S.NO	IMPORTANT QUESTIONS
	UNIT-I **DESIGN CONCEPTS, DESIGN OF BEAMS**
Part - A (Short Answer Questions)	
1	What are the three methods of design of reinforced concrete structural elements?
2	State four objectives of the design of reinforced concrete structure.
3	Which of the three methods of design is the best?
4	Explain the limit state method of design?
5	When do we go for doubly reinforced beams?
6	Explain the limiting moment of resistance
7	What is a doubly reinforced beam?
8	What do you mean by neutral axis?
9	What are the demerits of Working stress method?
Part - B (Long Answer Questions)	
1	What is meant by characteristic load, what are those values?
2	State and explain the significance of the six assumptions of design of flexural members employing limit state of collapse.
3	Draw a cross-section of singly reinforced rectangular beam and show the strain and stress diagrams.
4	Determine the depth of neutral axis for abeam section 250mmwide and 400mm deep (effective). The beam is reinforced with 3 bars of 20mm diameter. Use f_{ck}= 20 N/mm2and f_y= 415 N/mm2.
5	Give the stress block parameters used in limit state method along with the stress diagram.
6	Name the four different cases of flanged beams.
7	A singly reinforced R.C.C BEAM 250 mm wide and 400 mm deep (effective) is reinforced with 4 bars of 16 mm diameter. Find the depth of neutral axis, limiting depth of neutral axis and specify the type of beam. Use f_{ck} =20 N/mm2 and f_y=415 N/mm2.
8	Enumerate the steps of design of doubly reinforced beam.

9	What do you mean by neutral axis and leaver arm? Explain briefly with neat sketches.
10	Describe with sketches T-and L-beams and indicate their principal components.
11	For T-beam of flange width 1200, depth100 mm and web clear depth 350,width 250 mm find reinforcement required for ultimate moment of 250 KN/m
Part - C (Problem Solving and Critical Thinking Questions)	
1	Reinforced concrete beam of 230 mm X 500 mm effective is subjected to a factored moment of 200 KN m. Find the reinforcement required. Use M20 concreter and Fe 415 steel.
2	Calculate the ultimate moment of the resistance of an R.C beam of rectangular section 300mm wide and 600 mm depth the covers of both the reinforcement is 50 mm. Tension steel of 4-20mm diameter and compression steel of 4-12 mm diameter bars are provided. Use M20 concreter and Fe 415 steel.
3	A beam 300 mm X 500 mm effective depth is subjected to a factored moment of 170 KN m. Find the reinforcement required. Use M20 concreter and Fe 415 steel used d'=500 mm.
4	Design a rectangular beam of 250 mm X 500 mm effective depth is subjected to a factored moment of 160 KN m. Find the reinforcement required. Use M20 concreter and Fe 415 steel.
5	Explain characteristic strength of materials characteristic loads and Factored load?
6	A T-beam floor has 120mm thick slab supported on beams. The width of beam is 300 mm and effective depth is 580 mm. The beam is reinforced with 8 bars of 20mm diameter. Use M20 grade of concrete and Fe 415 steel. The beams are spaced 3 m centre to center. The effective span of beam is 3.6 m.
7	Find the moment of resistance of T-beam having, breadth of flange 740mm depth of beam is 400 mm 5-20 mm dia bars used as reinforcement, depth of flange 100 mm. Use M15 grade concrete and fe250 steel.
8	A simply supported *T*-beam of 8 m span using M 20 and Fe 415 subjected to dead load of 9.3kN/m and imposed loads of 10.7kN/m at service. Calculate the short- and long-term deflections and check the requirements of IS 456.Cross Section dimensions Bf=2234mm bw=300,Df=100mm Overall depth of beam 700 mm reinforced with 2 nos of 25 mm dia and 2 nos of 16 mm dia.
UNIT - II SHEAR, BOND & TORSION	
Part – A (Short Answer Questions)	
1	Define 'development length'?
2	What is the expression for spacing of vertical stirrups in R.C. beams for shear?
3	Why cover to be provided in design of reinforced concrete structures

