CIVIL ENGINEERING

(PAPER–I)

1. A well-seasoned timber has a moisture content of about
 a. 15% to 20%
 b. 10% to 12%
 c. 5% to 85
 d. 2% to 3%
2. Dry rot in timber is caused by
 a. Lack of ventilation
 b. Lack of light
 c. Immersion in water
 d. Alternate wet and dry atmosphere
3. Wood is impregnated with creosote oil in order to
 a. Change its colour
 b. Protect against fungi
 c. Protect the annular layers
 d. Fill up the pores
4. Consider the following statements :
 Bricks are soaked in water before use in masonry work
 1. to remove dust
 2. to remove air voids
 3. so that they do not absorb water from cement mortar
 Which of these statements is/are correct ?
 a. 1, 2 and 3
 b. 1 only
 c. 2 and 3
 d. 3 only
5. The proper size of mould for testing compressive strength of cement is
 a. 7.05 cm tube
 b. 10.05 cm cube
 c. 15 cm cube
 d. 12.05 cm cube
6. The specific gravity of commonly available ordinary portland cement is
 a. 4.92
 b. 3.15
 c. 2.05
 d. 1.83
7. A quick-setting cement has an initial setting time of about
 a. 50 minutes
 b. 40 minutes
 c. 15 minutes
 d. 5 minutes
8. Match List I (Cement Mortar for Different Work) with List II(Proportion of Cement and sand in Mortar) and select the correct answer :
 List I
 A. Cement mortar for normal brick work
 B. Cement mortar for plastering works
 C. Cement mortar for grouting the cavernous rocks
 D. Cement mortar for guniting
 List II
 1. 1 : 4
 2. 1 : 3
 3. 1 : 6
 4. 1 : 1.5

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

9. Match List I(Admixture) with list II (Action in Concrete) and select the correct answer :
 List I
 A. Calcium lignosulphonate
 B. Aluminum powders
 C. Tartaric acid
 D. Aluminum sulphate
 List II
 1. Anti bleeder
 2. Retarder
 3. Air entrainer
 4. Water reducer

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

10. A mortar in which both cement and lime are used in definite proportions as binding materials is reffered to as

a. Light weight mortar
b. Fire resistant mortar
c. Gauged mortar
d. Water resistant mortar

11. In order to improve the workability of harsh cement mortar which of the following items is/are added ?
1. water
2. Plaster of Paris
3. Lime
Select the correct answer using the codes given below :
a. 1 only
b. 1 and 2
c. 3 only
d. 1 and 3

12. Bleeding of concrete leads of which of the following ?
1. Drying up of concrete surface
2. Formation of pores inside.
3. Segregation of aggregate
4. Decrease in strength
Select the correct answer using the coded given below :
a. 1 only
b. 1 and 2
c. 1 and 3
d. 2 and 4

13. Match List I (material Characteristics) with List II (Property of Concrete) and select the correct answer :

List I
A. Water cement ratio
B. Water content
C. Minimum cement content
D. Segregation

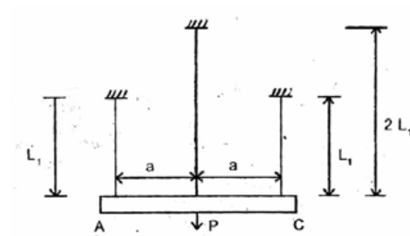
List II
1. Durability
2. Compressive strength
3. Stability of mix
4. Workability

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

14. Stress-strain curve of concrete is
a. A perfect straight line up to failure
b. Straight lien up to 0.002% string value and then parabolic up to failure
c. Parabolic up to 0.002% strain value and then a straight line up to failure
d. Hyperbolic up to 0.002% staring value and then a straight line up to failure

15. Consider the following statements :
Ultrasonic pulse velocity test is
1. used to measure the straight of wet concrete.
2. used to obtain estimate of concrete strength of finished concrete elements.
3. a destructive test
4. a non-destructive test.
Which of these statemtns are correct ?
a. 1, 2 and 3
b. 2 and 3
c. 2 and 4
d. 1 and 3

16. The material in which large deformation is possible before the absolute failure or rupture is termed as
a. Brittle
b. Elastic
c. Ductile
d. Plastic

17. 

