

Roll No.

2153

B. E. 4th Semester (Civil Engg.)

Examination – May, 2013

DESIGN OF CONCRETE STRUCTURES-I

Paper : CE-204-E

Time : Three Hours]

[Maximum Marks : 100

Before answering the question, candidates should ensure that they have been supplied the correct and complete question paper. No complain in this regard, will be entertained after examination.

Note : Attempt any *five* questions in all. Give your answers by using either of the *two* methods of design i.e. LSM or WLSM. Use of IS 456 : 2000 is permitted. Draw the sketches of your design. Assume any data suitably which is not given.

1. A RCC beam 250 mm and 600 mm has 4-20 mm ϕ bars as tension reinforcement. The centre of bars being 50 mm above bottom of the beam. Determine the safe UDL. The beam can carry over an effective simply supported span of 6 metres. Use M-20 concrete and HYSD bars. 20

2. A simply supported R.C.C. beam 300 mm wide and depth 600 mm (effective) carries a u.d.l. of 30 kN/m, inclusive of its own weight over a span of 5 m (l_e). Design suitable shear reinforcement for the beam, assuming that 0.5% tensile reinforcement is available throughout its length. The following data is also available :

(i) Grade of concrete used = M15.

(ii) Characteristic strength of stirrup reinforcement,

$$f_y = 250 \text{ N/mm}^2$$

(iii) $\sigma_{sv} = \sigma_{vt} = 140 \text{ N/mm}^2$

(iv) $m = 19$

20

3. Design a rectangular R.C.C. beam with the following data :

20

Span = 5 m

Load = 6.8 kN-m

Size of the beam is restricted having width 250 mm and depth 425 mm (overall).

Concrete used = M15

Steel - Fe415

4. An isolated T beam simply supported over a span of 6 m has a flange width of 1650 mm. The thickness of the flange is 100 mm and the beam has an effective depth of 500 mm upto the centre of reinforcement

which consist of 4-25 mm ϕ bars. Calculate moment of resistance of the section and the u.d.l. the beam can carry taking compressive force in the web into account. Width of web is 250 mm. Use M-20 concrete and F-415 steel. 20

5. A RC roof is to be constructed with T beams over a room measuring 9 m x 6 m. The roof slab is 110 mm thick and is monolithic with beams. The beams are spaced 3 m c/c. The rib which projects below the slab is 300 mm wide. The roof slab carries a super impose load of 4 KN/m^2 . Design the intermediate T-beam neglect compression in the rib. The walls are 300 mm thick. Use M-20 concrete and HYSD bars. 20
6. Design a RCC slab by IS code method measuring 6m x 7.2 m in size. The slab is simply supported on all four edges with corners held down the roof carries a super imposed load of 3000 KN/m^2 . Inclusive of floor finishes etc. Use M-25 grade concrete and Fe-415 steel. 20
7. Design an axially loaded column that carries a load of 500 KN. The effective length of the column is 8m. One side of the column is restricted to 300 mm. Use M-25 concrete and Fe-415 for steel. 20