TE – Sem-VI – Old – Civil

TRCPC

19/12/15

QP Code : 2086

(OLD COURSE)

(3 Hours) **[Total Marks : 100**

N.B. 1) Question No 1 is compulsory.

2) Solve any four questions from remaining six questions.

3) Assume suitable data if required but justify same.

4) Use of IS 456 is not permitted.

5) Figures to the right indicate full marks.

Q. No. 1 Explain under reinforced , balance and over reinforced R.C. section. Derive an expression for single reinforced R. C. section for balanced moment resisting capacity of section (08)

What are the codal provision with reference to short column and long column ? (04)

Explain why high strength concrete and steel is required in prestressed concrete. (04)

Explain the IS codal provisions for design of section against shear (04)

Q. No. 2 a) An Reinforced concrete beam 230mm X 600 mm overall with 4 bars of 20 mm diameter on tension side and 2 bars of 25 mm diameter on compression side. Find safe UDL the beam can carry on a simply supported effective span of 6 meter. Adopt M20 and Fe415 and effective cover as 50mm. (12)

b) Design simply supported beam subjected to UDL of 40 kN/m inclusive of its own weight. The width of beam is 230mm and span is 6 meter . Show details of reinforcement. Adopt M20 and Fe415 (8)

Q. No. 3 a) A Reinforced concrete Tee beam has the following dimension : (10)

Flange width 2000 mm

Width of Rib 300 mm

Depth of Rib 700 mm

Depth of flange 120mm

Steel provided 6 no of 25 mm diameter bars

Span 8.0 meter

Grade of concrete M20 and Steel Fe415

Find the safe UDL the beam can carry.

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b) A simply supported beam of span 6 meter 250 mm X 600 mm (effective) carries a UDL of 30 kN/m it is reinforced with 5 bars of 20mm diameter. Design shear reinforcement adopt M20 and Fe415

Pt%	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0	2.25	2.5
τ	0.22	0.3	0.35	0.39	0.42	0.45	0.47	0.49	0.51	0.51

Q.No. 4 a) Design an interior panel 4m X 4m of simply supported floor slab resting on brick wall on all four side subjected to live load of 3 kN/m^2 and floor finish 1 kN/m^2 Adopt M20 and Fe415 (12)

αx =-0.062 αy =-0.062

b) Design a short rectangular column to carry an axial load of 1200 kN. One side of the column is restricted to 300mm. Adopt M20 and Fe 415. Draw details of reinforcement. (08)

Q.No. 5 a) Design a Isolated slopped footing for the given data (10)

Column size 400 mm x400 mm

Load 1050 kN

Longitudinal steel 4-20mm bars

Grade of concrete M20 and Grade of steel Fe415

Safe bearing capacity of soil 200 kN/m^2

b) The column section as shown in fig is subjected to an axial load of 600 kN and a moment of 12 kNm about y-y axis. Calculate maximum stresses in compression in concrete and steel. Also check whether the section is safe. The materials are M20 and Fe415 (10)

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Q.No. 6 a) A post tensioned prestressed concrete beam 15 meter span is subjected to initial prestress of 1400 kN transferred at 28 days strength of concrete cable profile is parabolic with eccentricity of 500 mm at mid-span. Jacking is done from both ends of beam .Estimate net loss of prestress for following :-

i) loss due to elastic shortening

ii) Shrinkage of concrete

iii) Creep of concrete

iv) Slip in anchorage

v) Frictional loss.

Additional data :-

Crossectional Area=2.5 x10^5 mm^2 Ixx - 5.2 x 10^9 mm^2 Area of steel – 1300 mm^2 Es – 2x 10^5 N/mm^2

Ec – 0.38 x 10^5 N/mm^2 fs – 1050 N/mm^2 at transfer Anchrage slip – 2.5mm $\mu = 0.25$

Wobble correction factor k= 0.0015 (15)

b) Explain load balancing method (05)

Q. No. 7 a) A prestressed concrete beam 200mm x 300 mm is used over an effective span of 6 meter to support an imposed load of 4 kN/m. The density of concrete is 24 kN/m^3. Determine magnitude of prestressing force located at 50mm from soffit of the beam at mid span where permissible stresses in tension are limited to 1 N/mm^2 at service stage. Consider 20% loss of stresses in steel. Cable is parabolic and concentric at support. Determine stresses in extreme fibers at service at quarter span. (12)

b) Calculate the efficiency of the section : (08)

I – section top flange : 400mmx 200mm bottom flange :200mm x 200mm web : 100mm x600mm overall depth 1000mm

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Course T.E. (SEM.-VI) (REV. -2007) (CIVIL ENGG) (Prog T2616)

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Correction:

Q.NO 5.b

Correction:
Following are the crossectional dimensions and reinforcement of beam

1) Width of beam: 300mm
2) Effective depth of beam: 550mm
3) Top reinforcement: 4-16 mm Tor
4) Bottom reinforcement: 4-20 mm Tor

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