A rigid bar AC is supported by three rods of same material and of equal diameter. The bar AC is initially horizontal. A force P is applied such that the bar AC continues to remain horizontal. Forces in each of the shorter bars and in the longer bar are, respectively.
a. 0.4 P, 0.2 P
b. 0.3 P, 0.4 P
c. 0.2 P, 0.6 P
d. 0.5 P , zero

18. A member having length L, cross-sectional areas A and modulus of elasticity E is subjected to an axial load W. The strain energy stored in this member is
a. WL^2 / AE
b. $WL^2 / 2AE$
c. $W^2L^2 / 2AE$
d. W^2L / AE

19. Elastic limit is the point

a. Up to which stress is proportional to strain
b. At which elongation takes place without application of additional load
c. Up to which if the load is remoed, original volume and shaped are regained
d. At which the toughness is maximum

20. Match List I with list II and select the correct answer :

List I(Material)

A. Isotropic
B. Homogeneous
C. Viscoelastic
D. Brittle

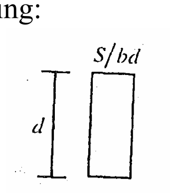
List II

1. Time dependent stress-strain relation
2. No plastic zone
3. Identical properties in all directions
4. Similar properties throughout the volume

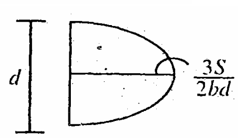
	A	B	C	D
a.	3	1	2	4
b.	4	1	2	3
c.	3	4	1	2
d.	4	3	1	2

21. As per the elastic theory of design, the factor of safety is the ratio of
a. Working stress to stress at the limit of proportionality
b. Yield stress to working stress
c. Ultimate stress to working stress
d. Ultimate load to load at yield

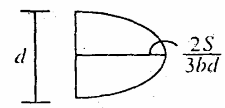
22. The shear stress distribution for a rectangular section under the action of shear force S is shown below. The rectangular section is b×d. Select the correct shear stress distribution form the following:



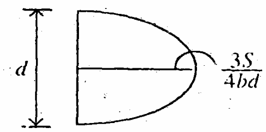
a.



b.



c.



d.

23. Two co-axial springs are subjected to a force of 1 kN. Spring constant of larger diameter spring is 80 N/mm and that of smaller diameter spring is 120 N/mm. The deformation in the spring combination will be equal to
a. 5 mm
b. 15 mm
c. 125/6 mm
d. 135/7 mm

24. Match List I (Method of Analysis) with List II(Unknown Being Evaluated) and select the correct answer

List I

A. Flexibility method
B. Stiffness Method
C. Kanis method
D. Moment distribution method

List II

1. Degrees of freedom
2. Redundant forces
3. Rotations by incremental iteration and unknown sways of plane frames
4. Displacement rotations and sways of plane frames

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

25. The principal strains at a point are $+ 800 \times 10^{-6}$ cm/cm, $+400 \times 10^{-6}$ cm/cm and -1200×10^{-6} cm/cm. The volumetric strain is equal to
a. $+ 1200 \times 10^{-6}$ cm/cm
b. $+ 800 \times 10^{-6}$ cm/cm
c. $- 1200 \times 10^{-6}$ cm/cm
d. zero

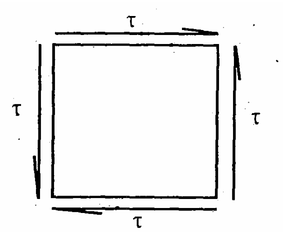
26. In a riveted joint, failure will occur due to which one of the following ?
a. Shear failure of rivet
b. Bearing failure of rivet
c. Tearing failure of plate

d. Minimum load value of shearing , bearing or tearing failure

27. The radius of Mohr's circle is zero when the state of stress is such that

a. Shear stress is zero
b. There is pure shear
c. There is not shear stress but identical direct stresses in two mutually perpendicular directions
d. There is no shear stress but equal direct stresses, opposite in nature, in two mutually perpendicular directions

28.



The above figure shows the stress condition of an element. The principal stresses are

a. $\pm\ 2\tau$
b. $\pm\ \tau/2$
c. $\pm\ \tau$
d. $\pm\ 2\tau/3$

29. If the principal stresses at a point in a stressed body are 150 kN/m^2 tensile and 50 kN/m^2 compressive, then maximum shear stress at this point will be

a. 100 kN/m^2
b. 150 kN/m^2
c. 200 kN/m^2
d. 250 kN/m^2

30. In the Mohr's circle for strains, radius of Mohr's circle givens the

a. Minimum value of normal strain
b. Maximum value of normal strain
c. Maximum value of shear stain
d. Half of maximum value of shear strain

31. A thin cylindrical tube with closed ends is subjected to

1. Longitudinal stress $\sigma_1 = 14\ N/mm^2$
2. Hoop stress $\sigma_2 = 2\ N/mm^2$
3. Shearing stress $\tau = 8\ N/mm^2$

Then the maximum shearing stress is

a. 14 N/mm^2
b. 12 N/mm^2
c. 10 N/mm^2
d. 8 N/mm^2

32. If the shear force diagram of a simply supported beam is parabolic, then he load on the beam is

a. Uniformly distributed load
b. Concentrated load at mid span
c. External moment acting at mid span
d. Linearly varying distributed load
e.

