

# CIVIL ENGINEERING

## (PAPER-I)

1. Timber can be made reasonably fire-resistant by
  - a. soaking it in Ammonium Sulphate
  - b. coating with Tar paint
  - c. pumping creosote oil into timber under high pressure
  - d. seasoning process
2. Which one of the following statements is the correct description of the structure of fibre board ?
  - a. Thin slices of superior quality of wood are glued and pressed on the surface of inferior wood
  - b. Streamed mass of wood dusts, wood wool and other vegetable fibres are pressed hard to a thickness varying from 3 mm to 12 mm
  - c. Thin and narrow wood shavings are soaked in a refractory binder material and pressed hard
  - d. Thin and narrow wood shaving are soaked in a refractory binder material and pressed hard
3. Match List I(Constituents of bricks) with List II(corresponding influence) and select the correct answer :

**List I**

  - A. Alumina
  - B. Silica
  - C. Magnesia
  - D. Limestone

**List II**

  1. Colour of brick
  2. Plasticity recovery for moulding
  3. Reacts with silica during burning and causes particles to unite together and development of strength
  4. Preserve the for on brick at high temperature and prevents shrinkage

	A	B	C	D
a.	2	1	4	3
b.	3	4	1	2
- c. 2 4 1 3
- d. 3 1 4 2
4. In some brick masonry walls, patches of whitish crystals were found on the exposed surfaces, also chipping and spalling of bricks took place from the same walls. Which among the following are the causes of these defects ?
  1. Settlement of foundation
  2. Over-loading of the walls
  3. Sulphate attach
  4. Efflorescence
  - a. 1 and 2
  - b. 2 and 3
  - c. 2 and 4
  - d. 3 and 4
5. Match List I with list II and select the correct answer :

List I(Property)

  - A. Specific heat of an aggregate
  - B. Thermal conductivity of an aggregate
  - C. Thermal expansion
  - D. Durability of concrete

**List II(Characteristic)**

  1. Breaks the bond between the aggregate and the paste
  2. Is a measure of its heat capacity
  3. Is affected by differences n thermal expansion of two different materials
  4. Is a measure of its ability to conduct heat

	A	B	C	D
a.	1	3	2	4
b.	2	4	1	3
c.	1	4	2	3
d.	2	3	1	4
6. Consider the following methods of preservation of timber :
  1. Pressure application
  2. Brush application

3. Dipping

4. Open tank application

The correct sequence of these methods in the increasing order of their effectiveness is :

- 1, 3 4, 2
- 3, 4, 2, 1
- 2, 3, 4, 1
- 4, 2, 1, 3

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

**List I (Name of defect)**

- Cupping
- Bowing
- Chucks
- Knots

**List II(Definition)**

- Caused by wood limbs encased by the wood of the free trunk
- Caused by grain irregularities in the board and can be eliminated by proper stacking
- Small cracks appearing at the ends of boards caused by too rapid drying
- Unequal shrinking in the radial and tangential direction

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

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

**List I (Type of cement)**

- Ordinary Portland cement
- Rapid hardening cement
- Low heat cement
- Sulphate resistant cement

**List II(Characteristics)**

- The percentage of  $C_3S$  is maximum and is of the order of 50%
- The percentages of  $C_2S$  and  $C_3S$  are the same and of the order of 40%
- Reacts with silica during burning and causes particles to unite together and development of strength

4. Preserves the for of brick at high temperature and prevents shrinkage

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

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

**List I(Type of cement)**

- High strength Portland cement
- Super sulphated cement
- High alumina cement
- Rapid hardening Protland cement

**List II(Property/Characteristic)**

- Should not be used with any admixture
- Is extremely resistant to chemical attack
- Gives a higher rate of heat development during hydration of cement
- has a higher content of tricalcium silicate

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

10. Consider the following stages in the manufacturing of bricks :

- Weathering
- Moulding
- Tempering

The correct sequence of these stages in the manufacturing of the bricks, is

- 1, 2, 3
- 2, 3, 1
- 1, 3, 2
- 3, 2, 1

11. Four main oxides present in ordinary Portland cement are :  $CaO$ ,  $Al_2O_3$ ,  $SiO_2$  and  $Fe_2O_3$ . Identify the correct ascending order of their proportions in a typical composition of OPC

