Hoe

C. Clam shell

D. Dumper truck

List-II

(Category)

1. Excavating equipment

2. Hauling equipment
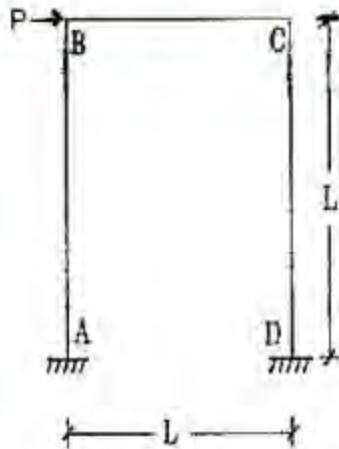
3. Hoisting equipment

4. Lifting equipment

Code:

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

72. The approximate hourly output of a scraper is given by $\dfrac{100C}{(D/30)+28}$ where c is the truck capacity of the scraper in m^3 and D is the one-way haul distance in meters. For a nominal 7 m^3 scraper hauling 65 m, the hourly output will nearly be

    a. 170 m^3

    b. 160 m^3

    c. 150 m^3

    d. 140 m^3

73. Which one of the following techniques is most suitable in case of research and development type of activity?

    a. Critical Path Method

    b. Project Evaluation and Review Technique

    c. Bar chart

    d. Graphical Evaluation and Review Technique

74. A tunnel of length of 800m is to be driven. Part of the total length is through granite and balance is through sandstone. Granite can be tunneled at 10m per day and sandstone at 20m per day. Two mutually exclusive site conditions can be. (1) A probability of 0.4 for 600m granite with 200m sandstone; (2) Probability of 0.6 that each is 400m lone. The probabilistic estimate of total tunneling duration is

    a. 74 bays

    b. 68 days

    c. 64 days

    d. 60 days

75. Assertion (A): addition of calcium chloride while preparing concrete proves more effective with slow hardening Portland cement than with rapid hardening cement.

Reason (R): Calcium chloride is an effective accelerator in increasing the rate of relevant reaction.

a. Both A and R are individually true and R is the correct explanation of A
b. Both A and R are individually true but R is the correct explanation of A
c. A is true but R is false
d. A is false but R is true

76. Assertion (A): The volume of mortar needed for plastering on both faces of a one-brick wall is more than that for the same are on both faces together of any other thickness of brick wall.

Reason (R): More water evaporates form the wetted bricks in case of a one-brick wall and also the joints have to be more commonly raked.

a. Both A and R are individually true and R is the correct explanation of A
b. Both A and R are individually true but R is the correct explanation of A
c. A is true but R is false
d. A is false but R is true

77. Assertion (A): In a tension test on a cast iron specimen, the failure of the specimen is one a cross section perpendicular to the axis of the specimen.

Reason (R): The failure of the specimen is on a plane subjected to maximum tensile stress and cast iron is relatively weak in tension.

a. Both A and R are individually true and R is the correct explanation of A
b. Both A and R are individually true but R is the correct explanation of A
c. A is true but R is false
d. A is false but R is true

78. Assertion (A): In a tension test on a mild steel specimen, the failure of the specimen is along a plane at 45° to the cross section.

Reason (R): The failure of the specimen is on a plane subjected to maximum shear stress and mild steel is relatively weak in shear.

a. Both A and R are individually true and R is the correct explanation of A

b. Both A and R are individually true but R is the correct explanation of A
c. A is true but R is false
d. A is false but R is true

79. Assertion (A): Linked bar chart cannot be developed form an AON network as easily as form an AOA network.

Reason (R): AON networks do not incorporate information corresponding to dummy arrows of AOA network.

a. Both A and R are individually true and R is the correct explanation of A
b. Both A and R are individually true but R is the correct explanation of A
c. A is true but R is false
d. A is false but R is true

80. Assertion (A): Where as crashing considers only the negative cost slop aspects, resource allocation may need consideration of the positive cost slope aspects also.

Reason (R): Implement ability is based on manageability and affordability of resource histograms.

a. Both A and R are individually true and R is the correct explanation of A
b. Both A and R are individually true but R is the correct explanation of A
c. A is true but R is false
d. A is false but R is true

81.