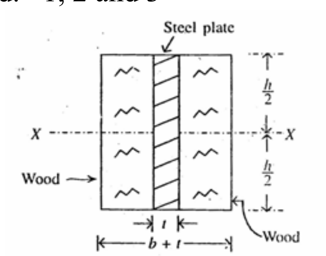
33. For determining the deflection y of a loaded beam at a distance x by Macaulay' method, which one or more of the following is/are used ?

1. The basic difference equation for deflection El $(d^2y / dx^2) = -M$.
   Where El is the flexural rigidity of the beam, M is the bending moment
2. Successive integration of the differential equation given in 1.
3. Known positions of zero slope and zero deflection in the beam.

Select the correct answer using the codes given below :

a. 1 only
b. 1 and 2
c. 3 only
d. 1, 2 and 3

34.



The above figure shows the cross-section of a fitched beam consisting of a steel plate sandwiched between two wooden blocks. The second moment of area of the composite beam about the neutral axis XX is

a. $\dfrac{bh^3}{12} + \dfrac{mth^3}{12}$

b. $\dfrac{bh^3}{12} + \dfrac{t(mh)^3}{12}$

c. $(b+t)\dfrac{h^3}{12}$

d. $\dfrac{bh^3}{12}$

(where m is modular ratio of steel and wood)

35. Match list I(End conditions of Columns) with List II(Effective Length, l_3) and select the correct answer :

List I

A. Both ends fixed
B. Both ends hinged
C. One end fixed, other free
D. One end fixed, other hinged

List II

1. $l_e = 2l$
2. $l_e = l/2$
3. $l_e = l/\sqrt{2}$
4. $l_e = l$

where l is the length & l_e is the effective length of the column)

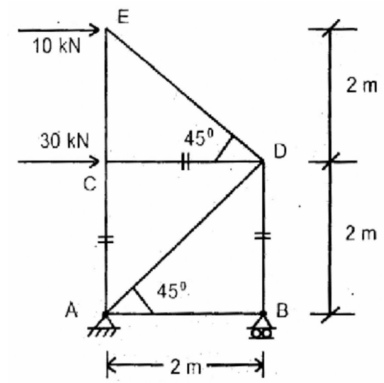
	A	B	C	D
a.	2	4	1	2
b.	3	1	2	4
c.	2	4	3	1
d.	3	4	1	2

36. A symmetrical parabolic arch of span l an dries h is hinged at both the supports. The arch carries a uniformly distributed load of ω/unit length along the entire span.
Which one of the following is correctly matched ?
a. Horizontal thrust : $\omega l^2 / 8h$
b. Bending moment at crown : $\omega l^2 / 8$
c. Radial shear at springing : $[(\omega l^2 / 2) - (\omega l^2 / 8h)]$
d. Vertical reaction at supports : ωl

37. A three-hinged semi-circular arch of radius R carries on the arch at the hinge would be
a. W / 2
b. W / 2π
c. 2/3 W
d. 4/3 W/π

38. From consideration of earthquake loading and lateral stability of tall building, which of the following measures are taken?
1. Minimize gravity loads
2. Add masses at floor levels.
3. ensure ductility at the location s of maximum moments
4. provide shear walls
5. Provide stilt (ground) storey

Select the correct answer using the codes given below :
a. 1 and 5
b. 2, 3 and 5
c. 1, 3 and 4
d. 2, 3 and 4



39. A pin jointed truss is loaded as shown in the above figure match List I with list II and select the correct answer :

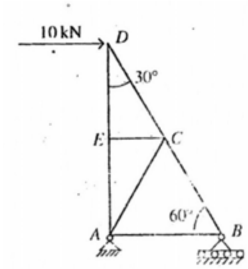
List I (member)

A. Member AB
B. Member AC
C. Member BD
D. Member CD

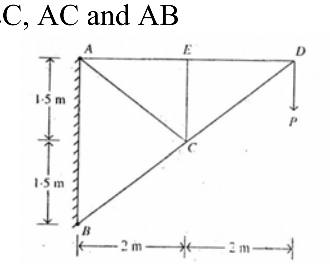
List II (Force induced)