4	Minimum shear reinforcement as per IS: 456.
5	How many forms we can provide shear reinforcement?
6	What are the stresses produced by torsion?
7	Spacing of shear reinforcement as per IS 456:2000
8	Explain the terms bond and anchorage?
9	Explain the terms average bond stress and local bond stress?
Part - B (Long Answer Questions)	
1	Explain modes of failures in R.C beams?
2	Step by step design procedure for shear reinforcement.
3	A simply supported reinforced concrete beam is 250 mm wide and 500mm effective depth and is reinforced with 4-20 mm diameter as tensile steel. If the beam is subjected to a factored shear of 65 KN at the support. Find the nominal shear stress at the support. Use M20 concrete and Fe 250 steel.
4	A singly reinforced concrete beam is 400x450 mm deep to the centre of tension reinforcement which consists of 4 bars of 16mm diameter. If the safe stresses on concrete and steel are 7 N / mm2 and 230 N / mm2 respectively, find the moment of resistance of the section. Take M = 14.
5	What are the IS 456:2000 code requirements for bond.
6	A simply supported reinforced concrete beam is 350 mm wide and 500mm effective depth and is reinforced with 6bars of 18 mm diameter as tensile steel. If the beam is subjected to a factored shear of 65 KN at the support. Find the nominal shear stress at the support and design the shear reinforcement. Use M20 concrete and Fe 250 steel.
7	What are the various remedial measures for control of cracking?
Part - C (Problem Solving and Critical Thinking Questions)	
1	A singly reinforced concrete beam is 400x450 mm deep to the centre of tension reinforcement which consists of 4 bars of 16mm diameter. If the safe stresses on concrete and steel are 7 N / mm2 and 230 N / mm2 respectively, find the moment of resistance of the section. Take M = 14.
2	A RC beam has an effective depth of 500 mm and a breadth of 350mm. It contains 4-25 mm bars out of which two bars are to be bent up at 450 near end of the support. Calculate shear resistance of the bent up bars and additional stirrups needed. If the factored shear of 350 kN at the support clear span of the beam is 6 m. Use M15 mix and Fe415 grade of steel

3	A simply supported reinforced concrete beam is 250 mm wide and 500mm effective depth and is reinforced with 4-20 mm diameter as tensile steel. If the beam is subjected to a factored shear of 65 KN at the support. Find the nominal shear stress at the support and design the shear reinforcement. Use M20 concrete and Fe250 steel
4	A reinforced concrete beam of rectangular cross section 400x450 mm deep to the centre of tension reinforcement which consists of 6 bars of 20mm diameter HYSD steel of grade of Fe415, placed at a cover of 50mm. Out of 6 bars, 3 bars have been bent up at 450. Design the shear reinforcement if the beam is subjected to a uniformly distributed load of 100KN/m over a simply supported beam of clear span of 7m. The concrete mix used is M20.
5	A simply supported concrete beam is 300 mm wide, 450 mm effective depth and is reinforced with 6 bars of 16 mm diameter as tensile steel. If the beam is subjected to a factored shear of 125 KN at the support and two of the main bars are cranked up at 450. Find the spacing of two legged 6 mm diameter stirrups at support. Use M 20 concrete and Fe 415 steel.
UNIT-III DESIGN OF SLABS	
Part - A (Short Answer Questions)	
1	What is difference between one-way and two-way slabs
2	Why cover to be provided in design of reinforced concrete structures
3	Effective span for slabs as per IS: 456?
4	Minimum and maximum reinforcement requirement for slabs.
5	Describe the code provisions for calculating the deflection due to creep?
6	What are the major factors that effect the deflection?
7	Explain about canopy slabs?
Part - B (Long Answer Questions)	
1	Design procedure for two way slabs, without transverse reinforcement or corners not held down?
2	Design a two-way slab simply supported on all the four edges and corners are restrained for a room 6 m X 4 m clear in size. The superimposed working load of 300 kN/m2.use M-20 and Fe 415.
3	Give neat sketches for the reinforcement details for one way simply support and two way continuous slabs.

4	Design an interior panel of 6 m X 5 m carrying a superimposed load of 300 kN/m2 use M-20 and Fe 415.
5	Design a slab panel having only short edge is continuous of 7 m X 4 m carrying a superimposed load of 300 kN/m2 use M-20 and Fe 415.
6	Design one way slab having span of 3 m for a factored superimposed load of 6 kN/m use M-20 and Fe 230.
7	What are the major factors which influence the crack width in flexural members?
Part - C (Problem Solving and Critical Thinking Questions)	
1	Design a two-way slab simply supported on all the four edges and corners are restrained for a room 6 m X 4 m clear in size. The superimposed working load of 3 kN/m2.use M-20 and Fe 415.
2	Design a simply supported roof slab of room 9 m X 4 m clear in size if the superimposed load is 4 kN/m2 use M-20 and Fe 415 grade of steel.
3	Design a one-way having a span of 2.75 m for a factored superimposed load of 5kN/m2.use M-20?
4	Design a slab panel having only short edge is continuous of 7 m X 4 m carrying a superimposed load of 3 kN/m2 use M-20 and Fe 415.
5	Design a slab of room of clear size 5.5 m X 4 m. The superimposed load is 5 kN/m2 use M-20 and Fe 415 grade of steel. The four edges of the slab are simply supported and there is no provision of torsion reinforcement (corners not held down). The width of the support is 300 mm.
UNIT-IV DESIGN OF COLUMNS	
Part – A (Short Answer Questions)	
1	Explain about column and pedestal.
2	What are the functions of column reinforcement?
3	Define effective length of column?
4	What is slenderness ratio? Explain.
5	Why cover to be provided in design of reinforced concrete structures.
6	What is the difference between behavior of a short and long column?
7	What is the minimum eccentricity specified for design of column?
8	What are the methods available in IS: 456-2000 to determine the effective length of column?

