ARCH 331. Study Guide for Quiz 4

This guide is not providing “answers” for the conceptual questions. It is a list of topical concepts and their application you should be familiar with. It is an aid to help prepare for the quiz.

Covers material of Lectures 13, 14, 15, 16 & 17

- Allowable Stress Design
- Load and Resistance Factor Design
- Working loads
- Factored loads
- Resistance Factors
- “Design” values vs. “Capacity”
- Factor of Safety
- Density of materials and relation to weight
- Static vs. dynamic loads
- Wind and dynamic response terms & behavior
- Load types (and directions) (like D, L, S ...)
- Load combinations for ASD, LRFD
- Load patterns
- Building codes vs. structural design codes vs. material standards
- Minimum Design Loads & Requirements
- Serviceability and limits
- Design vs. analysis
- Actions vs. reactions
- Load tracing & tributary width (vs. area)
- Concentrated loads
- Distributed loads – uniform / non-uniform
- w vs. W
- Equivalent center of load area
- Equivalent Force Systems
- Rafter, joist, girder, decking, pilasters, bearing walls, shear walls
- Shallow foundations: spread, wall, mat
- Deep foundations: piles, pile caps, grade beams
- Horizontal spanning levels and collectors
- Load distribution for slab supports
- Parts of retaining walls & types
- Loads on retaining walls (gravity, friction, equivalent fluid pressure, bearing pressure)
- Factor of safety of sliding and overturning
- Triangular or trapezoid shape of bearing pressure & relation to location of centroid of load
- Wind load tracing and bracing configurations
- Lumber vs. engineered timber characteristics
- Various strengths (directionality, wood type, etc.)
- Timber design methodologies and obtaining allowed stresses (duration, multiple member use....)
- Creep
- Nominal dimensions of timber
- Maximum bending stress (& location along length and in cross section)
- Maximum shear stress (& location along length and in cross section)
- Maximum shear stress by beam shape (proper equations)
- Stress types in beams
- Self-weight
Deflections & superpositioning (+ units)
Use of Beam Diagrams and Formulas
Lateral buckling (and bracing)
Equivalent distributed load based on a maximum moment
Use of Load Tables
Decking, joist types, laminated arches, stressed-skin panels, box sections, trusses, lamellas
Depth with respect to span length and shape
Timber construction types
Column stability factor, $F_{CE}$ & l/d
l/d limit for timber
Effective length, K & bracing
Beam-Columns

Combined bending and compression – interaction
P-Δ effect
Eccentricity
Connection stresses
Design vs. analysis
Bolt designations
Effective net area
Connection types
Nail load capacity charts
Bolt capacity charts and relation to wood strengths
Single vs. double shear
Stresses in built-up beam sections and the connectors