1. 30 kN
2. 50 kN
3. 0
4. 10 kN

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



40. Member(s) of the frame shown above which carries/carry zero force is/are
a. EC only
b. EC and AB
c. EC and AC
d. EC, AC and AB



41. What is the force in the member CE of a cantilever truss shown in the above figure?

a. P(tensile)
b. P(compression)
c. 2 P(tensile)
d. zero

42. A solid circular shaft of diameter d is subjected to a twisting moment T. The maximum shear stress in the shaft is proportional to
a. d^2
b. d
c. $1/d^2$
d. $1/d^3$

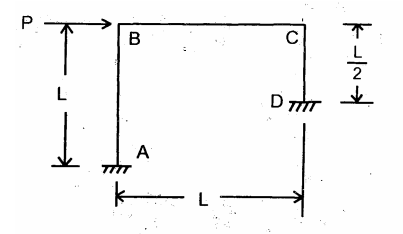
43. When a cantilever shaft of brittle material is subjected to a clockwise twisting moment at the free end, the possible crack propagation will be
a. 45^o clockwise with respective to the axis of shaft
b. 45^o anticlockwise with respective to the axis of shaft
c. Perpendicular to the axis
d. Parallel to the axis

44. For a solid circular section of diameter d, the stress in a column will be compressive only if the eccentricity of the line of action of the compressive force is within
a. d/4
b. d/8
c. d/6
d. d/16

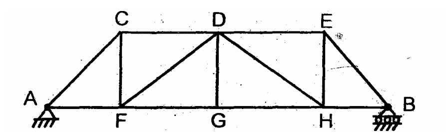
45. The stresses in concrete in a reinforced concrete element under sustained load due to creep
a. Increase with time
b. Decrease with time
c. Remain unchanged
d. Fluctuate

46. Fro the analysis of thick cylinders, the theory applicable is
a. Lame's theory
b. Rankine's theory
c. Poisson's theory
d. Courbon's theory

47. A thin hollow cylinder of diameter d, length *l* and thickness t is subjected to an internal pressure p. The hoop stress in the cylinder is
a. pd / 8t
b. pd / 4t
c. pd / 2t
d. pd / t

48.


A portal frame with all member s having the same El, has one end fixed and the other hinged. Due to side-sway, the ratio of fixed end moments M_{BA} / M_{CD} would be
a. 1 : 1
b. 1 : 2
c. 1 : 3
d. 2 : 1

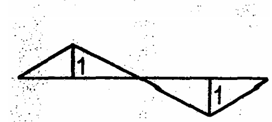
49.


Which one of the following diagrams represents the influence line for force in the member DG ?

a. 

b. 

c. 

d. 

50. Match List I (Assumption/Theorem) with list II(Analysis and strength) an select the correct answer :

List I
A. Plane section remains plane before and after bending deformations
B. Elasticity and small deformations
C. Uniqueness theorem
D. Large deformations

List II
1. Elastic analysis and superposition
2. Strain distribution and plastic moment of resistance
3. Non-linear analysis and buckling load
4. Collapse load

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

51. At the location of the plastic hinge of a deformed structure
   a. Curvature is infinite
   b. Radius of curvature is infinite
   c. moment is infinite
   d. Flexural stress is infinite

52. The order of elongation which a specimen of mild steel under goes before fracture is
   a. 0.1%
   b. 1%
   c. 10%
   d. 100%

53. An electric pole 5 m high is fixed into the foundation. It carries a wire at the top and is free to move sideways. The effective length of the pole is
   a. 3.25 m
   b. 4.0 m
   c. 5.0 m
   d. 10.0 m

54. Match List I with list II and select the correct answer :

List I(Failure Mode)
A. Shear failure of plates
B. Bearing failure of plates
C. Tearing failure of plate
D. Splitting failure of plate

List II(Reason)
1. Insufficient edge distance
2. Strength of plate is less than that of the rivets

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

55. Design of a sample element is steel used one of more of the following :
   1. Net area of cross-section
   2. Full area of cross-section.
   3. Buckling criterion.
   4. Crushing (or yielding) criterion.