9	Explain braced and un braced column?
10	How the columns are classified?
Part - C (Problem Solving and Critical Thinking Questions)	
1	Write the design procedure for slender columns for both braced and unbraced column.
2	Design an R.C isolated footing on ultimate load of 2000 KN for coloumn of 450x450 safe baring capacity of 200 kn/m2. Use M20 grade of concrete and Fe 415 steel?
3	Design a plain concrete footing for a column of 400 mm x 400 mm carrying an axial load of 400 kN under service loads. Assume safe bearing capacity of soil as 300 kN/m2 at a depth of 1 m below the ground level. Use M 20 and Fe 415 for the design. Detail as per IS 456-2000.
4	Design a short column, square in section carry an axial load of 2000 KN. Using mild steel M15.
5	Design a rectangular footing for a circular column, 500 mm in diameter, reinforced with 6–25 _ bars, and carrying an axial load of 2000 kN. Assume soil with a safe bearing capacity of 325 kN/m2 at a depth of 1.5 m below ground. Assume Fe 415 grade steel for both column and footing, and M 20 grade concrete for the footing and M 30 grade concrete for the column.
6	Design a short column, square in section carry an axial load of 2000 KN. Using Fe415 and M20.
7	Design an R.C isolated footing on ultimate load of 1500 Kn for column of 400x400 safe baring capacity of 180 kn/m2. Use M20 grade of concrete and Fe 415 steel?
Part – C (Problem Solving and Critical Thinking)	
1	How columns are classified on the basis of different criteria?
2	Outline the procedure for design of axially loaded reinforced concrete column?
3	Design a short column, square in section carry an axial load of 2000 KN. Using i) Mild steel M15 ii) Fe415 and M20
4	Check the column safety having column dimensions 400 X 600mm reinforced with 6nos of 20mm dia equally distributed on opposite sides subjected to ultimate load of 2000kN and ultimate moment of 120kN-m .Use M-20 and Fe-415.
5	A R.C. column rectangular in section 230 mm wide and 300 mm deep is reinforced with 4 bars of 20 mm, one at each corner, with an effective cover of 50 mm. It is subjected to an ultimate axial load of 340 kN, ultimate bending moment of M u x = 30 kN-m about x-axis bisecting the depth and ultimate

	moment of M u y = 18 kN-m about y-axis bisecting the width. Use M 20 grade concrete and Fe 415 grade steel. Check the safety of the column.
6	Check the column safety having column dimensions 350 X 350 mm reinforced with 6 nos of 16 mm dia equally distributed on opposite sides subjected to ultimate load of 2000 kN and ultimate moment of 120 kN-m .Use M-20 and Fe-415.
7	A short rc column 300 mm wide and 500 mm deep is reinforced with 6 nos of 20 mm dia equally distributed on opposite sides. Determine the bending moment Mu about an axis bisecting depth when it is also subjected to PU= 800KN. Assume M20 grade concrete and Fe415grade steel
UNIT-V DESIGN OF FOOTING, STAIR CASE	
Part - A (Short Answer Questions)	
1	Why cover to be provided in design of reinforced concrete structures
2	How the foundations are classified?
3	Explain about combined footing?
4	Explain about need of tensile reinforcement in footings?
5	Show how the pressure distribution beneath footings?
6	Provision of dowel bars as per IS: 456-2000 code of practice?
7	Explain shear and bond in footings?
8	How you can find tensile reinforcement for footing?
9	What are the types of footings?
10	Explain about the following stair cases (A) A stair case (B) A dog legged stair
11	Explain about tread and rise in staircase?
12	Explain about isolated footing?
13	Deep foundation explains?
Part - B (Long Answer Questions)	
1	What are the different types of foundations explain with fig?
2	Explain design procedure for footing as per IS:456

