

Register Number:

B.E., DEGREE EXAMINATIONS: MAY/JUNE 2013

Sixth Semester

CIVIL ENGINEERING

CEE 121 : Design of Reinforced Concrete Elements

INSTRUCTIONS

- 1) Use of IS456 codes and design charts are permitted
- 2) Use M20 grade of concrete and Fe415 steel, if not mentioned
- 3) Assume data if required

Time: Three Hours

Maximum Marks: 100

ANSWER ALL QUESTIONS

PART A (10 x 1=10 Marks)

1. The maximum area of tension reinforcement in a Beam shall not exceed
A) $0.85bd/f_y$ B) $0.87 \text{ } bd/bd$ C) $0.4bd/y$ D) $0.04bD$
2. In the limit state method of design the stress variation in concrete is
A) linear B) non-linear C) Parabolic D) parabolic and Rectangular
3. Ultimate limit state is performed to
A) Collapse B) Weak C) Strong D) Deflection
4. Deflection is categorised and checked in accordance to the
A) Working stress B) Limit state C) Safety D) Deflection
5. Which grade of concrete is not used for RCC work?
A) M20 B) M25 C) M30 D) M15
6. For a 'T' beam action slab and beam shall be
A) Placed separately B) Cast separately
C) Cast monolithically D) Placed monolithically
7. The main reinforcement in RCC cantilever beam is placed at
A) Bottom fibre B) Top fibre C) Top and bottom fibre D) Side fibres

8. For a continuous slab of span (L) the overall minimum thickness of the slab should be
A) $L/35$ B) $L/30$ C) $L/25$ D) $L/20$
9. The most frequently used footing type at the exterior wall for load bearing wall support system
A) Mat footing B) Pile footing
C) Continuous wall footings D) Isolated pad footings
10. In the design of RCC footing the critical section for bending moment is located at a
A) at face of column B) at a distance equal to twice the effective depth of footing
C) at center of the column D) All the above

PART B (10 x 2 = 20 Marks)

11. What are the types of limit state?
12. What is mean by HYSD bars?
13. What is the necessity of requirement of concrete cover?
14. What is the minimum grade of concrete in Sea-water?
15. List out the types of loads generally considered in structural design?
16. When side face reinforcement is necessary?
17. What is the percentage of longitudinal reinforcement in columns?
18. Why corner reinforcement are provided in two way slab.
19. When combined footings are resorted for columns?
20. What are the points to be considered while designing a footing?

PART C (5 x 14 = 70 Marks)

21. a) (i) Differentiate between working stress method and limit state method. (7)
- (ii) State the basic concepts of limit state method over other methods. (7)

(OR)

- b) A rectangular reinforced concrete beam of cross section 240 X 600mm is reinforced with 6 bars of 20mm dia. on tension side at an effective cover of 40mm. Calculate what super imposed load may be allowed on the beam over a simply supported span of 8m. Use M20 concrete and Fe415 steel.
22. a) Design a slab over a room size of 5m x 7m. The slab is supported on masonry walls all round with adequate restraint and the corners are held down. The live load on the slab is 4000 N/m². The slab has a bearing of 230mm on the supporting walls.
- (OR)**
- b) Design a dog legged staircase for the storey height of 3m. Assume the width of the staircase is 1m. The width of the landing slab is also 1m. Use M20 and Fe415.
23. a) A rectangular beam of 300mm wide and 450mm overall depth is reinforced with 4 Nos of 16 mm diameter bars at bottom. It is subjected to a factored shear force of 40 KN and factored torsional moment of 3.5 KN-m. Design the shear reinforce.
- (OR)**
- b) Design a beam for shear 300mm X 650mm section for the following forces:
 Factored Bending moment = 130 KNm
 Factored shear force = 100KN
 Percentage of tension steel = 0.25%. M20 and Fe415 steel are used.
24. a) Design a short rectangular column to carry a factored load of 600 KN and factored moment 25 KN-m and 20 KN-m about the major and minor axis respectively. Adopt M20 concrete and Fe 415 steel. Unsupported length of column is 3m. Use limit state method of design.
- (OR)**
- b) Design a RC column of circular in cross section subjected to concentric service load of 2000kN. Use m20 and Fe415 steel. Un supported length of column is 3m.
25. a) RCC column of 350mm x 500mm carries a load of 1200KN. The safe bearing capacity of soil is 200 KN/m² . Design the RCC footing for the column and sketch the reinforcement details.

(OR)

b) Design the wall footing with the following details

Thickness of brick masonry	= 230 mm
Transferred load from wall	= 120 kN/m
S B C of soil	= 180 kN/Sq.m
Unit weight of brick masonry	= 18kN/sq.m