For the propped cantilever shown in the above figure, a hinge is provided at C A and B is at the same level. What is the force reaction at the fixed end A?

a. $(4/3) P$
b. P
c. $(3/4) P$
d. $P/2$

82. Which one of the following is correct?
A suspension bridge with a two-hinged stiffening girder is

a. Statically determinate
b. Indeterminate of one degree
c. Indeterminate of two degrees
d. A mechanism
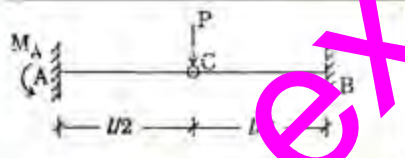
83.

What is the shear equation in slope deflection method for the portal frame shown above?

a. $\dfrac{M_{AB}+M_{BA}}{L}+\dfrac{M_{CD}+M_{DC}}{L}+P=0$

b. $\dfrac{M_{AB}+M_{BA}}{L}+\dfrac{M_{BC}+M_{CB}}{L}+P=0$

c. $\dfrac{M_{BD}+M_{CB}}{L}+\dfrac{M_{CD}+M_{DC}}{L}+P=0$
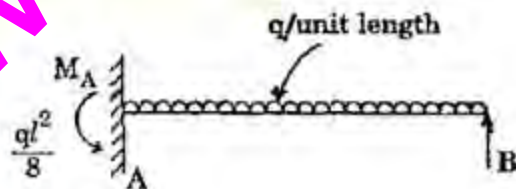
d. $\dfrac{M_{BC}+M_{CB}}{L}+p=0$

84.

The fixed beam AB has hinge C at mid span. A concentrated load P is applied at C. What is the fixed end moment M_A?

a. $P/$
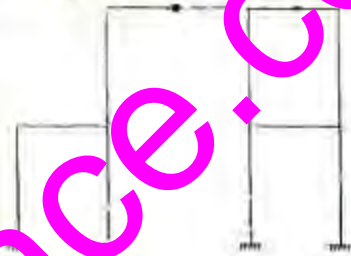b.
c. $P/$
d. $P/8$

85.

The propped cantilever AB carries a uniformly distributed load of q/unit length. In this condition the moment reaction

$M_A = \dfrac{ql^2}{8}$ What is the clockwise moment required at B to make the slope of the deflection curve equal to zero?

a. $\dfrac{ql^2}{8}$

b. $\dfrac{ql^2}{16}$

c. $\dfrac{ql^2}{12}$

d. $\dfrac{ql2}{4}$

86.

What is the statical indeterminacy for the frame shown above?

a. 12
b. 15
c. 11
d. 14

87. Which one of the following is correct?
A statically indeterminate structure is the one which

a. cannot be analysed at all
b. can be analysed using equations of static's only
c. can be analysed using equations of static's and compatibility equations
d. can be analysed using equations of compatibility only

88. By which one of the following methods is an approximate quick solution possible for frame subjected to transverse loads?

a. By cantilever or portal method
b. By strain energy method
c. By moment distribution method
d. By matrix method

89. match list-1 with list-II and select the correct answer using the code given below the lists:

List-I

A. Maxwell's diagram

B. Henneberg's method
C. New mark's method
D. Williot-mohr diagram

List-II
1. Displacement of joints in a truss
2. Deflection by numerical procedure
3. Forces in bar members
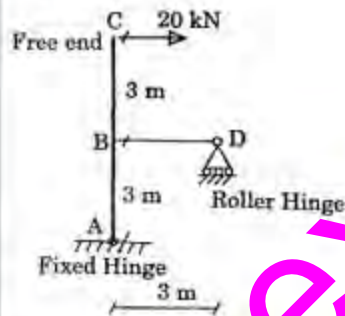4. Concept of substitute member

Code:

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

90. Some structural members subjected to long time sustained loads deform progressively with time especially at elevated temperatures. What is such a phenomenon called?
   a. Fatigue
   b. Creep
   c. Creep relaxation
   d. Fracture

91.

