

B.Tech. VI Semester (Main/Back) Examination, May-June 2015

Civil Engg.

6CE4A Design of Concrete Structures-I

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates:

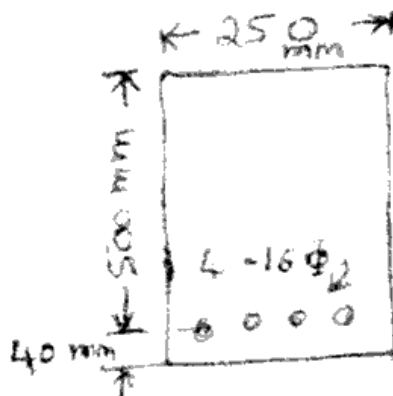
Attempt any **five** questions, selecting **one** question from **each** unit. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly)

Use of following supporting material is permitted during examination.

1. 1.5.456(2000)

Unit - I

1. a) With the help of neat diagram showing "stress distribution" and their typical values at extreme ends of a rectangular beam section, Describe the balanced under reinforced and over reinforced section in working stress method. (6)
- b) A beam section shown in fig.1 is of M-20 and Fe-415. If this section is used for a simply supported beam of 4m. effective span then determine the permissible superimposed working load. (U.d.l) That the beam can carry safely (10)



(Fig. 1)

OR

1. a) Describe the purpose of providing following types of reinforcements
 - i) Distribution reinforcement in slab
 - ii) Lateral ties in columns (4)
- b) For the beam shown in fig.2 determine the area of tension steel required to be provided to make the section as balanced section: (Use M-20 and Fe 415) by using:
 - i) Working stress method
 - ii) Limit state design method (2×6)

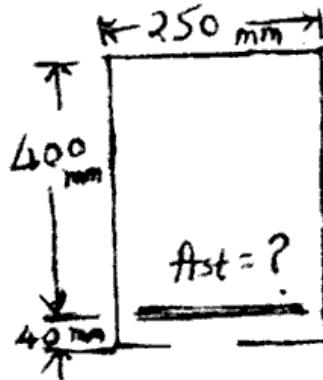


Fig. 2.

Unit - II

2. Determine the ultimate moment of resistance of the following sections. Also draw the stress block parameters for these sections use M-20 and Fe-415 (2×8)

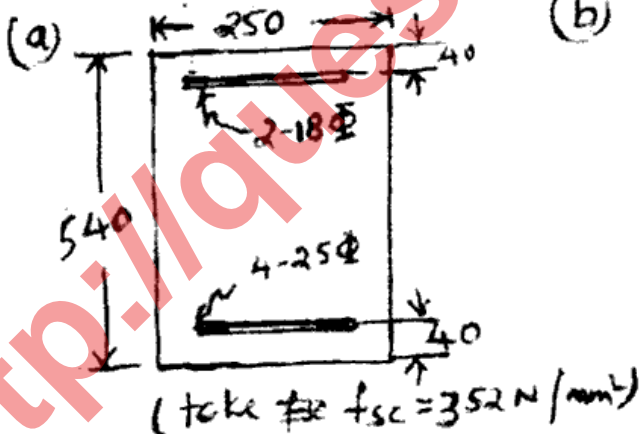


Fig. 3

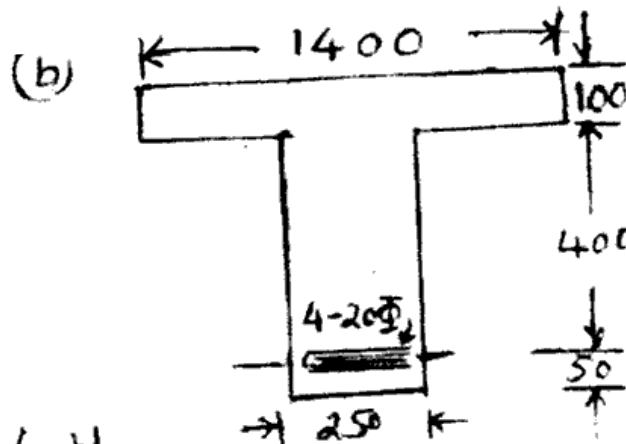
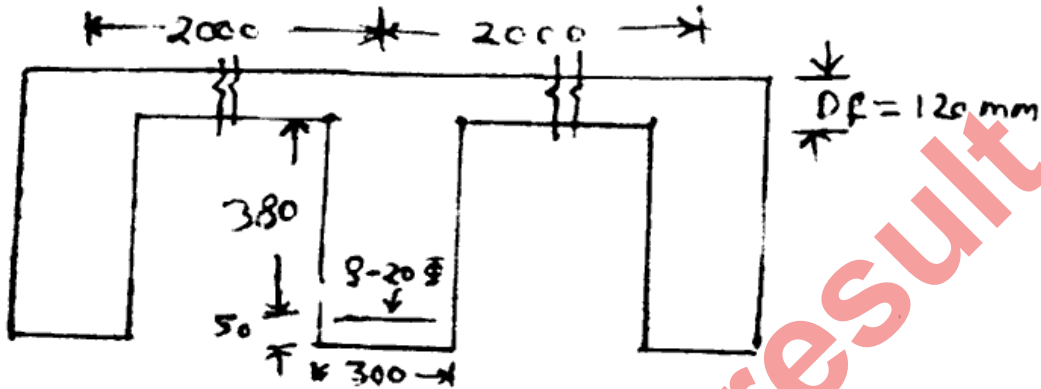


