

5E3152

Roll No. _____

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5E3152

B. Tech. V Sem. (Back) Exam., Nov.-Dec.-2016

Civil Engineering

5CE2 Concrete Structures - I

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks Main: 26

Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from **each** unit. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and **stated** clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. Is – 456 (2000) _____

2. NIL _____

UNIT – I

- Q.1 (a) Discuss the relative merit and demerit's of Working Stress Method and Limit State Method. [6]
- (b) A simple beam rests over a clear span of 5.1m. Bearing at each end is 150mm. Superimposed dead Load is 18 kN/m and Live Load is 12 kN/m. The overall dimensions of beam are restricted to 275mm × 550mm. Concrete grade m-15, Steel grade fe-415. Calculate the Steel required in tensile and compressive zone. [10]

OR

- Q.1 (a) Describe briefly the following terms - [6]
- (i) Balanced section
 - (ii) Under reinforced section
 - (iii) Over reinforced section
- with reference of singly reinforced beam.
- (b) Determine the ultimate moment resisting capacity of rectangular reinforced beam with the following sectional details - [10]
- width = 300mm
 - effective depth = 600mm
- Effective cover to tension reinforcement and
Compression reinforcement = 60mm
Compression Steel = 2 bar – 25mm dia
tension Steel = 5 bar – 25mm dia
Concrete grade m – 20, Steel grade f_e – 415

UNIT – II

- Q.2 (a) Why do we provide the minimum shear reinforcement in beam even if it is not required from shear point of view. rtuonline.com [6]
- (b) A reinforced concrete beam 250mm wide and 400mm effective depth is subjected to ultimate design shear force of 140 kN at the support. The tensile reinforcement at the support is .5 percent of the cross sectional area. Design the shear stirrup's at the support. Conc Grade. M – 15, Steel Grade f_e – 415. [10]

OR

- Q.2 Design a reinforced concrete slab over a clear opening in plan $3.75\text{m} \times 9\text{m}$.
Plain concrete tile flooring on the top of slab is 50mm thick. Live Load is 4kN/m^2 .
Bearing of Slab along all edge's is 150mm.
Concrete grade M – 15
Steel grade F_e – 415
Also give the neat sketch of Slab showing all the reinforcement details. [16]

UNIT – III

Q.3 A slab is Simply Supported over a clear opening in plan $6\text{m} \times 4.5\text{m}$. The corners of the slab are free to lift up. There is 50mm thick plain concrete floor finish on the top of slab.

Live Load 3 kN/m^2 , conc grade M – 15, Steel grade fe – 415

Design the Slab.

Also give neat sketch of slab showing all the details of reinforcement in support of your answer. [16]

OR

Q.3 An Interior panel of a flat slab is supported over columns provided at a spacing of 5.4m c/c in one direction and 4.5m c/c in orthogonal direction.

Floor finishing consists of 50mm thick plain concrete. Tile is on the top of slab. Columns are of circular cross section 360mm in diameter.

Diameter of capital is 960mm

Live Load = 3 kN/m^2

Concrete grade m – 15

Steel grade Fe – 415

Design the Slab without drop panels.

Also give neat sketch in support of your answer [16]

UNIT – IV

Q.4 (a) The Load carrying capacity of helically reinforced column is more than of column with lateral ties. why? [4]

(b) Determine the cross sectional dimension and reinforcement for an axially loaded column for following data -

Collapse Load = 2500kN

Unsupported Length = 4m

End condition – both the ends are pinned

Concrete grade M – 20

Steel grade Fe – 415

Adopt circular section and provide helical reinforcement.

Give neat sketch showing all the details. [12]

OR

- Q.4 (a) Explain the term interaction curve for column design. [6]
(b) Determine the cross sectional dimension and the reinforcement required for an axially loaded column of rectangular section if the collapse Load is 2550 kN.

$$\text{Ratio } \frac{D}{b} = 1.5$$

Concrete grade M-20

Steel grade Fe - 415

Unsupported Length = 3.05m

The column may be assumed as pinned at both the end.

Also give suitable sketch showing all details.

[10]

UNIT - V

- Q.5 Determine the following parameter of a footing which supports a square column of size 400mm × 400mm with service load of 1000 kN -
use M - 20 Grade Concrete

Steel grade - fe - 415

- (a) Size of footing if safe bearing capacity of soil is 200kN/m²
(b) Depth of footing
(c) Reinforcement requirement

Give the neat sketch of footing showing the above details.

[16]

OR

- Q.5 Design a footing for a 500mm × 350mm column using 20 mm dowel bar to transmit characteristic load of 600 kN as dead load and 400 kN as live load to a foundation with safe bearing capacity of 120 kN/m².

Assume concrete grade M - 20

Steel grade Fe - 415

Give neat sketch showing all the details.

[16]