What is the reaction at the support D of the rigid –jointed structure shown above?
   a. 10 kN
   b. 20 kN
   c. 30 kN
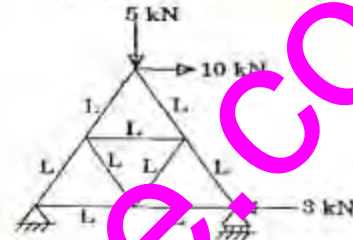   d. 40 kN

92. Which one of the following is correct?
   A determinate structure
   a. Cannot be analyzed without the correct knowledge of modulus of elasticity
   b. Must necessarily have roller support at one of its ends
   c. Requires only statical equilibrium equations for its analysis
   d. Will have zero deflection at its ends

93. Which one of the following is correct?

When a load is applied to a structure with rigid joints
   a. There is no rotation or displacement of joint
   b. There is no displacement of joint
   c. There is no displacement of joint
   d. There can be rotation and displacement of joint but the angle between the members connected to the joint remains same ever after application of the load
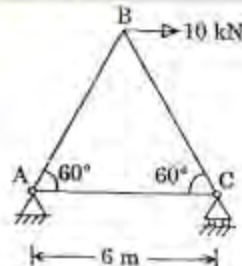
94.

In the frame shown above, what is true horizontal reaction at left support?
   a. 5 kN
   b. 3 kN
   c. 7 kN
   d. 2 kN

95.

What is the force in the member BC of the place frame shown above?
   a. 10 kN tensile
   b. 10 kN compressive
   c. 5.76 kN compressive
   d. Zero

96. Consider the following statements:
   1. The bending stiffness of a beam cannot be determined and the dimensions of cross-section of the beam.
   2. The boundary conditions of a structure are important in sketching its deflected shape qualifiedly as well as for computing the displacement quantitatively.

Which of the statements given above is/are correct?
   a. 1 only

b. 2 only
c. Both 1 and 2
d. Neither 1 nor 2

97. Match list-I with list-II and select the correct answer using the code given below the lists:

List-I
(Wood Element)
A. Pitch
B. Sapwood
C. Heart wood
D. Cambium layer

List-II
(Description)
1. Innermost portion of the tree
2. Inner annual rings surrounding the pitch
3. Outermost annual rings
4. Thin layer of sap between sapwood and inner bark

Code:

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

98. In respect of moisture content in wood fiver saturation point refers to which of the following?
a. Free water present in the cell
b. Free water present in cell walls and cell cavities
c. No moisture present in cell walls and cell cavities
d. No free water exists in cell cavities but cell walls is saturated

99. The moisture content of timber used in building frames can be
a. up to 8%
b. 8% to 12%
c. 12% to 18%
d. > 20%

100. Match list-I with List-II and select the correct answer using the code given below the lists:

List-I
(Disease of Timber)
A. Dry rot
B. Grey rot
C. Wet rot
D. White rot

List-II
(Effect of Disease)
1. Attack of sapwood by fungus
2. Damage to wood fibers due to chemical decomposition of wood
3. Destruction of cellulose of wood due o fungal attack
4. Destruction of lignin of wood due to fungal attack

Code:

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

101. For flatly laid single brick soling, what is the number of brick required of nominal size 20 cm × 10 cm, with 1.2 cm wide cement mortar all around and with allowing up to 1% wastage for 10 m^2 area?
a. 40
b. 40
c. 25
d. 440

102. Consider the following statements:
1. Soil containing more than 30% of calcium hydroxide is used for manufacture of sand lime brick.
2. Carbon brick is made form crushed coke bonded with tar.
Which of the statements given above is/are correct?
a. 1 only
b. 2 only
c. Both 1 and 2
d. Neither 1 nor 2

103. What is the number of traditional bricks required for 10m^3 of brickwork with standard thickness of cement mortar (1:3 to 1:5, as the case may be)?
a. 4750
b. 4850
c. 4950
d. 5050

104. Consider the following statements on cement mortar in brick masonry:
1. Cracking in brick masonry in most of the cases is due to differential movement of the structure.

2. Rich mix cement mortar in brick masonry makes the structure unnecessarily rigid.

3. small quantity of hydrated lime in cement mortar reduces shrinkage cracks.