- $Al_2O_3$ ,  $Fe_2O_3$ ,  $CaO$ ,  $SiO_2$
- $Al_2O_3$ ,  $CaO$ ,  $Fe_2O_3$ ,  $SiO_2$
- $Fe_2O_3$ ,  $Al_2O_3$ ,  $SiO_2$ ,  $CaO$

d.  $Fe_2O_3$ ,  $SiO_2$ ,  $Al_2O_3$ ,  $CaO$

12. Consider the following statements :

Pozzolana used as an admixture in concrete has the following advantages :

1. It improves workability with lesser amount of water
2. It increases heat of hydration and so sets the concrete quickly
3. It increases resistance to attack by salts and sulphates
4. It leaches calcium hydroxide

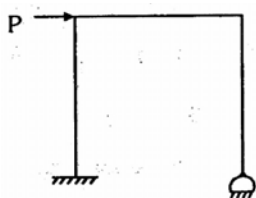
Select the correct answer using the code given below :

- a. 1, 2, 3 and 4
- b. 1, 2, and 4
- c. 1 and 3
- d. 2, 3 and 4

13. The length of time for which a concrete mixture will remain plastic is usually more depended on

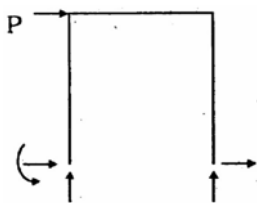
- a. the setting time of cement than on the amount of mixing water and atmospheric temperature
- b. the atmospheric temperature than on the amount of mixing water and the setting time of cement
- c. the setting time of cement and the amount of mixing water than on atmospheric temperature
- d. the amount of mixing water used and atmospheric temperature than on the setting time of cement

14.

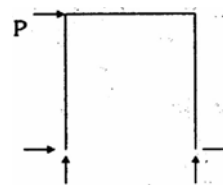


(Portal Frame)

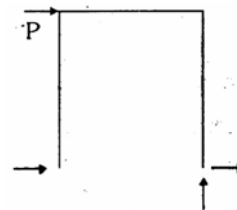
Which one among the following is the correct free body diagram for a portal frame shown in Figure given above ?



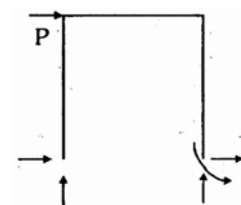
a.



b.



c.



d.

15. Consider the following statements :

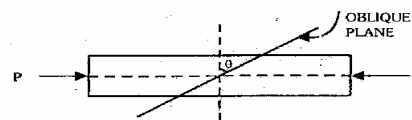
Mohr's circle is used to determine the stress on an oblique section of a body subjected to

1. direct tensile stress on one plane accompanied by a shear stress
2. direct tensile stresses in two mutually perpendicular directions accompanied by a simple shear stress
3. direct tensile stress in two mutually perpendicular directions
4. a simple shear stress

Select the correct answer using the codes given below :

- a. 1 and 4
- b. 2 and 3
- c. 1, 2, 3 and 4
- d. 1, 2 and 3

16. A bar of square cross-section, having an area of cross-section 'A' is subjected to a compressive force 'P' as shown in the figure



The intensity of the tangential stress on the oblique plane is given by

- a.  $P \sin 2\theta$
- b.  $P \cos 2\theta$

- d.  $P/2 \cos 2\theta$
17. The ratio of the torsional moment  $s$  of resistance of a solid circular shaft of diameter  $D$ , and a hollow circular shaft having external diameter  $d$  and internal diameter  $d$  is given by

a.  $\frac{D^4}{D^4 - d^4}$

b.  $\frac{D^4 - d^4}{D^4}$

c.  $\frac{D^3 - d^3}{D^3}$

d.  $\frac{D^3}{D^3 - d^3}$

18. Clapeyron's theorem is applied to
- Simply supported beam
  - Propped cantilever beam
  - Fixed & continuous beam
  - Continuous beam only
19. The variation of the hoop stress across the thickness of a thick cylinder is
- linear
  - uniform
  - parabolic
  - hyperbolic
20. The bulk modulus of elasticity of a material is twice its modulus of rigidity. The Poisson's ratio of the material is
- $1/7$
  - $2/7$
  - $3/7$
  - $4/7$
21. Match List I with List II and select the correct answer :

