

B.Tech Sem – VI (2007 Course) (Civil Engg.) : SUMMER - 2019
SUBJECT : STRUCTURAL DESIGN – II

Day : Friday
Date : 24/05/2019

Time : 02.30 PM TO 06.30 PM
Max. Marks : 80

S-2019-3108

N. B. :

- 1) **Q. No. 1 and Q. No. 5 is COMPULSORY.** Out of remaining, attempt **ANY TWO** questions from each Section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answer to both the sections should be written in **SAME** Answer book.
- 4) Use of electronic calculator is **ALLOWED**.
- 5) Assume suitable data, wherever necessary and mention it clearly.
- 6) Draw neat and labelled diagrams **WHEREVER** necessary.
- 7) Use of IS 456-2000 and interaction charts is allowed.

SECTION – I

- Q. 1**
- a) What are three design philosophies? Why over reinforced section is not allowed in LSM? (04)
 - b) What are the basic design parameters of a balanced RC section? Find the value of these parameters for M25, Fe 415. (05)
 - c) Why minimum shear reinforcement is always provided in beams? How it is calculated? (05)
- Q. 2**
- a) Draw the stress – strain relationship of concrete. Why the design strengths of concrete is taken as $0.446 f_{ck}$. (07)
 - b) What are the salient features of limit state method? (06)
- Q. 3**
- a) A singly reinforced rectangular beam simply supported on a span of 5 m has a cross section of 230 mm × 450 mm. It is reinforced with 3 bars 16 mm diameter. The beam is loaded with a load of 5kN/m inclusive of self-weight. Determine the maximum permissible live load the beam can carry. Use M25, Fe 415. (06)
 - b) What is a flanged beam? When a beam is designed as a flanged beam? Write the two possible conditions in the design of a flanged beam? (07)
- Q. 4**
- a) With the help of a figure, write the various modes of failures of R. C. beam? Based on these, how the zones for shear reinforcement are formed? (06)
 - b) A three span continuous beam with each span = 3.5 m is subjected to a dead load of 10 kN/m and a live load 12 kN/m. Find the maximum design moment at midspan and at the support. Write the relevant I.S. clauses used for this. (07)

P. T. O.

SECTION – II

- Q. 5** a) What is a torsional reinforcement? When and where it is provided? What is the amount of this steel? Explain with sketches. (05)
- b) Write the functions of longitudinal reinforcements in a column. A column $230 \text{ mm} \times 600 \text{ mm}$ is reinforced with 6 bars 20 mm diameter. Design the links for the column. (05)
- c) Draw the stress distribution diagram for a footing on different types of soils? How it is idealized for the design of footing? (04)
- Q. 6** Design a dog legged staircase for the following data: (13)
- i) Floor to floor height = 3.2 m
 - ii) Rise 160 mm, Tread = 250 mm
 - iii) Landing = 1.5 m
 - iv) Use M25, Fe 415
 - v) Design only one flight
- Q. 7** a) Column of size $230 \text{ mm} \times 600 \text{ mm}$ is subjected to an axial load of 1400 kN and a moment @ an axis bisecting the depth of column is 50 kN/m. If unsupported length is 3.8 m, design the column using M25, Fe 415. (10)
- b) As per IS 456-2000, what is the check given for a column subjected to biaxial bending? (03)
- Q. 8** Design an isolated rectangular pad footing for a column of size $230 \text{ mm} \times 450 \text{ mm}$ subjected to an axial load of 1200 kN. S.B.C. of soil is 220 kN/m^2 Use M25, Fe 500. (13)

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