*Total No. of Questions : 8]* *[Total No. of Printed Pages : 4*

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# CE-6002 (CBGS)

## B.E. VI Semester

Examination, May 2019

## Choice Based Grading System (CBGS)

## Structural Design - I (RCC)

***Time : Three Hours*** ***Maximum Marks : 70***

***Note:*** i) Attempt any five questions. All questions carry equal marks.
ii) Assume suitable data if required and mention it clearly.
iii) Use of IS-456-2000 is permitted.
iv) Draw neat and clean diagram as and when required to support your answer.



1. a) What are the factors affecting shear resistance of a R.C. member? 7

   b) Design a reinforced concrete beam subjected to a bending moment of 20 kN-m. Use M 20 concrete, and Fe 415 reinforcement. Keep the width of the beam equal to half the effective depth. 7

2. a) (i) Write in brief on different kinds of loads to be taken into account for the design of a structure.

   (ii) How is limit state method superior to the working stress method? 7





   b) Design the thickness of slab and drops of an interior panel of a flat slab, 6m × 6m, for a live load of 7 kN/m$^2$. Use M 20 concrete and Fe 415 steel. 7

3. a) Why longitudinal and transverse reinforcements provided in a column. Write their functions. 7

   b) Design a dog-legged stair (Figure 1) for a building in which the vertical distance between floors is 3.6 m. The stair hall measures 2.5m × 5m. The live load may be taken as 2500 N/m$^2$. Use M 20 concrete and Fe 415 steel bars. 7

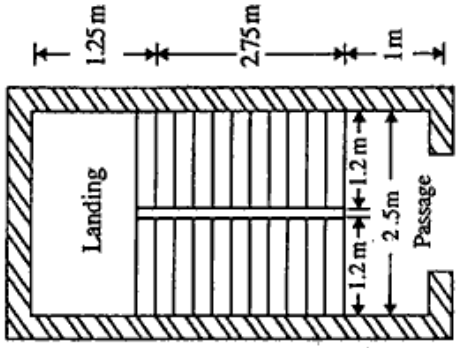


Figure 1

4. a) Explain different limit states to be considered in the design of R.C.C. beam and derive the expression for stress block parameter. http://www.rgpvonline.com 7

   b) Design a short square column to carry an axial load of 1200 kN. Use M 25 concrete mix and Fe 415 steel. 7

5. Design the tread-riser staircase of Figure 2 (All dimensions are in mm). The floor finish is 1 kN/m$^2$ and live load is 3 kN/m$^2$. The width of stair is 1 m. It is not possible to span landing in transverse direction. The materials are M 20 grade concrete and HYSD reinforcement of grade Fe 415. 14

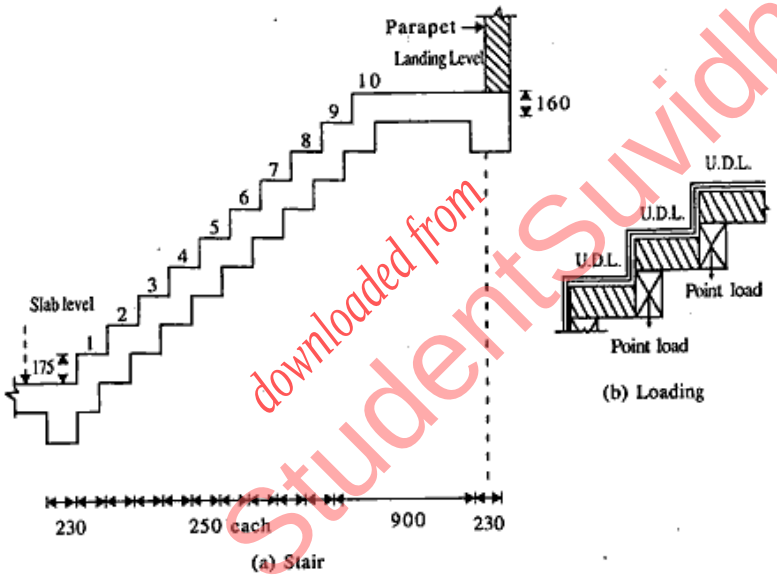


Figure 2

6. a) Write short notes with figure on: 7

   i) Singly reinforced and doubly reinforced beams.

   ii) Rectangular and Flanged beams.

   b) Design a cantilever slab having an overhang of 1.25 m. Take live load intensity of 1000 N/m$^2$ on the cantilever. Use M 20 concrete and HYSD bars. Assume weight of finishing at the top of slab as 800 N/m$^2$. 7

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7. a) What is Partial load factors? Enlist the reasons for adopting partial safety factor for loads and material strength. 7

   b) Design a R.C. slab for a room having inside dimensions 3m × 6m. The thickness of the supporting wall is 300 mm. The slab carries 100 mm thick lime concrete at its top, the unit weight of which may be taken as 19000 N/m$^3$. The live load on the slab may be taken as 2500 N/m$^2$. Assume the slab to the simply supported at the ends. Use M 20 concrete and Fe 415 steel. 7

8. Design an isolated footing of uniform thickness of a R.C. column bearing a vertical load of 600 kN and having a base of size 500mm × 500mm. The safe bearing capacity of soil may be taken as 120 kN/m$^2$. Use M 20 concrete and Fe 415 steel. 14

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