3	Explain pressure distribution under footing explain with figure?
4	Explain about one-way and two-way shear in footings?
5	Design a plain concrete footing for a column of 400 mm x 400 mm carrying an axial load of 400 kN under service loads. Assume safe bearing capacity of soil as 300 kN/m2 at a depth of 1 m below the ground level. Use M 20 and Fe415 for the design. Detail as per IS 456-2000.
6	Design a sloped footing for a square column of 400 mm x 400 mm with 16 longitudinal bars of 16 mm diameter carrying a service load of 1400 kN. Use M 20 and Fe 415 both for column and footing slab. The safe bearing capacity of soil is 150 kN/m2. Detail as per IS 456-2000.
Part – C (Problem Solving and Critical Thinking)	
1	Design a plain concrete footing for a column of 300 mm x 300 mm carrying an axial load of 250 kN under service loads. Assume safe bearing capacity of soil as 250kN/m2 at a depth of 1.5 m below the ground level. Use M 20 and Fe 415 for the design. Detail as per IS 456-2000.
2	Design a combined footing for two columns *C*1, 400 mm x 400 mm with 8 bars of 16 mm diameter carrying a service load of 800 kN and *C*2, 500 mm x 500 mm with 8 bars of 20 mm diameter carrying a service load of 1200 Kn.The column *C*1 is spaced at a distance of 500 mm from the property line. The columns are at 3.0 m c/c distance. The safe bearing capacity of soil is 200kN/m2 at a depth of 1.5 m below the ground level. Use M 20 and Fe 415 for columns and footing. Detail as per IS 456-2000.
3	Design footing for a column of 250 mm x 250 mm carrying an axial load of 325 kN under service loads. Assume safe bearing capacity of soil as 200 kN/m2 at a depth of 1 m below the ground level. Use M 20 and Fe 415 for the design. Detail as per IS 456-2000.

REINFORCED CONCRETE STRUCTURES VARIOUS LIMITING VALUES

1. By over reinforcing a beam, the moment of resistance can be increased not more than 25%.
2. The maximum shear stress in a rectangular section of a beam is 1.50 times the average.

3. According to Indian Standard 456 specifications, the safe diagonal tensile stress for M 150 grade concrete is 5 kg/cm2.
4. Spacing of stirrups in a rectangular beam is, increased at the center of the beam.
5. Dimensions of a beam need to be changed if the shear stress is more than 20 kg/cm2.
6. For M 150 grade of concrete, according to I.S.456 specifications, the local bond stress is 10 kg/cm2.
7. If the diameter of a reinforcement bar is d, the anchorage value of the hook is 16d.
8. The radius of the bar bend to form a hook, should not be less than, twice the diameter.
9. The length of the straight portion of a bar beyond the end of the hook should be at least, seven times of the diameter.
10. Lapped splices in tensile reinforcement are generally not used for bars of size larger than, 36 mm diameter.
11. Minimum spacing between horizontal parallel reinforcement of the same size should not less than one diameter.
12. For the design of simply supported T beam the ratio of the effective span to overall depth of beam is limited to 20.
13. Columns may be made of plain concrete, if their unsupported lengths do not exceed their least lateral dimension four times.
14. The diameter of transverse reinforcement columns should be equal to ¼ of the diameter of the main rods, but not less than 7mm.
15. The length of the lap in a compression member is kept greater than 24 bar diameter.
16. A column is regarded as long column, if the ratio of its effective length and lateral dimension, exceeds 15.
17. The pitch of the main bars in a simply supported slab should not exceed its effective depth by six times.
18. For M 150 grade of concrete, the moment of resistance factor is 8.50.
19. The floor slab of a building is supported on reinforced cement floor beams. The ratio of the end and intermediate spans is kept 0.90.
20. The maximum ratio of span to depth of a slab simply supported and spanning in one direction, is 30.
21. The maximum ratio of span to depth of a slab simply supported and spanning in one direction, is 35.
22. The maximum ratio of span to depth of cantilever slab is 12.
23. For a continues floor slab supported on beams, the ratio of end span length and intermediate span length, is 0.90.

24. If the sides of a slab simply supported on edges and spanning in two directions are equal, the maximum BM, is multiplied by 0.50.
25. The diameter of column head support of a flat slab is generally kept 0.25 times the span length.
26. The minimum thickness of the flat slab is taken as 13cm.
27. The effective width of a column strip of a flat slab is half the width of the panel.
28. For a circular slab carrying a UDL, the ratio of the maximum negative to maximum positive radial moment, is 2.
29. For normal cases, stiffness of a simply supported beam is satisfied, if the ratio of its span to its overall depth does not exceed 20.
30. The ratio of breadth to effective depth is kept. 0.50.
31. For initiate estimate for a beam, the width is assumed 1/30th of span.
32. The thickness of the topping of a ribbed slab varies between 5 cm to 8cm.
33. The breadth of a ribbed slab containing two bars must be between, 8cm to 10cm.
34. The maximum diameter of the bar used in ribbed slab, is 22mm.
35. The maximum permissible size of aggregates to be used in casting the rib of a slab is 10mm.
36. The thickness of the flange of a Tee beam of a ribbed slab is assumed as, thickness of the concrete topping.
37. According to I.S.456 – 1978, the thickness of reinforced concrete footing on piles at its edges, is kept less than 15 cm.
38. The weight of foundation is assumed as, 10% of wall weight.
39. If the width of the foundation for two equal columns is restricted, the shape of the footing generally adopted, is rectangular.
40. In a combined footing, if shear stress exceeds 5 kg/cm2, the nominal stirrups provided are 12 legged.
41. In a combined footing, if shear stress does not exceed 5 kg/cm2, the nominal stirrups provided are 8 legged.
42. Bottom bars under the columns are extended into the interior of the footing slab to a distance greater than, 42 diameter from the center of the column.
43. On piles, the drop must be at least 120cm.
44. The raft foundation is provided if its area exceeds the plain area of the building by 50%.
45. If W is weight of a retaining wall and P is the horizontal earth pressure, the factor of safety against sliding, is 1.5

