C14-C-**501**

# **4612**

## BOARD DIPLOMA EXAMINATION, (C-14)

MARCH / APRIL - 2019

## DCE - V SEMESTER EXAMINATION

## DESIGN & DETAILING OF R.C. ELEMENTS

Time : **3** Hours]                                                   [Total Marks : **80**

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**PART - A**                                                      **3×10=30**

**Instructions :**     *(1)  Answer **ALL** questions.*

*(2)  Each question carries **THREE** marks.*

*(3)  Answer should be brief and straight to the point and shall not exceed five simple sentences.*

*(4)  Candidates are allowed to use IS 456-2000 code book.*

*(5)  Assume suitable data wherever necessary.*

**1**    Write a short note on characteristic strength and chatrcteristic load.

**2**    State the differences between working stress and limit state methods.

**3**    Determine the development length of 20mm fe415 bar in tension having a bend of 45° at the end use mix M20.

**4**    Calculate the minimum and maximum reinforcement of a singly reinforced beam of effective c/s of 230×450 mm (Fe415 and M20) as per IS 456-2000. Effective cover is 50 mm.

**5**    Sketch detailing of reinforcement in stair case spanning longitudinally for one flight.

**6**    Write down the codal provisions for Torsion reinforcement for the restrained slabs.

**7**    Write three cases of determination of Neutral axis in case of a T beam.

**8**  Sketch the positions of a sagging (positive) and hogging (negative) bending moments along the span of continuous beam.

**9**  What are the advantages of continuos beam over the single span beam.

**10**  Write down the equation of minimum eccentricity as per IS 456 and explain the terms.

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**PART - B**  10×5=50

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**Instructions :**
(1) Answer any **FIVE** questions.
(2) Each question carries **TEN** marks.
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.
(4) Assume suitable data wherever necessary.

**11**  Design a singly reinforced rectangular beam having an effective span of 6m for an imposed load of 20 KN/m (Fe415, M25) using working stress method assume b/d ratio as 1.5.

**12**  A reinforced concrete beam of 230 mm wide and 550 mm effective depth is reinforced with 4 Nos of 16mm bars. If the beam is simply supported over a span of 5m, find the maximum udl the beam can carry inclusive of its own weight. Use M20 and Fe 415.

**13**  A doubly reinforced beam of width 230mm and 500mm total depth is reinforced with 4-16 mm bars as compression reinforcement and 6-20mm bars as tension reinforcement at an effective cover of 40mm on both sides. Find the safe udl the beam can carry if it is simply supported over an effective span of 5m (Fe 415, M20).

| Grade of | d'/d | | | |
|----------|------|------|------|------|
| Steel | 0.05 | 0.10 | 0.15 | 0.2 |
| Fe 415 | 355 | 353 | 342 | 329 |
| Fe 250 | 424 | 412 | 395 | 370 |

**14**  A room of inner dimension 3m × 7m is to be covered a RCC slab resting on masonry walls of 300mm thick live load on the slab is 2KN/sq m and floor finish of 1KN/sq m. Assuming the slab as simply supported, use Fe 415 grade steel and M20 grade concrete.

15 Calculate the moment of resistance of the T-beam with the following data :

Width of the flange          800 mm

Thickness of slab          110 mm

Width of web          300 mm

Effective depth          600 mm

Area of tension steel          2600 mm$^2$

Use Fe 415 grade steel and M25 grade concrete.

16 Design a singly reinforced continuous RC rectangular beam for flexure for the following conditions.

No. of Spans          3

Effective Span          5 m

Imposed load (not fixed)          8 KN/m

Imposed load (fixed) excluding self weight          12 KN/m

Adopt Fe 415 grade steel and M 20 grade concrete.

17 Calculate the axial compressive load carrying capacity of circular column of 450 mm diameter and reinforced with 8 Nos 20 mm diameter and helically reinforced by 8 mm diameter bars 30 mm pitch. Use Fe 415 grade steel and M 25 grade concrete and assume clear cover as 50 mm.

18 Design an RCC footing of uniform thickness for an RCC column 400×400 mm size carrying an axial load of 1200 KN. Use M20 concrete and Fe 415 steel. The SBC of soil is 220 KN/m$^2$. Check the design for one way and two way shear.

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