1/12/14 TE - CE - SEM - VI (Rev) TRCPC Block 01

QP Code :15221

(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 a) A short column 300mm X 300mm is reinforced with 4 bars of 20mm diameter . Determine the safe working load on the column. Use M20 grade of concrete and Fe 415 grade of steel (05)

b) Derive the expression for balanced moment of resistance for a singly reinforced rectangle section. (05)

c) Name different methods of post-tensioning. Discuss any one method in details. (05)

d) Why is necessary of using high strength concrete and high tensile steel in prestressed concrete (05)

Q.No. 2 a) Design a simply supported beam subjected to u.d.l. of 40 kN/m. The width of the beam is 230 mm. and span is 5 m. Use M20 grade of concrete and Fe415 grade of steel. Show details of reinforcement. (10)

b) In a doubly reinforced rectangular beam 230mm X 600 mm (overall) is reinforced with 4 bars of 16 mm diameter in compression and 4 bars of 16 mm dia. in tension. Determine Moment Of resistance of the section. Use M20 grade of concrete and Fe415 grade of steel (10)

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

Flange width 1000 mm

Width of Rib 230 mm

Depth of Rib 400 mm

Depth of flange 120mm

Steel provided 4 no of 20 mm diameter bars

Span 8.0 meter

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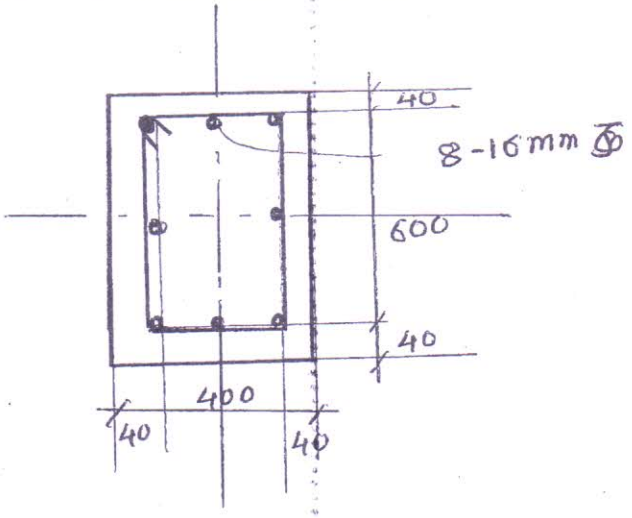
Grade of concrete M20 and Steel Fe415

Find the safe UDL the beam can carry.

b) A rectangle beam 230mm x 450mm (effective depth) is reinforced with 6 bars of 16 mm diameter out of which two bars are bent at 45^0 . Determine the shear resistance of bent up bars and additional shear reinforcement required if the shear force is 200 kN.. Design shear reinforcement adopt M20 and Fe415 (10)

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) A column is 400mm x 600mm is reinforced with 8 bars of 16mm diameter it is subjected to compressive force of 450 kN. Mx = 50 kNm My= 40 kNm Check the safety of the column as uncracked section. Use M20 grade of concrete and Fe415 grade of steel (10)



b) Design a simply supported slab having diamension 4m X 6m. Assume live load of 4 kN/m^2 and floor finish of 1 kN/m^2. Use M20 grade of concrete and Fe415 grade of steel

α_x = 0.089 α_y = 0.056 (10)

Q.No. 5 Design the isolated sloped footing (rectangular) for a reinforced concrete column 230mm x 450mm carrying an axial load of 1200 kN. The bearing capacity of soil is 150 kN/m^2 . . Use M20 grade of concrete and Fe415 grade of steel .Draw sketch showing reinforcement details. (20)

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Q. No. 6 a) A PSC beam 230mm x450mm is used over an effective span of 5m to support an imposed load of 4 kN/m . Determine the magnitude of prestressing force located at 60 mm from the soffit of the beam at mid span where permissible stresses in tension are limited to 1 N/mm^2 at service stage consider 15 % loss of stresses in steel. Cable is parabolic and concentric at support. Determine stresses in extreme fibres at service at quarter span. (14)

b) An I- section prestressed concrete beam has top flange 1000mm x 200mm, bottom flange 600mm x 200mm and web is 200mm x2000mm depth. Determine the efficiency of the section. (06)

Q. No. 7 A prestress concrete beam (I- section) has top flange 1400mm x 200mm, bottom flange700mm x 200mm and web 180mm x 2000mm (depth) is prestressed with wires having area 300 mm^2 located at 50 mm from soffit and carrying initial stress of 1200 N/mm^2 the span of beam is 10 m calculate the percentage loss of stress in wires if

I) beam is pretensioned

II) the beam is post-tenssioned use the following data.

Es = 200 kN/mm^2 and Ec = 35 kN/mm^2 Relaxation of steel stress = 5 % of the initial stress.

Shrinkage of concrete = 300 x 10^{-6} for pretensioning and 200 x 10^{-6} for post tensioning creep co-efficient = 1.6 slip at anchorage = 1mm frictional co-efficient for wave effect = 0.0015 /m (20)

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