

01. M_{ult} of a singly reinforced balanced RC rectangular beam section is

- a. $0.115 f_{ck} b d^2$
- b. $0.135 f_{ck} b d^2$
- c. $0.185 f_{ck} b d^2$
- d. $0.225 f_{ck} b d^2$

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

List I	List II
A. Doubly reinforced section	1. Serviceability
B. Limit state design	2. Durability
C. Minimum cover	3. Reduction in sectional depth
D. Span depth ratio	4. Ultimate moment capacity

- Codes :
- a. A-2, B-1, C-3, D-4
 - b. A-4, B-3, C-1, D-2
 - c. A-1, B-2, C-3, D-4
 - d. A-3, B-4, C-2, D-1

03. For plain concrete used in underground works of moderate exposure condition, the minimum cement content (in kg/m^2) of the concrete mix would be

- a. 220
- b. 250
- c. 290
- d. 310

04. The radial moment at the boundary of a simply supported circular slab of radius R, subjected to a uniformly distributed load of w will be

- a. $wR^2 / 8$
- b. $wR^2 / 12$
- c. $3 wR^2 / 16$
- d. zero

05. The loss of prestress due to shrinkage of concrete is the product of

- a. Modular ratio and percentage of steel
- b. Modular of elasticity of concrete and shrinkage of concrete
- c. Modulus of elasticity of steel and shrinkage of concrete
- d. Modular ratio and modular of elasticity of steel

06. If f_{cu} and f_y are cube compressive strength of concrete and yield stress of steel respectively and E_s is the modulus of elasticity of steel, for all grades of concrete, the steel, for all grades of concrete, the ultimate flexural strain in concrete can be taken as

- a. 0.002
- b. $F_{cu} / 1000$
- c. 0.0035
- d. $(f_y / 1.15 E_s) + 0.002$

07. Combination of partial safety factors for loads under limit state of collapse and limit 'state of serviceability will be

- (a) 1.5 (D.L + L.L) or 1.5 (D.L + W.L) or 1.2 (D.L + L.L + W.L) and D.L + 0.8(L.L+W.L)
- (b) 1.5 (D.L + L.L) and D.L + 0.8(L.L + W.L)
- (c) 1.5(D.L + L.L) or 1.5 (D.L + W.L) or 1.2 (D.L + L.L + W.L) and 1.0(D.L + L.L) or 1.0 (D.L + W.L) or D.L + 0.8 (L.L + W.L)
- (d) 1.2(D.L + L.L + W.L) and 1.0(D.L + L.L) or 1.0(D.L + W.L) or D.L + 0.8(L.L + W.L)

08. Which one of the following is the correct expression for the target mean strength f_t of concrete mix?

- (a) $f_t = Kf_{ck} + S$
- (b) $f_t = f_{ck} + KS$
- (c) $f_t = f_{ck} + S$
- (d) $f_t = Kf_{ck} + K$

where f_{ck} is characteristic strength, K is probability factor and S is standard deviation

09. Which one of the following predicts the effective modulus of elasticity of concrete

- A. $\frac{E_c}{1+\theta}$
- B. $\frac{E_c}{1+2\theta}$
- C. $\frac{E_c}{1+3\theta}$
- D. $\frac{E_c}{1+5\theta}$

(Where E_c is short term elastic modulus and θ is the ultimate creep coefficient.)

10. At what stress does the first flexural crack appear in RCC beams made of M25 grade concrete?

- (a) 3.0 MPa
- (b) 3.5 MPa
- (c) 4.0 MPa
- (d) 4.5 Mpa

11. Minimum clear cover (in mm) to the main steel bars in slab, beam, column and footing respectively are

- a. 10, 15, 20, 25
- b. 15, 25, 40, 75
- c. 20, 25, 30, 40
- d. 20, 35, 40, 75

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

List-I	List-II
A. IS-875	1. Earthquake resistant design
B. IS-1343	2. Loads
C. IS-1893	3. Liquid storage structure
D. IS-3370	4. Prestressed concrete

- Codes:
- a. A-3, B-1, C-4, D-2
 - b. A-2, B-1, C-4, D-3
 - c. A-3, B-4, C-1, D-2
 - d. A-2, B-4, C-1, D-3

13. What is the modular ratio to be used in the analysis of RC beams using working stress method if the grade of concrete is M 20?

- (a) 18.6
- (b) 13.3
- (c) 9.9
- (d) 6.5

14. Consider the following statements: Percentage of steel for balanced design of a singly reinforced rectangular section by limit state method depends on

- 1. Characteristic strength of concrete.
- 2. Yield strength of steel.
- 3. Modulus of elasticity of steel.
- 4. Geometry of the section.

Which of these statements are correct?

- (a) 2, 3 and 4
- (b) 1, 3 and 4
- (c) 1, 2 and 4
- (d) 1, 2 and 3

15. The additional cover thickness to be provided in reinforced concrete members that are totally immersed in seawater is

- (a) 25 mm
- (b) 30 mm
- (c) 35 mm
- (d) 40 mm