46. Cantilever retaining walls can safely be used for a height not more than 6m.
47. If H is the overall height of a retaining wall, the width of base slab usually provided as, 0.70H.
48. The toe projection of foundation slabs is taken as one third of the base.
49. The thickness of base slab of a retaining wall generally by provided as, width of the stem at the bottom.
50. The minimum head room over a stair must be 210 cm.
51. For stairs spanning horizontally, the minimum waist provided as 12cm.
52. The number of treads in a flight is equal to risers minus one.
53. In favorable circumstances a 15 cm concrete cube after 28 days, attains a maximum crushing strength is 400 kg/cm2.
54. The minimum cube strength of concrete used for a prestressed member is 350 kg/cm2.
55. As per I.S.1343, total shrinkage for a post tensioned beam is, 3.5*10-5.
56. A under reinforced section means, steel will yield first.
57. An R.C.C beam not provided with shear reinforcement may develop cracks in its bottom inclined roughly to the horizontal at 45 degree.
58. The live load to be considered for an Inaccessible roof is 75 kg/cm2.
59. The live load to be considered for accessible roof is 150 kg/cm2.
60. The allowable tensile stress in mild steel stirrups, reinforced cement concrete is 1400 kg/cm2.
61. The number of main steel bars provided in an octagonal columns, is 8.
62. Design of RCC cantilever beams, is based on the resultant force at fixed end.
63. Design of RCC Simply supported beams carrying UDL is based on the resultant BM at mid span.
64. The minimum clear cover of RCC column shall be greater of 25mm of diameter.
65. RCC column is treated as short column if its slenderness ratio is less than, 50.
66. RCC column is treated as long column if its slenderness ratio is greater than, 50.
67. Continuous beam shall be deemed to be a deep beam, if the ratio of span to depth is 2.5.
68. Failure of RC beam occurs as soon as the concrete strain in compression reaches 0.0035.
69. The ratio of the depth of parabolic and Rectangular portion block at the limit state of collapse of a singly reinforced section is, 4/3.
70. In under reinforced singly reinforced beam, concrete crushes at its maximum strain 0.35%.

71. In column design, the tensile strength of concrete is taken equal to 0.
72. The maximum compressive strain in concrete in axial compression is taken as, 0.002.
73. The ratio of minimum area of cross section of longitudinal bars and gross sectional area of column shall be 1in 125.
74. The ratio of No. of longitudinal bars provided in rectangular columns to those in circular column is 2/3.
75. Spacing of Longitudinal bars measured along the peripheral of the column should not exceed 300mm.
76. The nominal longitudinal reinforcement in pedestals should not be less than, 0.15% crosses section.
77. The internal angle of lateral ties in the form of polygonal links in columns shall not exceed 135degree.
78. The diameter of transverse reinforcement for longitudinal bars grouped together without touching, and each group in transversely tied, shall not exceed 20mm.
79. The ratio of the strength of compression members with helical reinforcement to those having lateral ties, is 1.05.
80. Minimum Grade of concrete for RCC is M20.
81. Creep co efficient of concrete at one year is 1.1.
82. Limit state design, the partial safety factor for concrete is 1.50.
83. Limit state design, the partial safety factor for steel is 1.15.
84. Floors of Banking halls, office entrance halls and reading rooms having a minimum live load of 3 kN/m2.
85. Counterfort retaining walls provided where height of retaining wall exceed 5.5m.
86. Cement mortar unit weight is 20.40 kN/m3.
87. Brick wall 100mm unit weight is 1.91 kN/m3.
88. Brick 200mm wall unit weight is 3.84 kN/m3.
89. Marble unit weight is 26.70 kN/m3.
90. Teak wood unit weight of 6.28 kN/m3.
91. For pavements recommended slump in mm is, minimum 25 and Maximum 50.
92. For Mass concrete structures recommended slump in mm is, minimum 25 and Maximum 50.
93. For Unreinforced footings recommended slump in mm is, minimum 25 and Maximum 75.

