Job Task Analysis (JTA) for ACI 318-14 Design Professional Certification

HOW TO USE THIS JTA:
For each of the following assessment methods, the Candidate must:

On the written examination:

- **Understand** the following general concepts, which may not have specified values, procedures, or measurements; *and*
- **Know** the following specific procedures or values; performance of these items may also be assessed on the performance examination.

RESOURCES:

ACI 318-14 Building Code Requirements for Structural Concrete and Commentary

*SBC 304 2018, Saudi Building Code for Concrete Structures, may be used as a resource in place of ACI 318-14 for the open-book exam.

General, Loads, and Analysis (Ch 1-6)

- Understand the general requirements of the Code.
- Understand the purpose of the Code.
- Know what types of structures to which the Code applies
- Understand how the Code is to be interpreted.
- Understand the meaning of the term Licensed Design Professional as it used within the Code.
- Understand how special systems of design, construction, or alternative construction materials are approved.
- Understand the notation defined in the Code.
- Understand the terminology defined in the Code.
- Know which editions of standards referenced in the Code apply
- Know which structural elements form part of the structural load path.
- Know which sections of the code apply to the seismic-force-resisting system designated for the structure.
- Understand the function of diaphragms and the forces they are required to be designed for.
- Understand the requirements for and methods of structural analysis.
- Understand the difference and relationship between nominal strength, strength reduction factors, design strength, and required strength.
- Know the additional requirements for specific types of construction.
- Understand how to apply load factors to determine required strength.
- Know the methods of analysis permitted by the Code
- Understand the requirements for dealing with slenderness effects in axially loaded members.
- Know the requirements for effective flange width of T-beams.
- Know the requirements for arrangement of live load.
- Know the limitations of the simplified method of analysis for beams and slabs.
- Understand the requirements for a first-order analysis.
- Understand the requirements for an elastic second-order analysis.

Member Design (Ch 7-14)

- Know the scope of one-way slab, two-way slab, beam, column, wall, diaphragm, foundation, and plain concrete members covered by the provisions in the Code.

- Know the design considerations required for diaphragms.
- Know where to find additional requirements for materials.
- Know where to find additional requirements for connections between members.
- Know the load distribution requirements for walls.
- Know the requirements for foundation members that transmit forces resulting from earthquake effects and when they apply.
- Know the limitations for flange width of T-beam construction.
- Know the requirements for slabs-on-ground that transmit forces to the ground.
- Know the design criteria for foundations.
- Know the critical sections for design of shallow foundations and pile caps.
- Know the requirements for development of reinforcement in shallow foundations and pile caps.
- Know the dimensional requirements for columns, drop panels, and shear caps.
- Understand the design requirements for shallow foundations.
- Know the minimum thickness/depth requirements for one-way slabs, two-way slabs, beams, walls, diaphragms, and shallow foundations and when they apply.
- Know the calculated deflection limits for one-way slabs, two-way slabs, and beams and when they apply.
- Know the reinforcement strain limits for nonprestressed and prestressed one-way slabs, two-way slabs, and beams.
- Understand the required strength requirements for one-way slabs, two-way slabs, beams, columns, walls, and diaphragms.
- Understand the design requirements for deep foundations.
- Understand how to calculate design strength of one-way slabs, two-way slabs, beams, columns, walls, and diaphragms.
- Understand the reinforcement limits for one-way slabs, two-way slabs, beams, columns, walls, and diaphragms.
- Know the reinforcement detailing requirements for one-way slabs, two-way slabs, beams, columns, walls, and diaphragms.
- Know the requirements for nonprestressed one-way and two-way joist systems.
- Understand the alternative method requirements for out-of-plane slender wall analysis
- Know the definition of a deep beam and the requirements for deep beam design.

