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Seat No.	

B.E. (Civil Engineering) (Semester - VII) Examination, December - 2015

DESIGN OF CONCRETE STRUCTURES - I (New)

Sub. Code : 47901

Day and Date : Tuesday, 08 - 12 - 2015 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions : 1) Attempt any three questions from each Section.
2) Figure to the right indicates full marks.
3) Assume any suitable data whenever necessary.
4) Use of non-programmable calculator and relevant I.S. 456: 2000 are allowed.

SECTION - I

Q1) a) Explain the balanced, under reinforced and over reinforced sections as per Limit State Method. **[6]**

b) An RCC beam, 200 mm × 400 mm effective, is reinforced with 3-16 mm diameter bars of Fe 415 steel. Find the ultimate udl which the beam can carry safely over a span of 5m. Take M 20 concrete. **[11]**

Q2) a) Explain the effective flange width of a T-beam showing the actual and assumed stress distribution. **[5]**

b) Determine the limiting moment of resistance and limiting area of steel for a reinforced concrete T-beam having flange width of 1600 mm, effective depth of 350 mm and thickness of flange is 100 mm. The width of web is 250 mm. Use M 20 grade concrete and Fe 500 steel. **[12]**

Q3) a) Explain the concept of "shear" in the RC beam with sketch. **[4]**

b) A simply supported beam 300 mm × 600 mm effective is reinforced with 5 bars of 25 mm diameter. It carries a udl of 80 kN/m including self weight, over an effective span of 6m. Out of the 5 main bars, two bars can be bent up safely near the supports. Design the shear reinforcement for the beam. Use M 20 grade of concrete and Fe 415 steel. **[12]**

P.T.O.

Q4) a) Explain in detail all the types of cracks. **[4]**

b) A rectangular beam has a width of 250 mm and effective depth of 500 mm. The beam is provided with tension steel of 5 bars of 28 mm diameter and compression steel of 2 bars of 25 mm diameter. The effective cover to the compression steel being 50 mm. Calculate the ultimate moment capacity of the section, if f_{ck} = 20 N/mm^2 and f_y = 250 N/mm. **[12]**

SECTION - II

Q5) Design a R. C. slab for a room measuring 4 m × 5 m from inside. The slab carries a live load of 2 kN/m^2 and is finished with 20 mm thick finish having unit weight of 24 kN/m^2. Use M 15 concrete and Fe 250 steel. The slab is silmply supported at all the four edges, with corners free to lift. Take width of supporting wall as 300 mm. **[16]**

Q6) Design a dog legged staircase for an office building in a room measuring 3.0 m × 6.0 m. Floor to floor height is 3.5m. The building is a public building liable to over crowding. Stairs are supported on brick wall 230 mm thick at the end of building. Use M 20 concrete and Fe 415 steel. **[17]**

Q7) Design a column of size 450 mm × 600 mm and having 3 m unsupported length. The column is subjected to a load of 200 kN and is effectively held in position but not restrained against rotation. Use M 20 concrete and Fe 415 steel. **[16]**

Q8) Design a square footing of uniform thickness for an axially loaded column of 450 mm × 450 mm size. The safe bearing capacity of soil is 190 kN/m^2. Load on column is 850 kN. Use M 20 concrete and Fe 415 steel. **[17]**