94. For Cassions and Bridge decks recommended slump in mm is, minimum 25 and Maximum 75.

95. For Reinforced footings, foundations and walls recommended slump in mm is, minimum 50 and Maximum 100.

96. For Reinforced Slabs and beams recommended slump in mm is, minimum 30 and Maximum 125.

97. For Reinforced columns recommended slump in mm is, minimum 75 and Maximum 125.

98. For RCC work beam, columns nominal size of aggregates used is, 20mm.

99. For Mass concrete work, Nominal size of aggregates used is, 40 mm.

100. For flooring, 10mm aggregates are used.

OBJECTIVE QUESTIONS

Question No. 01

An R.C.C. beam of 6 m span is 30 cm wide and has a lever arm of 55 cm. If it carries a U.D.L. of 12 t per m and allowable shear stress is 5 kg/cm2, the beam

(A) Is safe in shear
(B) Is safe with stirrups
(C) Is safe with stirrups and inclined bars
(D) Needs revision of section

Answer: Option D

Question No. 02

According to I.S. : 456, slabs which span in two directions with corners held down, are assumed to be divided in each direction into middle strips and edge strips such that the width of the middle strip, is

(A) Half of the width of the slab
(B) Two-third of the width of the slab
(C) Three-fourth of the width of the slab
(D) Four-fifth of the width of the slab

Answer: Option C

Question No. 03

The load stress of a section can be reduced by

(A) Decreasing the lever arm
(B) Increasing the total perimeter of bars
(C) Replacing larger bars by greater number of small bars
(D) Replacing smaller bars by greater number of greater bars

Answer: Option C

Question No. 04

The diameter of the column head support a flat slab, is generally kept

(A) 0.25 times the span length
(B) 0.25 times the diameter of the column
(C) 4.0 cm larger than the diameter of the column

(D) 5.0 cm larger than the diameter of the column
Answer: Option A

Question No. 05

If is the uniformly distributed load on a circular slab of radius fixed at its ends, the maximum positive radial moment at its centre, is
(A) $3WR^2/16$
(B) $2WR^2/16$
(C) $WR^2/16$
(D) None of these
Answer: Option C

Question No. 06

The maximum ratio of span to depth of a slab simply supported and spanning in one direction, is
(A) 35 (B) 25 (C) 30 (D) 20
Answer: Option C

Question No. 07

If the width of the foundation for two equal columns is restricted, the shape of the footing generally adopted, is
(A) Square (B) Rectangular (C) Trapezoidal (D) Triangular
Answer: Option B

Question No. 08

The floor slab of a building is supported on reinforced cement floor beams. The ratio of the end and intermediate spans is kept
(A) 0.7 (B) 0.8 (C) 0.9 (D) 0.6
Answer: Option C

Question No. 09

Pick up the correct statement from the following:
(A) Lateral reinforcement in R.C.C. columns is provided to prevent the longitudinal reinforcement from buckling
(B) Lateral reinforcement prevents the shearing of concrete on diagonal plane
(C) Lateral reinforcement stops breaking away of concrete cover, due to buckling
(D) All the above
Answer: Option D

Question No. 10

In case the factor of safety against sliding is less than 1.5, a portion of slab is constructed downwards at the end of the heel slab, which is known as
(A) A key (B) A cut-off wall (C) A rib (D) All the above
Answer: Option D

Question No. 11

Lapped splices in tensile reinforcement are generally not used for bars of size larger than
(A) 18 mm diameter (B) 24 mm diameter (C) 30 mm diameter (D) 36 mm diameter
Answer: Option D

Question No. 12

Minimum spacing between horizontal parallel reinforcement of the same size should not be less than
(A) One diameter (B) 2.5 diameters (C) 3 diameters (D) 3.5 diameters
Answer: Option A

Question No. 13

For a ribbed slab
(A) Clear spacing between ribs shall not be greater than 4.5 cm
(B) Width of the rib shall not be less than 7.5 cm
(C) Overall depth of the slab shall not exceed four times the breadth of the rib
(D) All the above
Answer: Option D

Question No. 14

A very comfortable type of stairs is
(A) Straight (B) Dog legged (C) Geometrical (D) Open newel
Answer: Option D

Question No. 15

Columns may be made of plain concrete if their unsupported lengths do not exceed their least lateral dimension
(A) Two times (B) Three times (C) Four times (D) Five times
Answer: Option C

Question No. 16

The width of the flange of a L-beam, should be less than
(A) One-sixth of the effective span
(B) Breadth of the rib + four times thickness of the slab
(C) Breadth of the rib + half clear distance between ribs
(D) Least of the above
Answer: Option D

Question No. 17

A pre-stressed concrete member is preferred because

(A) Its dimensions are not decided from the diagonal tensile stress
(B) Large size of long beams carrying large shear force need not be adopted
(C) Removal of cracks in the members due to shrinkage
(D) All the above
Answer: Option D

Question No. 18

If the ratio of the span to the overall depth does not exceed 10, the stiffness of the beam will ordinarily be satisfactory in case of a
(A) Simply supported beam (B) Continuous beam (C) Cantilever beam (D) None of these
Answer: Option C