   Which of the above criteria are valid for the design of a column ?
   a. 1 and 3
   b. 2 and 4
   c. 2, 3 and 4
   d. 1, 3 and 4

56. The working stress for structural steel in tension is of the order of
   a. 15 N/mm^2
   b. 75 N/mm^2
   c. 150 N/mm^2
   d. 750 N/mm^2

57. The centre to centre maximum distance between bolts in tension member of thickness 10 mm is
   a. 200 mm
   b. 160 mm
   c. 120 mm
   d. 100 mm

58. The type of stress induced in the foundation bolts fixing a column to its footing is
   a. Pure compression
   b. Bearing
   c. Pure tension
   d. Bending

59. Which of the following does not describe a weld type ?
   a. Butt
   b. Plug
   c. Zig-Zag
   d. Lap

60. A plate used for connecting two or more structural members intersecting each other is termed as
   a. Template
   b. Base plate
   c. Gusset plate
   d. Shoe plate

61. In the context of the ultimate load theory for steel, the stress-strain curve for steel is idealized as
   a. A single straight line
   b. Bi-linear
   c. A quadratic parabola
   d. A circular arc

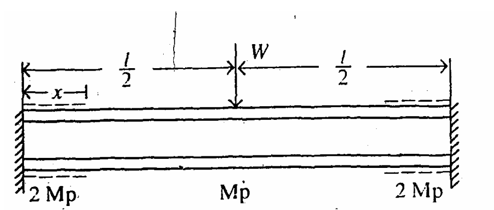
62. Consider the following statements about shape factor :
   1. It indicates the increase of strength of a section due to plastic action over elastic strength.
   2. It is a ratio of plastic moment of resistance to yield point moment of resistance.
   3. Beam sections which have bulk of area near neutral axis will have a low shape factor.

   Which of these statements are correct ?
   a. 1, 2 and 3
   b. 1 and 3

c. 1 and 2
d. 2 and 3

63. Which of the following conditions are to be satisfied by an ideal plastic material ?
1. It should follow Hooke's law up to the limit of proportionality.
2. Strains up to the strain hardening in tension and compression are to be the same.
3. The material property should be different in tension and compression.
4. The values of yield stress in tension an compression should be different.

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

64.


For a fixed beam shown above, it has been decided to weld coverplates at ends so that moment capacity doubles at the ends. If maximum advantage has to be derived, the length x of the plate should be
a. l / 2
b. l / 3
c. l / 4
d. l / 6

65. A steel column in a multi-storeyed building carries an axial load of 125 N. It is built up of 2 ISMC 350 channels connected by lacing. The lacing carries a load of
a. 125 N
b. 12.5 N
c. 3.125 N
d. zero

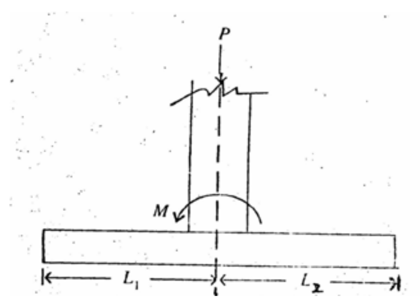
66. A structure has two degrees of indeterminacy. The number of plastic hinges that would be formed at complete collapse is
a. 0
b. 1
c. 2
d. 3

67. For a compresion member having the same effective length about any cross-sectional axial, the most preferred section from the point of view of strength is
a. A box
b. An I-section
c. A circular tube
d. A single angle

68. A trapezoidal combined footing for two axially loaded columns is provided when
1. Width of the footing near the heavier column is restricted.
2. Length of the footing is restricted.
3. Projections of the footing beyond the heavier columns are restricted.

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

69. In case of two-way slab, the deflection of the slab is
a. Primarily a function of the long span
b. Primarily a function of the short span
c. Independent of the span, long or short
d. Mostly long span but sometimes short span

70.


A rectangular reinforced concrete footing is to be designed to support a column which transfers axial load and uniaxial moment to the footing as shown in the above figure. The footing is to be designed to have uniform upward soil pressure. The dimensions L_1 and L_2 ($L = L_1 + L_2$) of the footing would be
a. $L_1 = L_2$
b. $L_1 > L_2$
c. $L_1 < L_2$
d. $L_1 = ½ L_2$

71. A reinforced concrete beam of 10 m effective span and 1 m effective depth is supported on 500 mm × 500 m columns. If

the total uniformly distributed load on the beam is 10 MN/m, the design shear force for the beam is

a. 50 MN
b. 47.5 MN
c. 37.5 MN
d. 43 MN

72. Match List I with List II and select the correct answer :

List I

A. Loss of pre-stress
B. End block
C. Transmission length
D. Partially pre-stressed structures

List II

1. Class 3
2. Predetermined members
3. Bursting tension
4. Elastic shortening

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

73. In pre-tensioning process of pre-stressing, the tendons are

a. Bonded to the concrete
b. Partially bonded to the concrete
c. Not bonded to the concrete
d. Generally bonded but sometimes remain unbounded to the concrete

