Code No: R32015 **R10** **Set No: 1**

III B.Tech. II Semester Regular Examinations, April/May -2013

DESIGN & DRAWING OF CONCRETE STRUCTURES-II

(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Note: Answer any ONE question from PART-A and THREE question from PART-B
Use of relevant IS codes and design charts is allowed.

PART-A

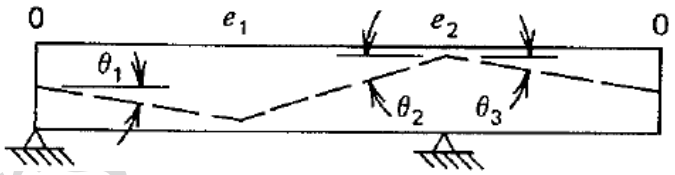
1. Design as per provisions in IS 456, an interior panel of a flat slab, 6 m × 6 m, for a live load of 7 kN/m^2. Use M20-Grade concrete and Fe 415 steel. Provide two-way reinforcement. Sketch the details of reinforcement. [30]

OR

2. Two reinforced concrete columns 400 mm × 400 mm in section carry a load of 1100 kN each, inclusive of the self-weight. Design as per provisions in IS 456, a combined footing having central beam joining the columns. The center to center spacing of the columns is 3.8 meters. The safe bearing capacity of soil is 200 kN/m^2. Use M20-Grade concrete and Fe 415 steel. Sketch the details of reinforcement. [30]

PART-B

3. (a) Explain in brief the following types of strains in concrete (1) Creep strain; (2) Shrinkage strain; and (3) Carbonation shrinkage.
   (b) Indicate the equivalent loads and moment diagram resulting from application of a prestress force P with tendon eccentricity as shown in the figure below



   (c) Explain in brief the following prestressing systems (1) Freyssinet system; and (2) Magnel Blaton system. [5 + 5 + 5]

4. A post-tensioned beam of rectangular section 0.2 × 0.6 m has a parabolic cable line with an eccentricity of 0.1 m at midspan and zero eccentricity at ends. The initial prestressing force is 750 kN. Determine the loss of prestress at midspan section due to creep of concrete for (i) bounded beam and (ii) unbounded beam. Take creep coefficient C_c= 1.5 and m = 7.5. [15]

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5. A pretensioned beam of rectangular cross-section 0.30 × 0.90 m has straight prestressing tendons at an effective eccentricity of 0.35 m. At the initial stage the prestressing force is 1.89 MN and sagging bending moment is 0.378 MN-m. At the final stage the prestressing force reduces to 1.485 MN and the total sagging bending moment is 0.7425 MN-m. Determine the stress at the initial and final stages. [15]

6. Design a rectangular section for a pretensioned beam for an industrial shed. The effective span is 15 m. The beam carries only its own weight at stress transfer. It has to carry a superimposed load of 4.2 kN/m at the final stage. Assume M40-Grade concrete, the strength of concrete at stress transfer, f_{ci} = 30 MPa, and the ultimate tensile strength of high tensile steel, f_{pu} = 1600 MPa. The beam has to be Type I (full prestress). Take working stresses pertaining to zone I as per Indian Code. [15]

7. A post-tensioned beam of rectangular section 250 × 550 mm has an effective prestressing force of 900 kN at a constant eccentricity of 200 mm. It carries a service load of 25 kN/m over an effective span of 10 m. Design the shear reinforcement for the beam. Assume M35-Grade concrete. [15]

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Code No: R32015 **R10** **Set No: 2**

III B.Tech. II Semester Regular Examinations, April/May -2013

DESIGN & DRAWING OF CONCRETE STRUCTURES-II

(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Note: Answer any ONE question from PART-A and THREE question from PART-B
Use of relevant IS codes and design charts is allowed.

PART-A

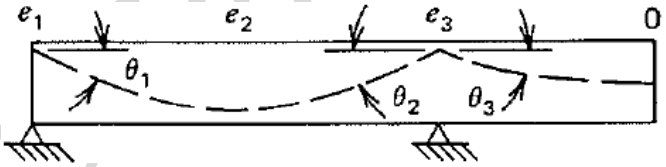
1. Design as per provisions in IS 456, an interior panel of a flat slab, 4 m × 4 m, for a live load of 6 kN/m^2. Use M20-Grade concrete and Fe 415 steel. Provide two-way reinforcement. Sketch the details of reinforcement. [30]

OR

2. Design a combined rectangular footing for two columns A and B, carrying loads of 550 and 750 kN respectively. Column A is 300 mm × 300 mm in size and column B is 400 mm × 400 mm in size. The center to center spacing of the columns is 3.5 meters. The safe bearing capacity of soil is 180 kN/m^2. Use M20-Grade concrete and Fe 415 steel. Sketch the details of reinforcement. [30]