Question No. 19

A pile of length carrying a uniformly distributed load per metre length is suspended at two points, the maximum, B.M. at the centre of the pile or at the points of suspension, is
(A) WL/8
(B) $WL^2/24$
(C) $WL^2/47$
(D) $WL^2/16$
Answer: Option C

Question No. 20

If is the net upward pressure on a square footing of side for a square column of side , the maximum bending moment is given by
(A) B.M = pb (c - a)/4 (B) B.M = pb (b - a) $^2/4$
(C) B.M = pb (b - a) $^2/8$ (D) B.M = pb (b + a)/8
Answer: Option C

Question No. 21

Longitudinal bars and lateral stirrups, is
(A) Stress in concrete × area of concrete
(B) Stress in steel × area of steel
(C) Stress in concrete × area of concrete + Stress in steel × area of steel
(D) None of these
Answer: Option C

Question No. 22

The pitch of the main bars in a simply supported slab, should not exceed its effective depth by
(A) Three times (B) Four times (C) Five times (D) Six times
Answer: Option D

Question No. 23

The transverse reinforcements provided at right angles to the main reinforcement
(A) Distribute the load (B) Resist the temperature stresses
(C) Resist the shrinkage stress (D) All the above

Answer: Option D

Question No. 24

The maximum permissible size of aggregates to be used in casting the ribs of a slab, is

(A) 5 mm (B) 7.5 mm (C) 10 mm (D) 15 mm

Answer: Option C

Question No. 25

Pick up the incorrect statement from the following: Tensile reinforcement bars of a rectangular beam

(A) Are curtailed if not required to resist the bending moment

(B) Are bent up at suitable places to serve as shear reinforcement

(C) Are bent down at suitable places to serve as shear reinforcement

(D) Are maintained at bottom to provide at least local bond stress

Answer: Option C

Question No. 26

Steel bars are generally connected together to get greater length than the standard length by providing

(A) Straight bar splice (B) Hooked splice

(C) Dowel splice (D) All the above

Answer: Option D

Question No. 27

The minimum thickness of the cover at the end of a reinforcing bar should not be less than twice the diameter of the bar subject to a minimum of

(A) 10 mm (B) 15 mm (C) 20 mm (D) 25 mm

Answer: Option D

Question No. 28

Top bars are extended to the projecting parts of the combined footing of two columns L distance apart for a distance of

(A) 0.1 L from the outer edge of column (B) 0.1 L from the centre edge of column

(C) Half the distance of projection (D) One-fourth the distance of projection

Answer: Option B

Question No. 29

For M 150 grade concrete (1:2:4) the moment of resistance factor is

(A) 0.87 (B) 8.50 (C) 7.50 (D) 5.80

Answer: Option B

Question No. 30

An R.C.C. lintel is spanning an opening of 2 m span in a brick wall. The height of the roof is 2.9 m above the floor level and that of the opening is 2.1 m above the floor level. The lintel is to be designed for self weight plus

(A) Triangular load of the wall
(B) UDL of wall
(C) UDL of wall + load from the roof
(D) Triangular load + load from the roof

Answer: Option C

Question No. 31

The minimum clear cover for R.C.C. columns shall be

(A) Greater of 40 mm or diameter
(B) Smaller of 40 mm or diameter
(C) Greater of 25 mm or diameter
(D) Smaller of 25 mm or diameter

Answer: Option C

Question No. 32

An R.C.C beam of 25 cm width has a clear span of 5 metres and carries a U.D.L. of 2000 kg/m inclusive of its self weight. If the lever arm of the section is 45 cm, the beam is

(A) Safe in shear
(B) Is safe with stirrups
(C) Is safe with stirrups and inclined members
(D) Needs revision of the section

Answer: Option A

Question No. 33

The neutral axis of a T-beam exists

(A) Within the flange
(B) At the bottom edge of the slab
(C) Below the slab
(D) All the above

Answer: Option D

Question No. 34

The spacing of transverse reinforcement of column is decided by the following consideration.

(A) The least lateral dimension of the column
(B) Sixteen times the diameter of the smallest longitudinal reinforcing rods in the column
(C) Forty-eight times the diameter of transverse reinforcement
(D) All the above

Answer: Option D

Question No. 35

The self-weight of the footing, is

(A) Not considered for calculating the upward pressure on footing
(B) Also considered for calculating the upward pressure on footing
(C) Not considered for calculating the area of the footing
(D) Both (b) and (c)

Answer: Option A

Question No. 36

If the bearing capacity of soil is 10 tonnes/cm2 and the projection of plain concrete footing from walls, is a cm, the depth D of footing is

(A) D = 0.0775 a (B) D = 0.775 a (C) D = 0.775 a (D) D = 0.775 a2

Answer: Option B

Question No. 37

In a simply supported slab, alternate bars are curtailed at

(A) 1/4th of the span (B) 1/5th of the span

(C) 1/6th of the span (D) 1/7th of the span

Answer: Option D

Question No. 38

If R and T are rise and tread of a stair spanning horizontally, the steps are supported by a wall on one side and by a stringer beam on the other side, the steps are designed as beams of width

