

KATHMANDU UNIVERSITY  
End Semester Examination  
June/July, 2023

Marks Scored:

Level : B.E./B.Tech.  
Year : III

Course : CIEG 310  
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date

03 JUL 2023

SECTION "A"

[20 Q. × 0.5 = 10 marks]

Encircle the most appropriate answer. Use of IS456:2000, IS 1343 (for prestressed concrete) and IS456-SP-16 is NOT ALLOWED.

1. Partial Safety factors for loads under limit state of collapse as per IS 456:2000 is
  - a. 1.2 For the load combination of Dead Load plus Live Load.
  - b. 1.2 For the load combination of Dead Load plus Earthquake Load.
  - c. 1.2 For the load combination of Dead Load plus Live Load plus Wind Load.
  - d. 1.5 For the load combination of Dead Load plus Live Load plus Wind Load.
2. Strain at the level of compression steel in DRB is (each symbol has standard meaning)
  - a.  $\epsilon_{sc} = 0.0035 \left(1 - \frac{d'}{x_{max}}\right)$
  - b.  $\epsilon_{sc} = 0.0055 \left(1 - \frac{d'}{x_{max}}\right)$
  - c.  $\epsilon_{sc} = 0.0035$
  - d.  $\epsilon_{sc} \geq \left(0.002 + \frac{0.87\sigma_y}{E_s}\right)$
3. Which of the following statement is **INCORRECT** about the assumption for the limit state of Flexure as per IS 456:2000 ?
  - a. The maximum strain in the extreme outermost compression fiber in concrete is taken as 0.35% in bending regardless of the strength of the concrete.
  - b. The relationship between stress-strain distribution in concrete is assumed to be parabolic with maximum compressive stress equal to the characteristic strength of the concrete.
  - c. Tensile strength of the concrete is ignored.
  - d. Plane sections normal to the axis remains plane after bending.
4. Singly reinforced Beam section (effective depth 400 mm & width 200 mm), having 3-20 $\Phi$  tension rebar is ..... (Steel and concrete are of Fe-415 and M20)
  - a. Balanced Section
  - b. Under reinforced Section
  - c. Over Reinforced Section
  - d. Under as well Balanced Section
5. Which of the following statement is **INCORRECT** about the horizontal distance between two parallel main reinforcing bars?
  - a. Spacing should be more than the diameter of the bar if the diameter of the bars are equal.
  - b. Spacing should be more than the diameter of the larger bar if the diameter are unequal.
  - c. Spacing should be more than the nominal maximum size of coarse aggregate plus 5mm.
  - d. Spacing should be more than two third the nominal maximum size of coarse aggregate.

6. As per **IS 456:2000**, which is the **INCORRECT** statement ?
- Development length decreases as the grade of concrete increases.
  - For same grade of concrete, development length increases as the grade of steel increase.
  - For given steel grade, bar diameter and concrete grade; development length for tension is more than compression.
  - The anchorage value of standard U-type hook is equal to the  $12\Phi$ . ( $\Phi$  is the nominal diameter of the reinforcement bar)
7. Equivalent nominal shear stress for the beam (width 250 mm, effective depth 400 mm, factored shear 10 kN and factored Torsional moment 4 kNm) is.....
- $0.1 \text{ N/mm}^2$
  - $0.15 \text{ N/mm}^2$
  - $0.534 \text{ N/mm}^2$
  - $0.356 \text{ N/mm}^2$
8. **Incorrect statement** for the shear reinforcement as per IS 456:2000 is
- Shear reinforcement are not required if the nominal shear stress is less than or equal to the shear strength of the concrete.
  - Minimums shear reinforcement should be provided if the nominal shear stress is less than or equal to the shear strength of the concrete.
  - Adequate shear reinforcement should be provided if the nominal shear stress exceeds the shear strength of concrete.
  - Section should be redesigned if the nominal shear stress exceeds the maximum permissible shear strength of concrete.
9. **Shrinkage strain** for the prestress concrete is taken as
- Between 0.002 to 0.003
  - 0.0003 for the pre-tensioned members
  - 0.002 for the post-tensioning and it decrease in dry atmospheric conditions
  - 0.002 for the post-tensioning and it increases in dry atmospheric conditions
10. **Incorrect Statement** about the Longitudinal reinforcement for the column is
- Area of longitudinal reinforcement must be more than or equal to 0.8% and maximum area must be less than or equal to 6% of the gross cross section.
  - The bar shall not be less than 12 mm in diameter.
  - Spacing of the longitudinal bars measured along the periphery of the column shall not exceed 200 mm.
  - The minimum number of bars provided in the column must be four in rectangular and six in circular column.
11. **Incorrect statement** about the Failure Cracks in the RCC beam is
- Flexural crack are perpendicular to the tensile face of concrete beam and are controlled by tension steel.
  - Shear Cracks are at an inclination of 45 degree and also known as diagonal tension crack.
  - Flexure Shear cracks are produced due to combination of shear as well as bending.
  - Shear stirrups are provided to resist shear cracks and there is no any role of tension steel for the resistance of crack propagation in RCC beam.
12. Recommended value of effective length of column effectively held in position at both ends but not restrained against rotation is
- 0.65 times the unsupported length of compression member.
  - 0.8 times the unsupported length of compression member.
  - 1 times the unsupported length of the compression member.
  - 1.2 times the unsupported length of the compression member.