PART-B

3. (a) Explain in brief the following prestressing techniques (1) External prestressing; (2) Circular prestressing; and (3) Partial prestressing.
(b) Indicate the equivalent loads and moment diagram resulting from application of a prestress force *P* with tendon eccentricity as shown in the figure below



(c) Explain in brief the following (1) Types of prestressing tendons; and (2) Advantages of prestressed concrete compared to reinforced concrete. [5 + 5 + 5]

4. A pretensioned beam of rectangular cross-section 0.2 × 0.3 m has a straight cable line parallel to centrodial axis with constant eccentricity of 0.05 m. The intial prestressing force is 375 kN. Determine the average loss of prestress due to elastic shortening. Take $m = 7.5$. [15]

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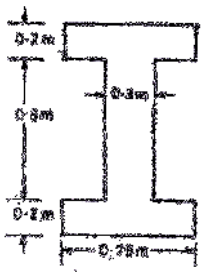
5. A post-tensioned girder of 20 m span has a cross section shown in the figure below. It has a parabolic cable line with eccentricities equal to 0.5 m, −0.2 m, and −0.2 m at midspan and at the two ends. At the initial stage the prestressing force is 3.78 MN and the dead load is 18 kN/m inclusive of self weight. At the final stage, the prestressing force reduces to 3.24 MN and the total load is 50 kN/m. Determine the extreme fiber stresses at midspan section at the initial and final stages. [15]



6. Design the midspan section of a precast pretensioned beam of a residential building floor. The effective span is 3.5 m. The beam has to carry only its own weight at the initial stage. The total service load exclusive of self weight at the final stage is 18 kN/m. Use M35-Grade concrete. Ultimate strength of high tensile steel, f_{pu} = 1750 MPa. Use provisions of IS code. [15]

7. A post-tensioned beam has T-section with the flange 1.5 m wide and 0.25 m thich and web 0.30 m thick. The overall depth of the section is 1.8 m. An effective prestressing force of 5.4 MN acts along a parabolic cable line with no eccentricity at ends and at an eccentricity of 0.9 m at midspan. It carries a uniform load of 30 kN/m over an effective span of 35 m. Design the shear reinforcement for the beam. Assume M40-Grade concrete. [15]

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Code No: R32015 **R10** **Set No: 3**

III B.Tech. II Semester Regular Examinations, April/May -2013

DESIGN & DRAWING OF CONCRETE STRUCTURES-II

(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Note: Answer any ONE question from PART-A and THREE question from PART-B
Use of relevant IS codes and design charts is allowed.

PART-A

1. 1Design as per provisions in IS 456, an interior panel of a flat slab, 6 m × 6 m having an opening of 1.25 m × 1.25 m at its middle, for a live load of 7 kN/m^2. Use M20-Grade concrete and Fe 415 steel. Provide two-way reinforcement. Sketch the details of reinforcement. [30]

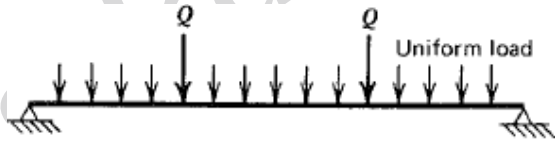
OR

2. Design a combined footing for two columns, each 600 mm × 600 mm, 5 meters apart, and each carrying a load of 1750 kN. The available width is restricted to 2.2 m. The safe bearing capacity of soil is 180 kN/m^2. Use M20-Grade concrete and Fe 415 steel. Sketch the details of reinforcement. [30]

PART-B

3. (a) Show that the theoretical lower and upper limits of eccentricity of kern points in a symmetrical I-section are *D*/6 and *D*/2 respectively in which *D* is the overall depth of the section.

(b) Disregarding member self-weight and the effect of prestress losses, sketch the tendon profile that is "best" in the sense of balancing the indicated loads as shown in the figure below



(c) Explain in brief the following (1) Time dependent deformation concrete; and (2) Stress relaxation. [5 + 5 + 5]

4. A pretensioned transmission pole has a rectangular cross-section 0.1 × 0.1 m at top and 0.1 × 0.2 m at bottom. It is prestressed concentrically with an initial force of 88 kN. Determine the average loss of prestress due to elastic shortening. Take m = 7.5. [15]