**List I**

- Assumption in the theory of simple bending
- The point at which the bending stress is maximum for any cross-section
- The point at which the bending stress is zero for any cross-section
- The point in the cross-section through which the neutral axis passes

**List II**

- Neutral axis

- Centroid
- The plane sections remain plain
- Extreme fibre
- The cross-section is circular

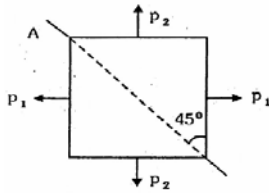
	A	B	C	D
a.	5	4	1	2
b.	3	1	2	4
c.	5	1	2	4
d.	3	4	1	2

22. A rectangular beam of width 200 mm and depth 300 mm is subjected to a shear force of 200 kN. The maximum shear stress produced in the beam is
- 10.0 MPa
  - 7.5 MPa
  - 5.0 MPa
  - 3.00 MPa
23. A symmetrical channel section is made of a material which is equally strong in tension and compression. It is used as a simply supported beam with its web horizontal to carry vertical loads. It will
- be strongest if the web is used as top face
  - be strongest if the web is used as bottom face
  - be equally strong in (a) and (b) above
  - not be possible to state which of the above statements is correct
24. For which of the following conditions, the virtual work should be zero according to the Principle of virtual work ?
- A body moving with constant acceleration
  - A body rotating with constant speed
  - A body in equilibrium
  - A body moving with constant momentum

Select the correct answer using the codes given below :

- 1 only
- 1 and 2
- 3 only
- 4 only

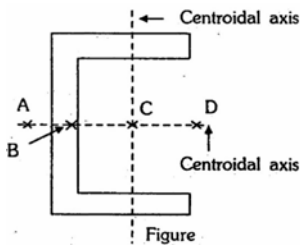
- 25.



$p_1$  and  $p_2$  are two equal tensile principal stresses. On the plane AB inclined at  $45^\circ$  to the plane of  $p_1$

- the shear stress is a maximum
- the normal stress is zero
- the shear stress is zero
- the normal stress is maximum

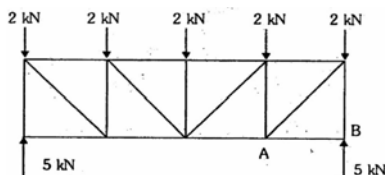
26.



In the symmetrical channel section shown in the figure, which point is likely to be the shear center ?

- A
- B
- C
- D

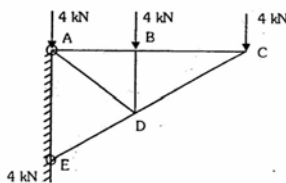
27.



The force in member AB is

- 5 kN compression
- 2 kN compression
- Zero
- 7 kN compression

28.



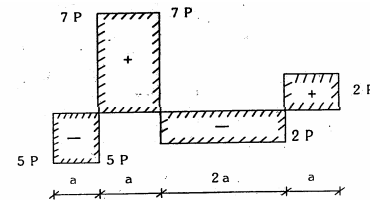
The force in the member BD of the truss shown in the figure given above is

- 4 kN tensile
- 4 kN compressive

- Zero
- 12 kN compressive

29. A free body diagram of a body shows
- A body isolated from all external effects without considering its own weight
  - A body isolated from its surroundings and all external forces acting on it
  - A body isolated from its surroundings and all external actions on it
  - A body isolated from its surroundings and all internal forces acting on it
30. Neglecting self weight, which of the following beams will have points of contraflexure?
- A simply supported beam with uniformly distributed load over part of the structure
  - An overhanging beam with loading only over supported span and not on overhangs
  - Fixed beam subjected to concentrated load
  - Cantilever beam subjected to uniformly varying load with zero load at free end

31.



The absolute maximum bending moment in the beam is

- $(2P \times a)$
- $(5P \times a)$
- $(4P \times a)$
- $(7P \times a)$

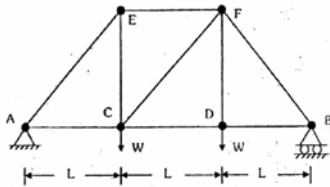
32. Which one of the following pairs is NOT correctly matched ?