74. A reinforced concrete beam is to be post-tensioned is such a way that no tensile stress develops at the time of post-tensioning. The distance of the tendon from the nearest face must be

a. Between d/5 and d/4
b. < d/6
c. Between d/4 and d/3
d. > d/3

(where d is the depth of the beam)

75. A simply supported RC beam carries UDL and is referred to as beam A. A similar beam is pre-stressed and carries the same UDL as the beam A. This beam is referred to as beam B. The mid-span deflection of beam A will be

a. More than that of beam B
b. Less than that of beam B
c. The same as that of beam B
d. Generally less but sometimes more depending upon the magnitude of UDL

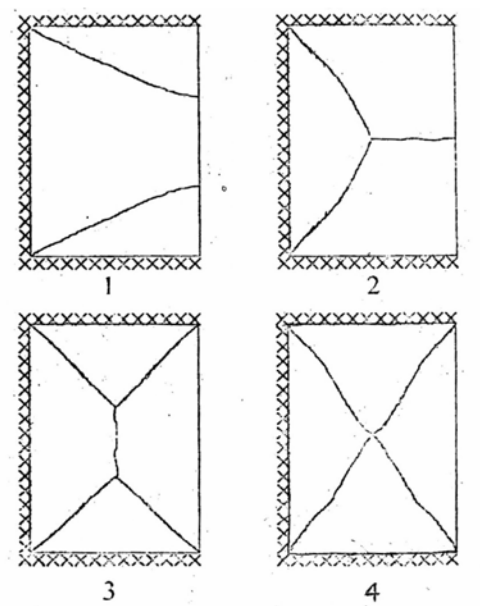
76. The critical section for two-way shear of footing is at the

a. Face of the column
b. Distance d from the column face
c. Distance d/2 from the column face
d. Distance 2d from the column face

77. In pre-stressed concrete, high grade concrete is used for

a. Controlling the pre-stress loss
b. Having concrete of low ductility
c. Having concrete of high brittleness
d. Having low creep

78.

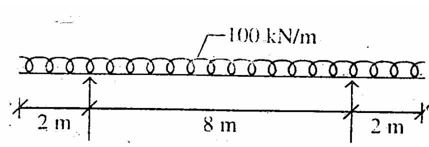


A reinforced concrete rectangular slab is built-in (fixed) on three edges and the other edge is free. The possible yield line patterns for the slab subjected to a uniformly distributed load and reinforced isotropically are shown above as 1, 2, 3 and 4.

Which of these correctly exhibits the yield line pattern ?

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

79.



The bending moment for which the beam shown above is to be designed is

a. 200 kNm
b. 800 kNm
c. 600 kNm
d. 640 kNm

80. A reinforced concrete beam is subjected to the following bending moments :
Dead load 20 kNm
Live load 30 kNm
Seismic load 10 kNm
The design bending moment for limit state of collapse is

a. 60 kNm
b. 75 kNm
c. 72 kNm
d. 80 kNm

81. In the Limit state design of pre-stressed concrete structure, the strain distribution is assumed to be

a. Linear
b. Non-linear
c. Parabolic
d. Parabolic and rectangular

82. Consider the following statements :
Under-reinforced concrete flexural members

1. are deeper
2. are stiffer
3. can undergo larger deflection

Which of these statements is/are correct ?

a. 1, 2 and 3
b. 1 and 2
c. 2 only
d. 1 and 3

83. Long term elastic modulus in terms of creep coefficient (θ) an 28-day characteristic strength (f_{ck}) is given by

a. $\frac{5000 \quad f_{ck}}{1+\theta}$ MPa
b. $\frac{50000\sqrt{f_{ck}}}{1+\theta}$ MPa
c. $\frac{5000\, f_{ck}}{1+\sqrt{\theta}}$ MPa
d. $\frac{5000\sqrt{f_{ck}}}{\sqrt{1+\theta}}$ MPa

84. A simply supported post-tensioned pre-stressed concrete beam of span L is pre-stressed by a straight tendon at a uniform eccentricity e below the centroidal axis. If the magnitude of prestressing force is P and flexural rigidity of beam is El, the maximum central deflection of the beam is

a. $\frac{PeL^2}{8\,El}$(downwards)
b. $\frac{PeL^2}{48\,El}$(upwards)
c. $\frac{PeL^2}{8\,El}$(downwards)
d. $\frac{PeL^2}{8\,El}$(upwards)

