Concrete Design

1. Design philosophies
   (a) Strength design, design-related factors
   (b) Allowable stress/serviceability design

2. Material Properties
   (a) Concrete
   (b) Steel reinforcement bars and prestressing tendons

3. General purposes and placement of reinforcement

4. Effects of concrete shrinkage and creep
   (a) For reinforced concrete
   (b) For prestressed concrete

5. Flexural analysis and design
   (a) Basic flexural models assumptions, equations
   (b) Balanced and maximum reinforcement
   (c) Strength-based flexural analysis and design
   (d) rectangular, T, and general shape beams
   (e) Compression steel reasons for use, effects
   (f) Cover, spacing general provisions and reasons for limits
   (g) Analysis (not design) of singly reinforced beams by allowable stress procedures
   (h) Beam deflections

6. Anchorage, cut-off lengths, hooks

7. Behavior and design procedures for flexural shear

8. Torsion when important, general design concepts

9. Columns and beam-columns
   (a) Behavior and analysis (not design) of short columns
   (b) Column length effects

10. Two-way slabs - behavior, general design approaches, punching shear
11. Prestressed concrete

(a) Basic behaviors & analysis approaches including load balancing
(b) Prestress losses short and long term
(c) Analysis/design for stress limits at transfer and service loads
(d) Flexural strength of prestressed concrete beams

A clean copy of possibly relevant part of the ACI Code Chapter 11 will be provided with the exam, along with areas/sizes of standard (U.S.) reinforcement and specific empirically (i.e. test data based) design equations (not included in Chapter 11) when the test authors deem appropriate and possibly needed.

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