(A) R + T (B) T – R (C) 2 + T2) (D) R - T

Answer: Option C

Question No. 39

In the zone of R.C.C. beam where shear stress is less than 5 kg/cm2, nominal reinforcement is provided at a pitch of

(A) One-half lever arm of the section (B) One-third lever arm of the section

(C) Lever arm of the section (D) One and half lever arm of the section

Answer: Option C

Question No. 40

If is the load on a circular slab of radius, the maximum radial moment at the centre of the slab, is

(A) $WR^2/16$ (B) $2WR^2/16$ (C) $3WR^2/16$ (D) $5WR^2/16$

Answer: Option C

Question No. 41

If the permissible compressive and tensile stresses in a singly reinforced beam are 50 kg/cm2 and 1400 kg/cm2 respectively and the modular ratio is 18, the percentage area At of the steel required for an economic section, is

(A) 0.496 % (B) 0.596 % (C) 0.696 % (D) 0.796 %

Answer: Option C

Question No. 42

The modular ratio m of a concrete whose permissible compressive stress is C, may be obtained from the equation.

(A) m = 700/3C (B) m = 1400/3C (C) m = 2800/3C (D) m = 3500/3C

Answer: Option C

Question No. 43

Side face reinforcement shall be provided in the beam when depth of the web in a beam exceeds
(A) 50 cm (B) 75 cm (C) 100 cm (D) 120 cm
Answer: Option B

Question No. 44
For initial estimate for a beam design, the width is assumed
(A) 1/15th of span (B) 1/20th of span (C) 1/25th of span (D) 1/30th of span
Answer: Option D

Question No. 45
In a slab, the pitch of the main reinforcement should not exceed its effective depth
(A) Three times (B) Four times (C) Five times (D) Two times
Answer: Option A

Question No. 45
The Young's modulus of elasticity of steel, is
(A) 150 KN/mm2 (B) 200 KN/mm2 (C) 250 KN/mm2 (D) 275 KN/mm2
Answer: Option D

Question No. 46
Design of a two way slab simply supported on edges and having no provision to prevent the corners from lifting, is made by
(A) Rankine formula (B) Marcus formula
(C) Rankine Grashoff formula (D) Grashoff formula
Answer: Option C

Question No. 47
Spacing of stirrups in a rectangular beam, is
(A) Kept constant throughout the length (B) Decreased towards the centre of the beam
(C) Increased at the ends (D) Increased at the centre of the beam
Answer: Option D

Question No. 48
As per IS: 456, the reinforcement in a column should not be less than
(A) 0.5% and not more than 5% of cross-sectional area
(B) 0.6% and not more than 6% of cross-sectional area
(C) 0.7% and not more than 7% of cross-sectional area
(D) 0.8% and not more than 8% of cross-sectional area
Answer: Option D

Question No. 49
The allowable tensile stress in mild steel stirrups, reinforced cement concrete, is

(A) 1400 kg/cm2 (B) 190 kg/cm2 (C) 260 kg/cm2 (D) 230 kg/cm2
Answer: Option A

Question No. 50
Bottom bars under the columns are extended into the interior of the footing slab to a distance greater than
(A) 42 diameters from the centre of the column
(B) 42 diameters from the inner edge of the column
(C) 42 diameters from the outer edge of the column
(D) 24 diameters from the centre of the column
Answer: Option C

Question No. 51
An R.C.C. column is treated as short column if its slenderness ratio is less than
(A) 30 (B) 35 (C) 40 (D) 50
Answer: Option D

Question No. 52
If the length of an intermediate span of a continuous slab is 5m, the length of the end span is kept
(A) 4.5 m (B) 4.0 m (C) 3.5 m (D) 3.0 m
Answer: Option A

Question No. 53
The maximum ratio of span to depth of a slab simply supported and spanning in two directions, is
(A) 25 (B) 30 (C) 35 (D) 40
Answer: Option C

Question No. 54
If T and R are the tread and rise of a stair which carries a load w per square metre on slope, the corresponding load per square metre of the horizontal area, is
(A) $w (R + T)/T$ (B) $w (R^2 + T^2)/T$ (C) $w (R + T)/T$ (D) $w (R/T)$
Answer: Option B

Question No. 55
For normal cases, stiffness of a simply supported beam is satisfied if the ratio of its span to its overall depth does not exceed
(A) 10 (B) 15 (C) 20 (D) 25
Answer: Option C

Question No. 56
If depth of slab is 10 cm, width of web 30 cm, depth of web 50 cm, centre to centre distance of beams 3 m, effective span of beams 6 m, the effective flange width of the beam, is

(A) 200 cm (B) 300 cm (C) 150 cm (D) 100 cm
Answer: Option C