Boundary conditions of column	Euler's buckling load
a. Both ends hinged	: $\pi^2 EI / l^2$
b. Both ends fixed	: $4\pi^2 EI / l^2$
c. One end fixed and other end free	: $\pi EI / 4l^2$

d. One end fixed and  $\sqrt{2} \pi^2 EI/l^2$  the other hinged

33. For a two-hinged parabolic arch,  $V_x$  is sum of the vertical forces on the left hand side of the section.  $H$  is the horizontal thrust. If  $\alpha$  is the angle of tangent at the point on arch with the horizontal, the shearing force at section from left hand side is given by

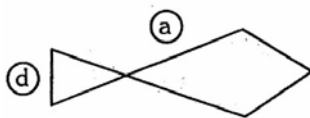
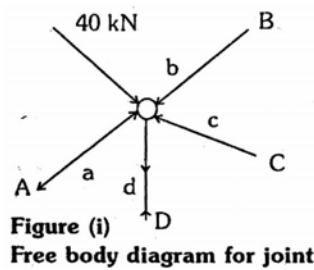
- a.  $V_x \sin \alpha - H \cos \alpha$
- b.  $V_x \cos \alpha - H \sin \alpha$
- c.  $V_x \sin \alpha + H \cos \alpha$
- d.  $V_x \cos \alpha + H \sin \alpha$



34. In the truss shown in the figure given above, which one of the following members has no force induced in it ?

- a. CD
- b. CE
- c. CF
- d. DF

35.



**Figure (ii)**  
**Force Polygon**

A joint of a roof truss has been isolated and shown in Figure (i). the force polygon for the joint is the shown in Figure (ii). Member 'a' is in compression, member 'd' is in tension.

- a. Both b and c are in tension
- b. Both b and c are in compression
- c. b is in tension, c is in compression
- d. b is in compression, c is in tension

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

**List I**

- A. Torque-twist relationship for a circular shaft
- B. Strain energy of elastic torsion
- C. Circumferential shear stress
- D. Maximum shearing stress due to combined torsion and direct stress

**List II**

- 1.  $1/2 \sigma^2 + 4\tau^2$
- 2.  $Gr\theta / l$
- 3.  $(GJ/2l)\theta^2$
- 4.  $\frac{GJ}{l} \theta$

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



37.

A beam ( $EI = \text{constant}$ ) of span  $L$  is subjected to clockwise moments  $M$  at both the ends  $A$  and  $B$ . The rotation of end  $A$  works out to be

- a.  $ML / 2 EI$
- b.  $ML / 3 EI$
- c.  $ML / 4 EI$
- d.  $ML / 6 EI$

38.

Consider the following statements :  
The principle of superposition is not applicable when

- 1. the material does not obey Hooke's law
- 2. the effect of temperature changes are taken into consideration
- 3. the structure is being analysed for the effect of support settlement

Which of the above statements is/are correct ?

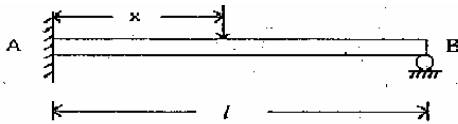
- a. 1 only
- b. 1 and 2
- c. 2 and 3
- d. 1, 2 and 3

39. Which of the following apply to 'fully rigid design' of steel structures ?

1. End connections are capable of transmitting moments
2. angle between member s at the joint does not change
3. The structure is assumed to be pin-pointed
4. A reduction in the maximum bending moment is permitted to provide a degree of direction fixity

Select the correct answer using the codes given below :

- a. 1, 2 and 3
- b. 1 and 2
- c. 1, 3 and 4
- d. 2, 3 and 4



40.

For the propped cantilever shown in the figure, influence line for reaction at the propped end is given by  $y_1 = f(x)$ . The influence line ordinate ( $y_2$ ) for moment at A is given by the equation

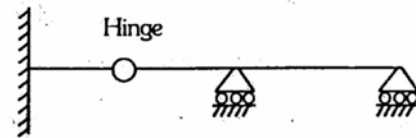
- a.  $y_2 = f(x)$
- b.  $y_2 = f(x) \cdot x$
- c.  $y_2 = x - f(x) \cdot x$
- d.  $y_2 = x - f(x) \cdot L$

41. In a system two weightless rigid bars AB and BC of length 'a' each having hinge supports at the ends. A and C, respectively, are connected to each other at B by a frictionless hinge (internal hinge). The rotation at the hinge is restrained by a rotational spring of stiffness k and system assumes a straight line configuration ABC. The rotation at the supports due to vertical load P acting at joint B is

