

**B.TECH. SEM -VI (CIVIL) 2014 COURSE (CBCS) : SUMMER -
2018**

SUBJECT : STRUCTURAL DESIGN – II ★

Day : **Friday**
Date : **01/06/2018**

S-2018-2394

Time : **02.30 PM TO 06.30 PM**
Max. Marks :60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of I.S. 456-2000 ,interaction charts, nonprogrammable electronic calculator is allowed.
- 4) Assume suitable data whenever necessary and mention it clearly.
- 5) Your answer will be valued as a whole.

Q.1 a) Elaborate actual and idealized stress strain curve of concrete with its salient features. (05)

b) What is 'working stress method'? What are its merits and demerits? Why it became necessary to shift to other design philosophies? (05)

OR

a) Compare stress strain curves of concrete of grade M15, M 25, M40 with sketch. (03)

b) Sketch a typical stress-strain curve of concrete and show, how will you find modulus of elasticity of concrete? How it is obtained in absence of data? (04)

c) Differentiate between short term and long term modulus of elasticity. (03)

Q.2 Calculate the ultimate moment of resistance of L-beam for following data: (10)
Width of flange – 1200 mm. Depth of slab = 110 mm
Effective depth = 600 mm, width of web = 300 mm
Concrete grade M 20, steel grade Fe 500 tension steel : 6 bars of 25 mm diameter. Draw detailing.

OR

a) Illustrate the concept of under-reinforced, balanced and over-reinforced R. C. section with the help of strain variation diagram. (06)

b) Write the stress block parameters across the cross section of a singly reinforced rectangular beam State all significant numerical values with proper justifications.. (04)

Q.3 a) What is meant by development length? Find the development length for 16 mm diameter bar of grade 415 in compression in concrete of grade M 25. (04)

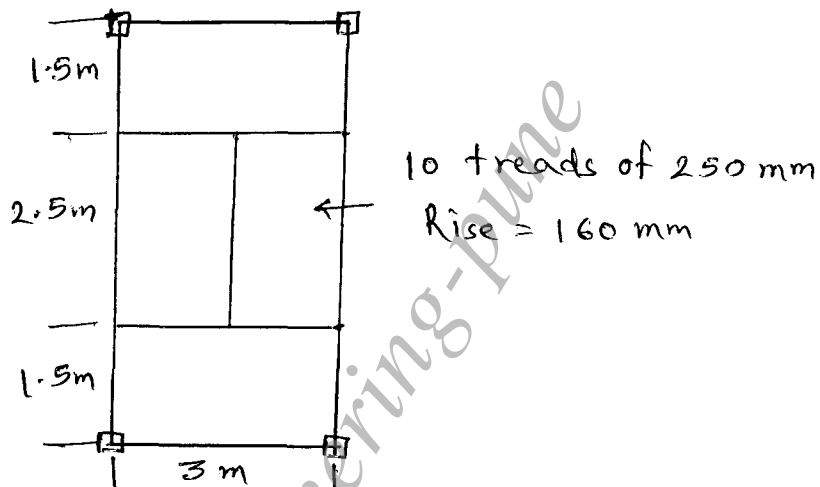
b) Design a beam for flexure and shear , which is simply supported over an effective span 7 m carrying uniformly distributed load of 15kN/m excluding self weight. Use M 20 and Fe 500 grade of concrete and steel respectively. Keep width of beam 230 mm. (06)

P.T.O.

OR

- a) A.R.C. beam is 230 mm x 380 mm in cross-section. At a particular section it is provided with 2 legged 8 mm diameter stirrups at 150 mm c/c. Calculate the amount of shear force the beam can resist at that cross section. M 25, Fe 500 is used. (05)
- b) What are the various load combinations considered in the design of a continuous beam or slab? Justify your answer with practical applications of considering these load combinations. (05)

Q.4 Design a Flight No. 2 of a dog legged staircase of an office building. Use M20 Fe 500. Show the detailing of reinforcement. (10)



OR

- a) Design a cantilever balcony of span 1.8 m. The balcony is provided with a parapet wall of 100 mm thickness and 1 m height. Use M20. Fe 415. (06)
- b) Write the functions of distribution steel in a slab. (04)

Q.5 A corner column of a building is of size 300 mm x 400 mm and is reinforced with 8 bars of 20 mm diameter. The column is subjected to an ultimate axial load of 450 kN, $M_{ux} = 45$ kNm and $M_{uy} = 10$ kNm. Unsupported length of the column about both the axes is 4.0 m. Check the safety of column. Use M20. Fe 415. (10)

OR

- a) What are the requirements for a R.C. column to be designed as purely axially loaded column? Elaborate your answer with relevant clauses from I.S. 456-2000. (04)
- b) Design a short R.C. column of size 230 mm x 450 mm to carry an axial load of 300 kN and ultimate moment of 75 kNm about an axis bisecting the depth of the column. Use M20. Fe 415. (06)

Q.6 Design an isolated footing for a column of 230 mm x 600 mm to carry a factored load of 1600 kN. Safe bearing capacity of soil is 220 kN/m². Use M 20, Fe 500. (10)

OR

Design an isolated footing for a column of size 525 mm x 525 mm to carry a factored load of 1500 kN. Safe bearing capacity of soil is 210 kN/m². Use M25, Fe 415. (10)

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