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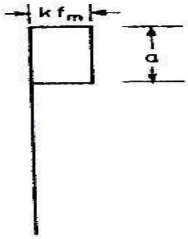
5. Determine the ultimate moment of a rectangular cross-section 0.4 × 0.8 m of a pretensioned beam. Given that area of prestressing steel = 810 mm^2 and effective depth = 0.75 m. The failure occurs by breaking of tendons at a stress of 1700 MPa. Use the stress block in the figure shown below in which f_m = 32 MPa. [15]



6. Design a precast pretensioned beam of rectangular section for an industrial building to carry only its own weight at the initial stage and a total working load of 10 kN/m exclusive of own weight at the final stage over an effective span of 12.5 m. Use M35-Grade concrete and the provisions of IS code. [15]

7. A pretensioned beam has a T-section with the flange 1.5 m wide and 0.25 m thick and web 0.30 m thick. The overall depth of the section is 1.8 m. An effective prestressing force of 5.4 MN acts along a parabolic cable line with no eccentricity at ends and an eccentricity of 0.9 m at midspan. It carries a uniform load of 30 kN/m over an effective span of 35 m. Design the shear reinforcement for the beam. Assume M40-Grade concrete. [15]

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Code No: R32015 **R10** **Set No: 4**

III B.Tech. II Semester Regular Examinations, April/May -2013

DESIGN & DRAWING OF CONCRETE STRUCTURES-II

(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Note: Answer any ONE question from PART-A and THREE question from PART-B
Use of relevant IS codes and design charts is allowed.

PART-A

1. Design as per provisions in IS 456, an interior panel of a flat slab, 4 m × 4 m having an opening of 1 m × 1 m at its middle, for a live load of 6 kN/m^2. Use M20-Grade concrete and Fe 415 steel. Provide two-way reinforcement. Sketch the details of reinforcement. [30]

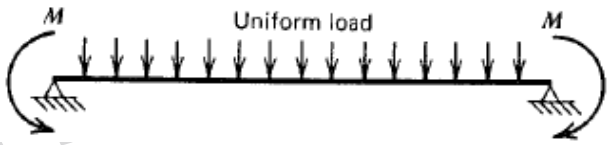
OR

2. Design a combined rectangular footing for two columns A and B, carrying loads of 1200 and 1600 kN respectively. Column A is 500 mm × 500 mm in size and column B is 600 mm × 600 mm in size. The center to center spacing of the columns is 3.6 meters. The safe bearing capacity of soil is 180 kN/m^2. Use M20-Grade concrete and Fe 415 steel. Sketch the details of reinforcement. [30]

PART-B

3. (a) The eccentricities of six cables each carrying a force of 320 kN at a section are 0.5, 0.4, 0.3, 0.2, 0.1 and –0.3 m. Determine the eccentricity of prestress and prestressing moment.

(b) Disregarding member self-weight and the effect of prestress losses, sketch the tendon profile that is "best" in the sense of balancing the indicated loads as shown in the figure below



(c) Show that in the absence of external bending moment, the line of thrust in a prestressed concrete member coincides with the cable line. [5 + 5 + 5]

4. A post-tensioned beam of rectangular section 0.3 × 0.6 m has a parabolic cable line with zero eccentricity at ends and 0.15 m eccentricity at midspan. Determine the average increase in prestress due to uniform load of 20 kN/m over its entire span of 9 m. Take m = 7.5. [15]

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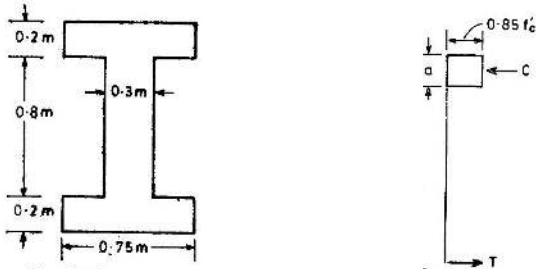
5. Determine the ultimate moment of a bounded beam having cross-section shown in the figure below. Given that area of prestressing steel = 1650 mm^2 and effective depth = 1.0 m. The failure occurs by breaking of tendons at a stress of 1620 MPa. Use the stress block of the figure shown below in which f'_c = 32 MPa. [15]



6. A post-tensioned girder of a warehouse has to carry only its self-weight at the initial stage and a total working load of 35 kN/m exclusive of self-weight at the final stage over an effective span of 25 m. Design the girder using a symmetrical I-section and determine a suitable cable line. Assume M35-Grade concrete, Freyssinet system and provisions of IS code. [15]
7. A pretensioned beam of rectangular section 250 × 550 mm has an effective prestressing force of 920 kN at a constant eccentricity of 200 mm. It carries a service load of 26 kN/m over an effective span of 12 m. Design the shear reinforcement for the beam. Adopt M40-Grade concrete. [15]

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