- a.  $Pa / 2k$
- b.  $Pa / 4k$
- c.  $Pa / k$
- d.  $2 Pa / k$

42. A solid circular shaft, ABC, has a total length of '3 a'. A gear wheel positioned at B, at distance 'a' from the left hand end A, exerts a torque T. If the ends A and C are instantaneously locked in position by brakes just before the torque is applied, the torsional moments induced in both segments  $T_1$  (AB) and  $T_2$  (BC) are in the ratio

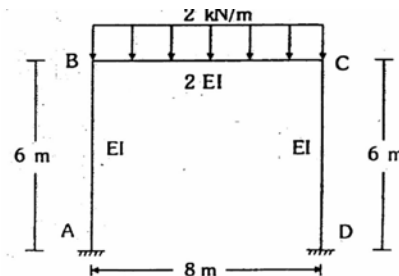
- a. 3 : 1
- b. 2 : 3
- c. 1 : 2
- d. 2 : 1



43.

The degree of indeterminacy of the beam given above is

- a. zero
- b. one
- c. two
- d. three



44.

For the frame shown above, the distribution factors for members BC and BA at joint B are

- a. 0.4, 0.6
- b. 0.5, 0.5
- c. 0.6, 0.4
- d. 0.7, 0.3

45. Creep of a material is a property indicated by

- a. a time-dependent strain of the material
- b. elongation of the material due to changes in the material properties
- c. shortening caused by shrinkage of the member
- d. the decrease in the volume of the material affected by the weather conditions

46. Principle of minimum strain energy is



theorem

2. a particular case of Castigliano's second theorem
3. applicable only when the redundant supports do not yield
4. applicable even when the redundant supports yield

Select the correct answer using the codes given below :

- a. 1 and 3
  - b. 1 and 4
  - c. 2 and 3
  - d. 2 and 4
47. Two shafts having same length and material are joined in series and subjected to a torque of 10 kNm. If the ratio of their diameters is 2 : 1, then the ratio of their angles of twist is
- a. 16 : 1
  - b. 2 : 1
  - c. 1 : 2
  - d. 1 : 16
48. Resilience is
- a. Maximum strain energy
  - b. Recoverable strain energy
  - c. Total potential energy
  - d. Shear strain energy(Beyond Hooke's law)
49. The slenderness ratio of a compression member in the context of Rankine's formula is defined as
- a.  $\frac{\text{length}}{\text{least lateral dimension}}$
  - b.  $\frac{\text{effective length}}{\text{least radius of gyration}}$
  - c.  $\frac{\text{effective length}}{\text{least lateral dimension}}$
  - d.  $\frac{\text{length}}{\text{least radius of gyration}}$
50. A propped cantilever of span 4 m is fixed at A and propped at B. The beam carries a u.d.l. of 1 t/m over the entire span. The reaction at B is
- a. 5/2 t
  - b. 2 t
  - c. 1 t

d. 3/2 t

51. The elements that are normally subjected to combined bending and axial forces are
- a. struts in reinforced concrete members
  - b. the members in long span bridges
  - c. columns in framed structures
  - d. space truss members
52. Which among the following assumptions are made in the design of roof trusses ?
1. Roof truss is restrained by the reactions
  2. Axes of the members meeting at a joint intersect at a common point
  3. riveted joints act as frictionless hinges
  4. Loads act normal to roof surface

Select the correct answer using the codes given below :

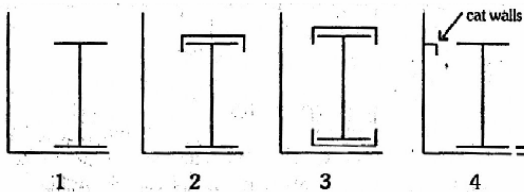
- a. 1, 2 and 4
  - b. 2, 3 and 4
  - c. 1, 3 and 4
  - d. 1, 2 and 3
53. The effective flange area in tension of a plate girder is equal to
- a.  $A_f$
  - b.  $A_f + \frac{A_w}{2}$
  - c.  $A_f + \frac{A_w}{8}$
  - d.  $A_f + \frac{A_w}{6}$

where  $A_f$  is the area of each flange and  $A_w$  is the web area

54. The maximum deflection in timber beams or joints should not be greater than
- a. span / 300
  - b. span / 325
  - c. span / 360
  - d. span / 380
55. A simply supported rectangular beam of span 20.0 m is subjected to u.d.l. The minimum effective depth required to check deflection of this beam, when modification factor for tension and compression are 0.9 and 1.1 respectively, will be
- a. 2.0 m
  - b. 1.8 m
  - c. 1.3 m



