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BCE-041

DIPLOMA IN CIVIL ENGINEERING DCLE(G) / DCLEVI Term-End Examination December, 2019

BCE-041 : THEORY OF STRUCTURES - II

Time : 2 hours

Maximum Marks : 70

- Note: Question no. 1 is compulsory. Answer four more questions from the remaining questions. All questions carry equal marks. Use of scientific calculator is permitted.
- 1. Choose the correct answer from the given alternatives : $7 \times 2 = 14$
 - (a) In a singly reinforced beam, the effective depth is measured from its compression edge to
 - (i) tensile edge
 - (ii) centre of tensile reinforcement
 - (iii) neutral axis of the beam
 - (iv) longitudinal central axis
 - (b) As the percentage of steel increases in a beam
 - (i) depth of neutral axis decreases
 - (ii) depth of neutral axis increases
 - (iii) lever arm decreases
 - (iv) lever arm increases

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- (c) Spacing of stirrups in a simply supported beam is
 - (i) kept constant throughout the length
 - (ii) decreased towards the centre of the beam
 - (iii) increased at the ends
 - (iv) increased at the centre of the beam
- (d) If the diameter of a reinforcement bar is d, the anchorage value of hook alone, is equal to
 - (i) 4 d
 - (ii) 8 d
 - (iii) 12 d
 - (iv) 16 d
- (e) As per IS : 456, the reinforcement in a column should not be less than
 - (i) 0.5% and not more than 5% of cross-sectional area of column
 - (ii) 0.6% and not more than 6% of cross-sectional area of column
 - (iii) 0.7% and not more than 7% of cross-sectional area of column
 - (iv) 0.8% and not more than 6% of cross-sectional area of column
- (f) The diameter of longitudinal bars of a column should never be less than
 - (i) 6 mm
 - (ii) 8 mm
 - (iii) **10 mm**
 - (iv) 12 mm

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- (g) Distribution reinforcement in a simply supported slab is provided to distribute
 - (i) bond stress
 - (ii) temperature stress
 - (iii) shrinkage stress
 - (iv) All of the above
- 2. What are basic assumptions for design of sections of flexural members ? Draw a neat sketch of stress block of compressive force of concrete and show distance of its C.G. from extreme fibre in compression.
- 3. Determine areas of tensile as well as compression reinforcement for a doubly reinforced section of $b \times D = 375 \times 500$ mm applied with a factored moment of 300 kN-m. Use M25 concrete and Fe-415 steel. Assume effective cover of 50 mm, both for tensile as well as compressive reinforcement. Take $f_{sc} = 350$ N/mm².
- 4. Describe the various steps in the design of a one-way RC slab. Draw a neat sketch showing the placement of reinforcement.

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5. Design longitudinal reinforcement for a circular column of diameter 350 mm with lateral ties for a factored load of 1800 kN and effective length 2.75 m to the following design parameters :

$$f_y = 415 \text{ N/mm}^2 \text{ and } f_{ck} = 20 \text{ N/mm}^2$$
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- 6. What are the stability requirements while designing a retaining wall? If sliding resistance of the base slab is not sufficient, what additional provision is made to enhance it? Explain with neat sketches, giving all design considerations.
- 7. Write a classification of footings. Draw neat line sketches of any two of them. Compare any two of them in respect of use.
- 8. Write short notes on any *two* of the following : $2 \times 7 = 14$
 - (a) Working Stress Method
 - (b) Comparison of Steel and RC Construction
 - (c) Creep and Shrinkage

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