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PREPARE Structural Systems – Material and Recording Summary

Chapter 01 – (Pages 1-41): **Introduction / ARE – Structural Systems Overview & Principles**

2 Video Lectures - Approximately 03 hrs 14 min

Topics Covered Include:

- Structural Systems Principles Defined
- Equilibrium – Modeling of structural connections
- Derterminate and Indeterminate Structures

Chapter 02 – (Pages 42-188): **Loads**

7 Video Lectures - Approximately 11 hrs 35 min

Topics Covered Include:

- Permanent Loads / Dead Load
- Roof Live Loads
- Floor Live Loads
- Critical Combinations of Loads (patterns of loads)
- Live Load Reduction
- Tributary Area / Tributary Width / Load Path
- Partition Loads
- Soil Loads
- Flood Loads and Hydrosatic Loads
- Snow Loads
- Rain Loads
- Ponding Instability
- Wind Loads
- Seismic Loads
- Temperature Loads
- Impact Loads
- Serviceability (deflection and drift limitations)
- Design Methods (Allowable Stress Design and Strength Design Methods)
- Load Combinations
- Factor of Safety

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Chapter 03 – (Pages 189-240): Properties of Sections, Statics, Forces, Moments, Stress

7 Video Lectures - Approximately 07 hrs 59 min

Topics Covered Include:

- Area, Section Modulus, Moment of Inertia
- Centroid of Sections
- Center of Rigidity
- Force and Moment Defined
- Equilibrium Equations, Beam and Truss Reactions
- Diaphragms (Flexible and Rigid Force Distribution)
- Torsion
- Overturning of shearwall elements (factor of safety and holdown forces)
- Shear and Moment Diagrams
- Chords and Collectors (Drag Struts)
- Axial Stress
- Bending Stress
- Modulus of Elasticity
- Axial Deformation ($\Delta = \frac{PL}{AE}$)
- Thermal movements and stresses (unrestrained versus restrained)
- Shear Stress
- Beam Penetrations

Chapter 04 – (Pages 241-257): Trusses

1 Video Lecture - Approximately 01 hrs 17 min

Topics Covered Include:

- Basic Overview / Components
- Work Point / System of Concurrrent Forces
- Truss Types (Pratt, Howe, Warren) & Span to Depth Ratios
- Application of loads, eccentricities and moments
- Method of Joints
- Method of Sections

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Chapter 05 – (Pages 258-288): Steel

4 Video Lectures – Approximately 04 hrs 29 min

Topics Covered Include:

- Steel Beam Design – Basic Overview
- Beam Design – Allowable Strength Design design checks
- Beam Design – Stability and Unbraced Length of the Compression Flange
- Example Problems and Use of AISC design tables (Bending, Shear and Deflection)
- Composite Beams (Advantages and Disadvantages)
- General Column Overview and Steel Column Design
- Connections – Bolted and Welded

Chapter 06 – (Pages 289-315): Wood

3 Video Lectures - Approximately 02 hrs 30 min

Topics Covered Include:

- Wood – Basic Overview (species, creep, shrinkage, expansion, thermal)
- Allowable Stress Checks and Adjustment Factors
- Glue-Laminated Beam Design Example
- Compression (Parallel to Grain versus Perpendicular)
- Notching and Holes in wood members
- Connections

Chapter 07 – (Pages 316-326): Concrete

2 Video Lectures - Approximately 01 hrs 59 min

Topics Covered Include:

- Basic building blocks, Properties and Characteristics
- Ad-Mixtures
- Compressive Strength of Concrete, Slump Test
- Creep and Shrinkage / Modular Ratio
- Definitions, Symbols and Terminology
- Effective Depth
- Reinforcement Ratio / Ductility
- Flexural Reinforcement Layout
- Shear Resistance and Stirrups
- T-Beams
- Columns and Confinement

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Chapter 08 – (Pages 327-342): Foundations

2 Video Lectures - Approximately 01 hrs 42 min

Topics Covered Include:

- Foundation System Selection Criteria
- Shallow Foundations (spread footings, wall footings, combined footings, cantilever footings, mat foundations, raft foundations)
- Area of Footing Required and Bearing Pressure
- One-way Shear, Two-Way Shear, Flexural Reinforcement
- Uniform Bearing and Eccentric Loads
- Deep Foundations (Piles and Piers)
- End Bearing, Friction, and Resistance to Uplift
- Settlement

Chapter 09 – (Pages 343-369): Irregular Structures and Detailing – Seismic

1 Video Lectures - Approximately 00 hrs 32 min

Topics Covered Include:

- Plan Irregularities and Vertical Irregularities
- Building Separations and Pounding
- Accidental Torsion
- Deformation Compatibility
- PΔ Effect
- Cross-grain Bending of Wood Ledgers / Tension Ties
- Non-Structural Components – Cantilever Parapets

SS Vignette

1 Video Lectures - Approximately 00 hrs 32 min

Topics Covered Include:

- Review of Vignette Directions
- Review of Vignette Program
- Review of Successful Bearing Wall Solution