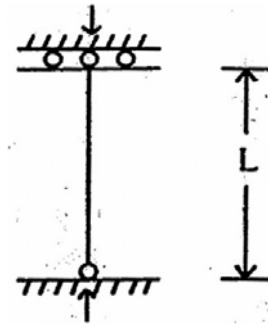
- d. 1.0 m
56. Prestressing of indeterminate structure should take care of the following :
1. High strength concrete
  2. High tensile steel
  3. Load balancing
  4. particle safety factors
- Select the correct answer using the codes given below :
- a. 1 and 3
  - b. 2, 3 and 4
  - c. 1, 2 and 4
  - d. 1, 2, 3 and 4
57. For a portai truss column fixed at the base, the point of contraflexure is assumed at
- a. a distance mid-way between the base and the foot of the knee brace
  - b. a distance mid-way between the base and top of the column
  - c. the foot of the knee brace
  - d. quarter distance between base and top of the column
58. As the span of a bridge increases, the impact factor
- a. decreases
  - b. increases
  - c. remains constant
  - d. increases up to a critical value of span and then decreases
59. A gantry girder has been provided with the following section shown in the following figures



In which case(s), the allowable stresses in being compression is equal to that in tension ?

Select the correct answer using the cods given below :

- a. 1 and 2
- b. 2 and 3
- c. 4 only
- d. 3 only



60.

The effective length of the member shown in the figure is equal to

- a. 1.2 L
- b. 1.5 L
- c. 2.0 L
- d. 3.0 L

61.

In a compression member, plate element may buckle locally before the entire member fails. To avoid this, which of the following recommendations are made ?

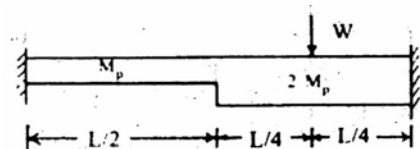
1. Thickness of members is taken in terms of lengths of compression members
2. length of element is increased
3. length of member is increased
4. Outstand is decreased

Select the correct answer using the codes given below :

- a. 1, 2 and 3
- b. 1, 2 and 4
- c. 2 and 3
- d. 1 and 4

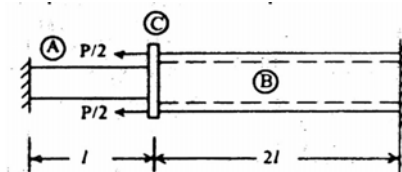
62.

Figure given below shows a fixed beam of steel



At the point of collapse, the value of load W will be

- a.  $10 M_p / L$
- b.  $15 M_p / L$
- c.  $20 M_p / L$
- d.  $25 M_p / L$

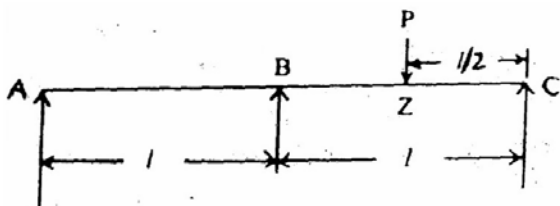


63.

A rigid plate C is fastened to steel rod A of area  $S$  and to steel pipe B of area  $2S$ . The other ends of A and B are fastened to rigid supports. When the force  $P$  is zero, there are no stresses in A and B. The yield stresses in tension and compression  $\sigma_y$ . The collapse load  $P$  under yield condition is

- $\sigma_y S$
- $2 \sigma_y S$
- $3 \sigma_y S$
- $\sigma_y S/2$

64. A continuous beam ABC of two equal spans AB and BC carries a load  $P$  at Z, the centre of BC. Then the magnitude of collapse load  $P$  is equal to



- $2 M_p / l$
- $4 M_p / l$
- $6 M_p / l$
- $8 M_p / l$

65. The shape factor for a solid circular section of diameter  $D$  is equal to

- $D / 2\pi$
- $15 / 2\pi$
- $16 / 3\pi$
- $D / 8\pi$

66. Gross flange area for a riveted plate girder is to be designed considering net area as 80% of its gross area. Consider width of the flange as 500 mm while web plate as 1000 mm  $\times$  12 mm. The girder is to resist a maximum BM of 4500 kNm. Maximum allowable bending stress in tension is 150 MPa. Gross flange area is