85. Match List I with List II and select the correct answer :

List I
A. Service ability
B. Shear key
C. Shrinkage
D. Concrete spalling

List II
1. Sliding
2. deflection
3. Cracking
4. Corrosion

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

86. Cost of required materials for construction has been estimated by contractor and an extract thereof indicates Rs. 80,000 for month-1, Rs. 1,20,000 for month-2, Rs. 1,00,000 for month-3 and Rs. 1,40,000 for month-4. He has arranged with suppliers to pay 40% immediately on purchase, 40% one month later and balance 20% two months later. His payment towards cost of material in month-3 will exceed that in month 4 by

a. Rs. 20,000
b. Rs. 16,000
c. Rs. 12,000
d. Rs. 8,000

87. The vibrators are used for

a. Compacting concrete
b. Proper mixing of concrete
c. Removing excess water from concrete
d. Obtaining smooth surface

88. Match List I(Material Use din Individual Batching of Concrete) with List II(tolerance When Batch Weight Exceeds 30% of Scale Capacity) and select the correct answer :

List I

A. Cement
B. Water
C. Aggregates
D. Admixtures

List II

1. ± 0.3% of scale capacity
2. ± 1% of scale capacity
3. ± 2% of scale capacity
4. ± 3% of scale capacity

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

89. Which one of the following statements is correct ?

a. Grade resistance is positive when the unit travels down grade and negative when travelling upgrade.
b. Grade resistance depends on the type of equipment or the haul surface and is in addition to rolling resistance
c. Grad resistance acts against the total weight of both wheel and track type units
d. Grade resistance for units moving on the road surface is greater than grade resistance for units moving on rails

90. Match List I (Type of Compactor) with List II (Soil Best Suited) and select the correct answer :

List I

A. Sheep's foot compactor
B. Steel tandem compactor with 2 or 3 axles
C. Steel drum
D. Pneumatic with large tyre

List II

1. Granular or granular plastic
2. Sandy silts, sandy clays, gravelly sand and clays with few fines
3. Clay, silts clay, gravel with clay binder
4. Sandy silts, most granular material with come clay binder

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

91. Match List I (equipment) with list II(Operation) and select he correct answer:

List I

A. Powel shovel
B. Dragline
C. Backhoe
D. Clamshell

List II

1. Can excavate vertically
2. Can excavate underwater
3. has better control because of the rigid dipper stick
4. Can operate while standing on firm ground and the bucket is pulled towards the machine

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

92. The number of trips of a dumper per hour is given by

a. $\frac{\text{60 minutes}}{\text{Actual or effective cycle time in minutes}}$

b. $\frac{\text{60 minutes}}{\text{Ideal cycle time in minutes}}$

c. $\frac{\text{60 minutes}}{\text{Ideal running time + Loss time in minutes}}$

d. $\frac{\text{60 minutes}}{\text{Runnig time in minutes}}$

93. In compaction of clayey-soils using sheep-foot roller, compaction is achieved by

a. Static action
b. Vibration action
c. Kneading action
d. Impact action

94. The working range of a crane is limited horizontally for maximum lift only by

a. Boom length
b. Length of hoist cable
c. Length of jib
d. Counter weight

95. Which one of the following types of crane is used for high rise buildings ?

a. Traveller crane
b. Tower crane

c. Overhead gantry crane
d. Derric crane

96. A certain concreting job can be started only when all three groups
1. measuring and loading
2. operating the machine, and
3. evacuating and transporting

are in potion. These local groups can be credited each with only a chance of 0.7 being on time, and the 0.3 chance of being late, each independently of the other. What are the chances of the starting of the job getting delayed on any day due to non-arrival of any one group on time ?
a. 0.021
b. 0.147
c. 0.343
d. 0.441

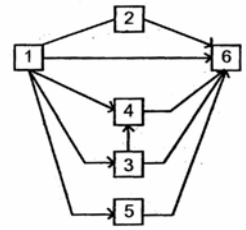
97. Three activities F, G and H are to be performed in the said sequence and for the whole stretch of the project need 15, 21 and 27 days respectively. If a ladder network is adopted with on-third of each activity as the laddered activity, the saving in total project time in days will be
a. 15
b. 18
c. 21
d. 24

98. Match list I (Inputs Into Networks) with List II(Basis) and select the correct answer:

List I
A. Activity Time
B. PERT durations
C. WBS
D. interfaces

List II
1. Availability of resources is not discussed
2. Senior management's involvement is assumed
3. Total cost of each activity is considered
4. Needed supervisory inputs are considered

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

99. 

