BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – Dip.CE-2022
Course Name – Design of Steel and RCC Structure
Course Code - DCEPC501
(Semester V)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Identify the primary component in reinforced concrete.
a) Cement b) Steel
c) Sand d) Water

(ii) Select the type of structure best suited for high-rise buildings.
a) RCC b) Timber
c) Masonry d) Bamboo

(iii) Identify the property of concrete that makes it suitable for compression.
a) Tensile strength b) Durability
c) Compressive strength d) Flexibility

(iv) Identify the limit state that ensures safety against collapse.
a) Limit State of Serviceability b) Limit State of Strength
c) Limit State of Durability d) Limit State of Deflection

(v) Select the stress block diagram used in the limit state design of reinforced concrete beams.
a) Parabolic-Rectangular b) Triangular
c) Trapezoidal d) Rectangular

(vi) Identify the Indian Standard code used for the design of reinforced concrete structures.
a) IS 875 b) IS 1893
c) IS 456 d) IS 3370

(vii) Classify the type of reinforcement used to resist the compression forces in a doubly reinforced beam.
a) Main Reinforcement b) Secondary Reinforcement

c) Compression Reinforcement
d) Shear Reinforcement

(viii) Identify the formula component that represents the area of steel in tension in a singly reinforced beam.

a) Asc
b) Ast
c) Asv
d) Ast1

(ix) Act to determine the unit used for nominal shear stress in RCC sections.

a) N/mm
b) N/mm^2
c) N/cm^2
d) N/m

(x) Act to identify the type of shear reinforcement commonly used in RCC beams.

a) Bent-up Bars
b) Horizontal Stirrups
c) Vertical Stirrups
d) Prestressed Wires

(xi) Choose the form of shear reinforcement recommended for torsion in beams.

a) U-shaped Stirrups
b) Bent-up Bars
c) Spiral Reinforcement
d) Inclined Stirrups

(xii) Write the factor that affects the shear strength of concrete in a beam.

a) Compressive Strength
b) Elastic Modulus
c) Depth of Beam
d) Grade of Reinforcement

(xiii) Select the clause from IS 456 for determining the minimum cover for a column subjected to an aggressive environment.

a) Clause 26.4.2
b) Clause 30.5.1
c) Clause 24.3.1
d) Clause 34.6.2

(xiv) List the type of sections used for compression members.

a) Flat sections
b) Channel sections
c) Angle and I-sections
d) Hollow circular sections

(xv) Write the appropriate action to determine the shear capacity of a steel beam as per IS 800.

a) Calculate the bending moment
b) Check the shear strength of the section
c) Determine the load-carrying capacity
d) Compute the deflection

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Identify the primary materials used in the construction of RCC and Steel structures. (3)
3. Identify the components involved in calculating the effective depth of a reinforced concrete beam. (3)
4. Identify the different types of sections used for tension members in steel structures. (3)
5. Choose the appropriate formula for calculating bending stress in a simply supported beam under uniform loading. (3)
6. Evaluate the significance of effective length and slenderness ratio in the design of compression members, (3)

OR

Select the appropriate standard beam section for a specified loading condition and justify your choice based on bending stress calculations. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Act by performing a design calculation for a doubly reinforced beam. Given specific dimensions and material properties, calculate the area of tension and compression reinforcement (Ast and Asc), including all necessary steps and justifications for the chosen values. (5)
8. Describe the procedure for determining the development length in tension and compression members of RCC structures. Include the steps involved in checking bond stress as per the codal provisions and explain the importance of proper anchorage. (5)
9. Evaluate the adequacy of an RCC section for shear using a given numerical example. Incorporate the design of shear reinforcement and the application of IS 456 codal provisions in your solution. (5)
10. Evaluate the design procedure for axially loaded single and double angle struts connected to gusset plates by bolted and welded connections. (5)
11. Define the criteria used for checking bending stress in steel beams according to IS 800. (5)
12. Select the appropriate section (under reinforced, over reinforced, or balanced) based on given stress and strain conditions and justify your choice. (5)

OR

Differentiate between the design of singly reinforced and doubly reinforced sections with respect to stress block diagrams and the neutral axis depth. (5)

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