- 22000 mm<sup>2</sup>
- 35500 mm<sup>2</sup>
- 46000 mm<sup>2</sup>
- 73000 mm<sup>2</sup>

67. Match List I (Type of member) with List II (Slenderness ratio) and select the correct answer :

**List I**

- For compression members carrying dead and superimposed loads
- For members carrying compressive loads due to wind or seismic forces only
- For members carrying tension but in which the reversal of stress occurs due to wind or seismic forces

**List II**

- 350
- 180
- 250

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

68. A buttress in a wall is intended to provide

- lateral support to roof slab only
- lateral support to wall
- to resist vertical loads only
- lateral support to roof beams only

69. A continuous R.C. beam spans six span segments, each supporting a monolithic reinforced concrete slab. The beam will best be designed

- as a rectangular one throughout its span
- as a tee-beam throughout its span
- as a rectangular beam for span moments and tee-beam for support moments
- as tee-beam for span moments and as a rectangular beam for support moments

70. Shrinkage in a concrete slab

- causes shear cracks
- causes tension cracks
- causes compression cracks
- does not cause any cracking

71. The reinforcement for tension, when required in members, shall consist of

- only longitudinal reinforcement in the tension face
- only longitudinal reinforcement in the compression face
- only two legged closed loops enclosing the corner reinforcement

- d. both longitudinal and transverse reinforcement
72. The codal provisions recommend minimum shear reinforcement in the form of stirrups in the beams :
1. to cater for any torsion in the beam section
  2. to improve ductility of the cross-section
  3. to improve dowel action of longitudinal tension bars
- Select the correct answer using the codes given below :
- a. 1, 2 and 3 are correct
  - b. 2 and 3 are correct
  - c. Only 1 is correct
  - d. Only 2 is correct
73. The specified span to depth ratios of beams satisfying the limits of vertical deflection are for spans up to 10 m.
1. for higher spans, these are to be modified by multiplying the ratio  $y$  (10/span in metre)
  2. For higher spans, these are to be modified by multiplying the ratios by (span in metre/10)
  3. They get further modified depending on area and type of tension reinforcement
  4. However, they do not change further with the area and type of compression reinforcement
- Select the correct answer using the codes given below :
- a. 1 and 3 are correct
  - b. 2 and 3 are correct
  - c. 1 and 4 are correct
  - d. 2 and 4 are correct
74. When the tendon of a rectangular prestressed beam of cross-sectional area  $A$  is subjected to a load  $W$  through the centroidal longitudinal axis of beam, (where  $M$  = maximum bending Moment and  $Z$  = section modulus) then the maximum stress in the beam section will be
- a.  $\frac{W}{A} - \frac{M}{Z}$
  - b.  $\frac{W}{A} + \frac{M}{Z}$
  - c.  $\frac{A}{W} - \frac{Z}{M}$
  - d.  $\frac{A}{W} + \frac{Z}{M}$
75. Which of the following deformations are important in case of deep beams when compared to flexure along?
- a. shear
  - b. axial
  - c. torsional
  - d. bearing
76. The maximum depth of neutral axis for a beam with  $ad$  as the effective depth, in limit state method of design for Fe 415 steel is
- a. 0.46  $d$
  - b. 0.48  $d$
  - c. 0.50  $d$
  - d. 0.53  $d$
77. The load factor to be used for plastic design of steel structures for dead load and imposed load is
- a. 2.2
  - b. 2.0
  - c. 1.7
  - d. 1.5
78. Match List I with list II and select the correct answer :
- List I**
- A. A rubber bulldozer gives better output
  - B. A bulldozer mounted on crawler tracks gives better output
  - C. A rubber tyred bulldozer
  - D. A crawler mounted bulldozer
- List II**
1. While working on earth or soft ground
  2. Results in lesser operator fatigues
  3. Has greater use and versatility on jobs
  4. When working on a hard surface
- |    | A | B | C | D |
|----|---|---|---|---|
| a. | 2 | 1 | 4 | 3 |
| b. | 4 | 1 | 2 | 3 |
| c. | 2 | 3 | 4 | 1 |
| d. | 4 | 3 | 2 | 1 |













