



B.E/B.TECH DEGREE EXAMINATIONS: NOV / DEC 2024

(Regulation 2018)

Sixth Semester

CIVIL ENGINEERING

U18CEI6201 Design of Masonry and Reinforced Concrete Elements

(IS 456, IS 1905, SP 16 may be permitted)

COURSE OUTCOMES

- CO1:** Design masonry walls subjected to axial and eccentric loads.
CO2: Design rectangular and flanged reinforced concrete beams under flexure.
CO3: Design reinforced concrete staircase.
CO4: Design rectangular and flanged reinforced concrete beams shear and torsion.
CO5: Design reinforced concrete short and slender columns.
CO6: Design isolated and combined footing for columns.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

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|---|-----|-------------------|
| 1. What factors should be taken into account when designing a masonry wall? | CO1 | [K ₂] |
| 2. Compare the under reinforced and over reinforced section. | CO2 | [K ₂] |
| 3. Differentiate one-way and two-way slab. | CO2 | [K ₂] |
| 4. Define tread. | CO3 | [K ₁] |
| 5. What are the types of staircases? | CO3 | [K ₁] |
| 6. Differentiate flexure bond and anchorage bond. | CO4 | [K ₂] |
| 7. List the factors affecting bond strength between the concrete. | CO4 | [K ₁] |
| 8. What is the minimum eccentricity to be adopted while designing columns? | CO5 | [K ₂] |
| 9. Classify Columns. | CO5 | [K ₂] |
| 10. Sketch the critical sections for bending moment, one-way shear, and two-way shear in footing. | CO6 | [K ₂] |

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

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|--|---|-----|-------------------|
| 11. a) Calculate the safe axial load for a brick column of size 300 mm x 300 mm with | 8 | CO1 | [K ₃] |
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an effective height of 3m in both directions. Masonry is made with modular bricks of basic compressive strength 7.5MPa in cement mortar ratio 1:6.

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|--------|--|----|-----|-------------------|
| b) | Tabulate the effective length and effective height of wall with respect to its support condition. | 8 | CO1 | [K ₂] |
| 12. a) | Find the moment of resistance of singly reinforced concrete beam of 200 mm width and 400 mm effective depth, which is reinforced with 3 bars of 16mm dia. Take M20 grade concrete and Fe415 steel. | 10 | CO2 | [K ₄] |
| b) | Compare working stress and limit state method. | 6 | CO2 | [K ₂] |
| 13. a) | Design a dog-legged staircase for an office building within a room measuring 2.8m x 5.8m clear. The vertical distance between the floors is 3.6m, and the width of the flight is to be 1.25m. Allow for a live load of 3kN/m ² . Sketch the reinforcement details. Utilize M20 concrete and Fe415 steel. Assume the stairs are supported on 230mm walls at the end of the outer edges of landing slabs. | 16 | CO3 | [K ₄] |
| 14. a) | Design the reinforcement required for a rectangular beam section with the following data:
Size of the beams = 300 mm X 600 mm
Factored Shear Force = 95 kN
Factored torsion = 45 kN
Factored Bending Moment = 115 kNm
Materials = M20 concrete and Fe415 Steel. | 16 | CO4 | [K ₄] |
| 15. a) | Design an axially loaded tied column 400 mm X 400 mm pinned at both ends with an unsupported length of 3m to carry a factored load of 2300 kN. Use M20 grade concrete and Fe415 steel. | 16 | CO5 | [K ₄] |
| 16. a) | Design a wall footing for a foundation of a brick wall 400 mm thick, exerting a load of 140 kN/m of its length, and with a bearing capacity of soil of 180 kN/m ² . Utilize M20 concrete and Fe415 steel. | 16 | CO6 | [K ₄] |