Which of the statements given above are correct?

a. 1, 2 and 3

b. 1 and 2 only

c. 2 and 3 only

d. 1 and 3 only

105. Match List-I with List-II and select the correct answer using the code given below the lists:

List-I

(Composition of raw material used in manufacture of cement)

A. 25%

B. 65%

C. 5%

D. 5%

List-II

(Component of raw material)

1. Silica

2. Calcium oxide

3. Aluminum oxide

4. Ferrous and magnesium oxide

Code:

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

106. Match List-I with List-II in respect of ordinary Portland cement and select the correct answer using the code given below the lists:

List-I

(Compound)

A. Tribalism silicate

B. Dualism silicate

C. Tribalism aluminate

D. Tertra calcium aluminoferrite

List-II

(Proportion)

1. 25 to 30%

2. 50 to 60%

3. 6 to 8%

4. 8 to 12%

Code:

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

107. Match List-I with List-II and select the correct answer using the code given below the lists:

List-I

(Equipment)

A. Briquette testing machine

B. Le chatelier

C. Vicat apparatus

List-II

(Property)

1. Compressive strength

2. Consistency

3. Soundness

4. Tensile strength

Code:

	A	B	C
a.	1	3	2
b.	1	2	3
c.	4	2	3
d.	4	3	2

108. When sand for construction work is stored at site in stacks of 61 cm height, what allowance due to sink age and shrinkage should be provided?

a. 5%

b. $7\frac{1}{2}$%

c. 10%

d. $12\frac{1}{2}$%

109. How can shear strength be ensured in a beam?

a. By providing binding wire on main bars

b. By providing HYSD bars instead of mild steel bars

c. By providing rounded aggregate

d. By providing stirrups

110. How is the depth of footing for an isolated column governed?

1. By maximum bending moment

2. By shear force

3. By punching shear

Select the correct answer using the code given below:

a. 2 and 3 only

b. 1 and 2 only

c. 1 and 3 only

d. 1,2 and 3

111. Usually stiffness of a simply supported beam is satisfied if the ratio of its span to depth does not exceed which one of the following?

a. 7

b. 10

c. 20

d. 26

112. When is an R.C.C roof slab designed as two way slab?

a. If the slab is continuous over two opposite edges only

b. It the slab is un-supported one edge only

c. If the ratio of span in two directions is > 2

d. If the ratio of spans in two directions is < 2 s

113. Which one of the following is correct? When HYSD bars are used in place of mild steel bars in beam, the bond strength

a. Is not change

b. Increases

c. Decreases

d. Becomes zero

114. In a singly reinforced beam, the tensile steel reaches its maximum allowable stress earlier than concrete. What is such a section known as?

a. Under-reinforced section

b. Over-reinforced section

c. Balanced section

d. Economic section

115. Why is the design of a R.C. section as over-reinforced undesirable?

a. It consumes more concrete

b. It undergoes high strains

c. It fails suddenly

d. Its appearance is not good

116. What is the moment capacity of an under-reinforced rectangular RCC beam?

a. $R\,b\,d^2$

b. $R\,d\,b^2$

c. $A_{st}\,\sigma_{st}\,j\,d$

d. $A_{st}\,j\,d$

(Symbols have the usual meaning)

117. What is the bond stress acting parallel to the reinforcement on the interface between bar and concrete?

a. Shear stress

b. Local stress

c. Flexural stress

d. Bearing stress

118. In a singly reinforced concrete beam section maximum compressive stress in concrete and tensile stress in steel reach their permissible stresses simultaneously. What is such a section called?

a. Under reinforced section

b. Economic section

c. Balanced section

d. Over-reinforced section

119. Which one of the following is correct? While designing combined footing, the resultant of the column loads passes through the centre of gravity of the footing slab such that the net soil pressure obtained is

a. Parabolic

b. Trapezoidal

c. Uniform

d. Non-uniform

120. For shorter storey height, cheaper form work and better lighting facilities, what is the recommended slab floor?

a. T beam and slab

b. Two way slab

c. Flat slab

d. Framed structure