

**DIPLOMA IN CIVIL ENGINEERING
DCLE(G) / DCLEVI**

Term-End Examination

December, 2016

00262

BCE-041 : THEORY OF STRUCTURES – II

Time : 2 hours

Maximum Marks : 70

Note : Question no. 1 is compulsory. Attempt any four questions from the remaining questions. Assume suitable data wherever needed and mention it clearly. Use of scientific calculator is allowed but IS : 456 code is not permitted for use.

1. Choose the most appropriate answer from the given alternatives in questions (a) to (g) below :

7×2=14

(a) In the notation 'M 25', 25 is considered in

(i) cm^2/g

(ii) N/m^2

(iii) kN

(iv) N/mm^2

- (b) For determining the characteristic strength of concrete, the cube size is
- (i) 150 cm
 - (ii) 150 mm
 - (iii) 100 mm
 - (iv) 75 mm
- (c) The value of aspect ratio for determining the nature of a slab as one-way or two-way is
- (i) 1
 - (ii) 2
 - (iii) 3
 - (iv) 4
- (d) In Limit state design approach
- (i) partial safety factors are taken for loads only
 - (ii) partial safety factors are taken for materials only
 - (iii) partial safety factors are taken for both loads and materials
 - (iv) partial safety factors are not considered

- (e) What type of forces may produce shear forces in columns in a building ?
- (i) Dead loads
 - (ii) Live loads
 - (iii) Wind loads
 - (iv) Snow loads
- (f) The minimum number of bars in a square column is
- (i) 4
 - (ii) 8
 - (iii) 6
 - (iv) 12
- (g) Elastic linear distribution of strains across sections is considered in
- (i) Working stress method
 - (ii) Ultimate load method
 - (iii) Limit state method
 - (iv) None of the above

2. Cross-section of a doubly reinforced beam is subjected to a service load moment of 175 kNm. Determine the stresses in concrete and steel.

Use the following data :

$$b = 300 \text{ mm}, d = 550 \text{ mm},$$

$$d' = 50 \text{ mm}, \sigma_{cbc} = 7 \text{ MPa},$$

$$\sigma_{st} = 130 \text{ MPa}$$

M 20 concrete and Fe 250 steel has been used. 2 – 25 ϕ and 3 – 36 ϕ reinforcement bars have been used in compression and tension sides respectively. Notations, here, have their usual meanings. Use working stress method.

14

3. (a) What do you understand by chemical admixtures used in concrete ? Enlist the names of some of them and describe any one briefly.

7

- (b) What do you understand by a 'Limit state' ? Discuss the concept as used for the design of concrete structures.

7

4. (a) Discuss why shear stirrups are provided in beams.

7

- (b) Draw a neat sketch of an RC retaining wall and explain how its stability is checked.

7

5. Design a RC slab for a room of size (effective) of $4\text{ m} \times 10\text{ m}$. The slab is simply supported on all sides on 230 mm thick walls. Use M 20 concrete and Fe 415 steel. Slab is subjected to an imposed load of 4 kN/m^2 including floor finish. Nominal cover = 20 mm. 14
6. (a) What do you understand by 'Development length'? Describe with a neat sketch. 7
- (b) What is the function and importance of lateral ties in concrete columns? Discuss with a neat sketch. 7
7. Write short notes on any *two* of the following topics: $2 \times 7 = 14$
- (a) Compaction of Concrete
- (b) Balanced Beam Section
- (c) T-beam
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