Fig. 4

OR

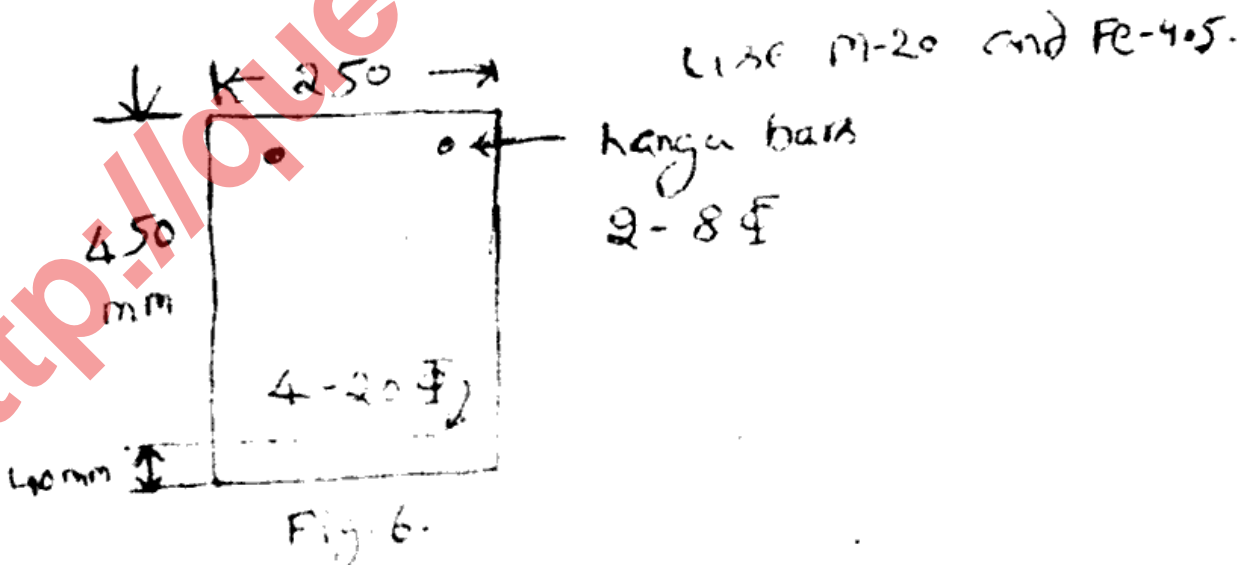
2. a) Describe the conditions under which it is advisable to provide doubly reinforced beams and why? (4)
- b) For the intermediate T-beam shown in fig.5 determine the effective flange width, depth of neutral axis and ultimate moment of resistance of the section. Consider the beam as simply supported over an effective span of 3.6m. Take M-20 and Fe-415 (12)



All dimensions are in mm
fig.5 (not to the scale)

Unit - III

3. a) Describe the reasons of providing minimum shear reinforcement even if it is not required theoretically in a beam. (4)
- b) Describe the various factors governing the bond strength. (4)
- c) For the beam shown in Fig. design the minimum shear reinforcement. Draw the neat cross-section and longitudinal section showing all reinforcement (8)



OR

3. a) A reinforced concrete continuous beam with section of size 300×500 mm(effective) is reinforced with 4-16 ϕ . It is subjected to a factored shear force of 300 kN at the point of inflection. Check the beam for limit state of collapse in bond at the point of inflection. Use M-20 and Fe-415 (8)
- b) Determine the ultimate shear resisting capacity of a beam section of size 230 mm width, 450mm effective depth and is provided with four bars of 20 ϕ . The beam is provided with 2- legged vertical stirrups of 10 ϕ @ 140mm c/c use M-20 & Fe-415 (8)

Unit - IV

4. a) Describe the limitations of direct design method of flat slabs (4)
- b) Design a one way slab, with a clear span of 4m, simply supported on 230 mm thick masonry walls on all the four edges and subjected to an ultimate u.d.l (including all loads) of 15 KN/m². Give a neat sketch showing detailing of reinforcement Use M-25, and Fe-415 and consider total depth of slab as 200 mm (12)

OR

4. Design a slab over a room 4m×6m (clear dimensions) as per IS 456 code. The edges of the slabs are simply supported on a bearing of 150mm thick walls. Use M-20 and Fe-415 total factored u.d.l including all types of loads=11kN/m² over all depth of slab=170mm with effective cover of 20 mm. "Give neat sketches with necessary details. check the slab for deflection" (10+3+3)

Unit - V

5. a) Write a short note on "P-M interaction curve" and its salient features. (4)
- b) Determine the safe working axial load for a short column 425mm in diameter reinforced with 6 bars of 22mm diameter. It is provided with 8mm diameter helical reinforcement at a pitch of 40mm. Use M-20 concrete and Fe-250 steel. Take clear cover to the main longitudinal reinforcement =40mm. (12)

OR

5. Design an isolated footing for a column of size 400mm×400mm and carrying a service axial load of 1000kN. The safe bearing capacity of soil is 200 kN/m². Use M-20 & Fe-415. sketch the details of reinforcement. (16)