Joints, Connections, and Anchoring to Concrete (Ch 15-17)

- Know the scope of beam-column and slab-column joints and of connections covered by the provisions in the Code.
- Understand the general requirements for beam-column and slab-column joints.
- Understand the requirements for transfer of column axial force through the floor system.
- Know the requirements for detailing of beam-column and slab-column joints.
- Understand the requirements for connections of precast members.
- Understand the requirements for connections to foundations.
- Understand the requirements for horizontal shear transfer in composite concrete flexural members.
- Understand the requirements for brackets and corbels.
- Know the scope of concrete anchors that are covered by the provisions in the Code.
- Understand the earthquake resistant anchor design requirements.
- Know the limits of concrete compressive strength used for calculation of anchor capacity.
- Understand the general requirements for anchor strength.

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- Understand the design requirements for anchors loaded in tension.
- Understand the design requirements for anchors loaded in shear.
- Understand the design requirements for anchors loaded in combined tension and shear.
- Understand the requirements for edge distance, spacing, and thickness to preclude splitting.
- Understand the requirements for installation and inspection of anchors.

Seismic Design (Ch 18)

- Understand which seismic requirements apply to specific concrete structures.
- Understand which additional requirements apply to the structural systems and elements designate to resist seismic forces.
- Understand the additional seismic requirements for ordinary moment frames.
- Understand the additional seismic requirements for intermediate moment frames.
- Understand the additional seismic requirements for special structural walls.

Material Properties and Durability Requirements (Ch 19-20)

- Know the scope of concrete properties and durability requirements covered by the provisions in the Code.
- Know the concrete design property requirements in the Code.
- Understand the concrete durability requirements in the Code.
- Know the scope of steel reinforcement properties, durability, and embedment requirements covered by the provisions in the Code.
- Know the material property requirements for nonprestressed bars and wires.
- Know the design property requirements for nonprestressed bars and wires.
- Know the material property requirements for prestressing strands, wires, and bars.
- Know the design property requirements for prestressing strands, wires, and bars.
- Know the specified concrete cover requirements for durability of steel reinforcement.
- Know the durability requirements for nonprestressed coated reinforcement.
- Know the corrosion protection requirements for unbonded prestressing reinforcement.
- Know the corrosion protection requirements for grouted tendons.
- Know the requirements for embedments.

Toolbox Chapters (Ch 21-25)

- Know the requirements for strength reduction factors.
- Know the scope of sectional strength, serviceability, and reinforcement details covered by the provisions in the Code.
- Understand the design assumption requirements in the Code for moment and axial strength.
- Understand the requirements for calculating nominal flexural strength.
- Understand the requirements for calculating nominal axial strength or combined flexural and axial strength.
- Understand the requirements for calculating nominal one-way shear strength.
- Understand the requirements for calculating nominal two-way shear strength.
- Understand the requirements for calculating nominal torsional strength.
- Understand the requirements for calculating nominal bearing strength.
- Understand the requirements for calculating nominal shear friction strength.
- Know the scope of the Strut and Tie Method of Analysis
- Know the design strength requirements

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- Know the minimum distributed reinforcement requirements
- Understand the requirements for calculation of deflections due to service-level gravity loads.
- Know the requirements for distribution of flexural reinforcement in one-way slabs and beams.
- Know the requirements for shrinkage and temperature reinforcement.
- Know the requirements for minimum reinforcement spacing
- Know the requirements for detailing of hooks, ties, and minimum inside bend diameters.
- Know the requirements for development of reinforcement.
- Know the requirements for splicing of reinforcement.
- Know the requirements for bundling reinforcing bars.
- Know the requirements for transverse reinforcement.

Construction Requirements and Strength Evaluation (Ch 26-27)

- Know the scope of the requirements for construction documents and inspection.
- Know the design criteria requirements for construction documents.
- Know the member information requirements for construction documents.
- Know the concrete materials and mixture requirements for construction documents.
- Know the concrete production and construction requirements for construction documents.
- Know the reinforcement materials and construction requirements for construction documents.
- Know the anchoring to concrete requirements for construction documents.
- Know the embedment requirements for construction documents.
- Know the additional precast concrete requirements for construction documents.
- Know the formwork requirements for construction documents.
- Know the concrete evaluation and acceptance requirements for construction documents.
- Know the inspection requirements for construction documents.
- Know the scope of existing structure strength evaluation requirements covered by the provisions in the Code.