13. As per IS 456:2000, in correct statement is
- Maximum area of compression and tension reinforcement in beam shall not exceed  $0.04bD$ . ( $b$  &  $D$  are standard symbols)
  - For footings minimum cover shall be 50 mm.
  - Where the depth of the web in a beam exceeds 600 mm, side face reinforcement shall be provided along the two faces.
  - For torsional moment case in beam if the web depth exceeds 450 mm, side face reinforcement shall be provided along the two faces.
14. For a slab spanning in two directions, having clear room dimensions as 4 meter by 5 meter in major and minor direction. If the supporting wall width is of 400 mm and effective depth of slab is 150 mm, then the effective span along the major axis is.
- 4400 mm
  - 4150 mm
  - 5400 mm
  - 5150 mm
15. For the slab having effective depth of 80 mm and effective cover of 30 mm, if the reinforcement to be provided is HYSD bar, then minimum reinforcement to be provided shall be
- $132 \text{ mm}^2$  per meter width of the slab
  - $165 \text{ mm}^2$  per meter width of the slab
  - $120 \text{ mm}^2$  per meter width of the slab
  - $96 \text{ mm}^2$  per meter width of the slab
16. An isolated square footing (effective depth of 500 mm and area of top plan as  $16 \text{ m}^2$ ). If the column is square with dimension 500 mm by 500 mm. The section critical for Bending moment is at
- The distance " $d$ " from the face of the column
  - The distance " $d/2$ " from the face of the column
  - The center of the column
  - The Face of the column
17. T-beam having effective flange width  $b_{ef} = 2200 \text{ mm}$ , web width  $b_w = 300 \text{ mm}$ , effective depth  $d = 360 \text{ mm}$  and the reinforcement to be provided is of Fe-250, then the minimum reinforcement to be provided in T-beam is
- $2692 \text{ mm}^2$
  - $367 \text{ mm}^2$
  - $222 \text{ mm}^2$
  - $130 \text{ mm}^2$
18. Area (in  $\text{mm}^2$ ) of 6 legged 8 mm diameter stirrups is
- 96 times  $\pi$
  - 16 times  $\pi$
  - Depends upon percentage of Tension reinforcement provided
  - Depends upon the percentage of Compression reinforcement provided
19. For Rebar detailing in RCC member
- Bar should be cut exactly at theoretical cut off point.
  - 100% tension bars can be curtailed in same section in beam.
  - For beam At least two number of bars should be continue into the support.
  - Bar should be curtailed exactly at the point of inflection.
20. Effective span of staircase for the given figure is... (if  $X = 1.2$  meter and  $Y = 0.8$  meter)
- $G + 1.2 + 0.8$
  - $G + 1 + 0.8$
  - $G + 2.4 + 1.6$
  - $G$

