Limit State Design Method

Duration: 45 Minutes **Maximum marks: 30**

Q.1 - Q.10 Carry One Mark each.

1. Which load combination is not taken in consideration as per IS 456:2000
   (A) 0.9 DL ± 1.5 WL
   (B) 1.5 DL + 1.5 IL
   (C) 1.5 DL ± 1.5 WL ± 1.5 EL
   (D) 1.2 DL + 1.2 IL ± 1.2 EL

2. IS code for wind load is
   (A) IS 456 : 2000
   (B) IS 1893 : 2002
   (C) IS 875 (Part III)
   (D) IS 875 (Part II)

3. Minimum number of reinforcement bars required in circular column as per IS 456 : 2000 are
   (A) 8
   (B) 6
   (C) 12
   (D) 9

4. Minimum tensile strain in steel reinforcement as per IS 456 : 2000 shall not be less than Q. if the grade of steel is Fe500 and modulus of elasticity is 2×10^5 N/mm^2. What is the value of Q(Upto four decimal place)

5. Maximum diameter of bar which can be used in 100 mm thick RCC slab, as per IS 456 : 2000
   (A) 10 mm
   (B) 8 mm
   (C) 12 mm
   (D) 16 mm

6. A continuous T-beam is simply supported with span 7.0 m. the width of web and depth of flange are 300 mm and 200 mm respectively. The effective width of flange (in mm upto two decimals)is _____.

7. As per IS 456 : 2000 modulus of elasticity of concrete for M30 grade is _____(N/mm^2).

8. As per IS 456 : 2000, the modulus of rupture for M35 grade of concrete (in N/mm^2), upto two decimal places is _____

9. What is the minimum grade of concrete (For PCC and RCC work) required near sea shore for durability requirement as per IS 456 : 2000
   (A) M20 and M30 respectively
   (B) M30 and M35 respectively
   (C) M15 and M20 respectively
   (D) M20 and M25 respectively

10. In limit state method of design as per IS 456:2000, the ratio of factor of safety used for steel and factor of safety used for concrete is _____ (up to one decimal place).

Q.11 - Q.20 Carry Two Mark each.

11. Three concrete cubes were tested for compressive strength. Their compressive strength are $32N/mm^2$, $33.5N/mm^2$, $31N/mm^2$ respectively. It is prepared for M30. How many number of cubes don't satisfy the following criteria of IS 456 : 2000. The individual variation in strength shall not exceed $\pm 15\%$ of its average compressive strength
(A) Only 1 (B) Two
(C) All three (D) Zero

12. Minimum nominal clear cover (in mm) for slab, beam column and footing as per IS 456 : 2000 are
(A) 40, 35, 40, 60 respectively (B) 20, 40, 35, 70 respectively
(C) 20, 25, 40, 75 respectively (D) 15, 35, 20, 60 respectively

13. If the probability of load of not exceed the characteristic load is 85% and for strength 15% results are expected to fall. What is the probability of failure of any structure in percentage up to two decimals.

14. If Coefficient of creep is 2.2 and the grade of concrete is M25. What is the value of long term static modulus of elasticity in N/mm^2 upto one decimal places_____.

15. If unfactored maximum bending moments at any section of the beam are calculated as 85, 60, 175, 200 kN-m under dead, live, wind and earthquake loads respectively. The design moment (kN-m) as per IS 456 : 2000 for the limit state of collapse is _____.

16. If 35 N/mm^2 is the compressive strength of concrete for which not more than 5% results are expected to fall. As per IS 456 : 2000, calculate the compressive strength of concrete for which not more than 50% results are expected to fall. (Assume standard deviation = 5.0 N/mm^2)
(A) 50 N/mm^2 (B) 43.25 N/mm^2
(C) 45 N/mm^2 (D) 43.50 N/mm^2

17. A RCC beam has width b = 250 mm and overall depth D = 400 mm with effective cover 500 mm. the grade of steel reinforcement and concrete are Fe500 and M25. Find the difference between maximum and minimum area of reinforcement required in beam as per IS 456 : 2000 for limit state of collapse.
(A) 3852 mm^2 (B) 3702 mm^2
(C) 3520 mm^2 (D) 3622 mm^2

18. Consider the following statements of IS 456 : 2000
(i) Maximum number of bars in square column shall not be less than 4.
(ii) Minimum diameter of bar shall not be less than 12 mm when dimension of column section is greater than or equal to 200 mm.
(iii) Maximum compressive strain in concrete is taken as 0.0035 in axial compression.
For limit state method of design for collapse which of the statement is not correct
(A) (i) (B) (ii)
(C) (iii) (D) All of these

19. Consider the following statements for limit state method of design
    (i) Limit state method of collapse deals with deflection, cracking and corrosion
    (ii) Limit state method of serviceability deals with all the type of forces which act on the structure through it's life and cause shearing, bending, twisting etc.

    Which one is true.

    (A) Both
    (B) Only (i)
    (C) Only (ii)
    (D) None of these

20. A cantilever beam has clear span of 3.5 m. the effective depth is 270 mm. Find the effective span of the beam as per IS 456 : 2000 _____(in meter upto two decimal places).