A-O-A network is suggested as shown above. The number of errors/incompatibilities in this network is
a. 1
b. 2
c. 3
d. 4

100. Which one of the following project management techniques is deterministic in nature ?
a. CPM
b. PERT
c. GERT
d. LCES

101. The probabilistic time is
a. $\dfrac{t_0 + t_p + t_n}{3}$
b. $\dfrac{t_0 + t_p + 4t_n}{6}$
c. $\dfrac{t_0 + 4t_p + t_n}{6}$
d. $\dfrac{t_0 + 2t_p + 4t_n}{4}$

where t_0 = Optimistic time
t_p = Pessimistic time
t_n = Most likely time

102. A serious limitation of independencies between various activities is generally observed in
a. Bar charts
b. Milestone charts
c. Network analysis
d. Job layouts

103. In time-cost analysis, the cost slope C_s is
a. $\dfrac{C_c - C_n}{t_c - t_n}$
b. $\dfrac{C_c - C_n}{t_n - t_c}$
c. $\dfrac{t_c - t_n}{C_c - C_n}$
d. $\dfrac{C_n - C_c}{2(t_n - t_c)}$

where C_c = Crash cost
C_n = Normal cost
t_c = Crash time
t_n = Normal time

104. Sinking fund method is useful in
a. Depreciation
b. Obsolescence
c. Liquidation
d. Scrap value

105. Assertion (A) : Timbers used for engineering construction are derived from deciduous trees.
Reason (R) : Deciduous trees yield hard wood while conifers yield soft wood.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

106. Assertion (A) : Dry rot is a disease in wood caused by spores germinating in wood cells.
Reason (R) : Decomposition and putrefaction of tissues of a standing tree are indication of dry rot.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

107. Assertion (A) : The greater the surface area of a given volume of cement the greater the hydration.
Reason (R) : The reaction between the water and cement starts from the surface of the cement particles.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

108. Assertion (A) : A low C3A cement generates less heat and develops higher ultimate strength.
Reason (R) : During setting and hardening, the amount of lime liberated appears to be about 15 to 20 per cent by weight of cement.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

109. Assertion (A) : Addition of 5% to 6% of moisture content by weight increases the volume of dry sand from 18% to 38%.
Reason (R) : Bulking of sand is caused due to surface moisture on sand particles.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

110. Assertion (A) : Normal stress of one nature (compressive or tensile) acting along one of the three orthogonal axes of a member will produce strains of the same nature in its direction and strains of opposite nature along the other two directions.
Reason (R) : Sum of the strains along the three orthogonal axes equals volumetric strain.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

111. Assertion (A) : A horizontal beam hinged at one end and freely supported at the other end will be in static equilibrium under inclined load applied on it.
Reason (R) : The hinged end will offer resistance to the horizontal component of the applied force.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

112. Assertion (A) : In a circular masonry column it is desirable to restrict the resultant load within the middle core of one fourth the area of the column section.
Reason (R) : It is desirable not to allow any tension in masonry structures.

a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

113. Assertion (A) : Any arch cannot practically be built to the shape of the theoretical arch.
Reason (R) : The shape of the theoretical arch is affected by loads moving on it.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

114. Assertion (A) : Lateral support to a beam is provided by a concrete slab resting over the top flange of a beam.
Reason (R) : Shear connectors are needed to provide continuous lateral support.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

115. Assertion (A) : Compared to riveted plate girders, in welded plate girders a thicker web must be used.
Reason (R) : Omission of flange angles in creases the clear depth of the web and we thickness is controlled by buckling criterion.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

116. Assertion (A) : In double-laced system of a built-up column, cross member perpendicular to the longitudinal axis of the column is not used.
Reason (R) : Lacing bars are forced to share the axial load on the strut.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

117. Assertion (A) : Web crippling occurs at a section where heavy vertical load is applied.
Reason (R) : There is stress concentration in the vicinity of the load.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

118. Assertion (A) : All columns shall be designed for a minimum eccentricity of unsupported length of column divided by 500, plus lateral dimension divided by 30 subject to a minimum of 20 mm.
Reason (R) : Assertion refers to the design of axially loaded column and it may not be possible to build a perfectly axially loaded column in practice.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

119. Assertion (A) : Under working loads, in a reinforced concrete beam the lever arm remains unchanged.
Reason (R) : As the bending moment increases, the total compressive force and tensile force are assumed to increase in direct proportion.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

120. Assertion (A) : Rubber tyred equipment pull better on smooth, hard surfaces while crawlers work better on firm earth.
Reason (R) : Bulldozers mounted on wheels are employed on earth construction for better performance.
a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true