

ARCH 631. Questions from Lectures of Exam 3

Lecture 15

1. Do you know the mechanism (or way) that a lateral resisting system transfers the load or limits the displacement?
2. What are the possible deformations caused by lateral loads from any direction?
3. What is the difference between lateral resistance for low structures vs. tall structures?
4. What is an in-plane force? What is an out-of plane force?
5. Where are the most effective locations (in plan) for lateral resistance? Does it depend on plan shape, or load direction, or something else.?
6. What problems does a plan irregularity cause?
7. What problems does a vertical irregularity cause?
8. Is there such a thing as a horizontal irregularity?
9. Is it required that there be diaphragms to distribute lateral loads for shear walls to be effective lateral resisting elements?
10. Do you know the difference between a knee brace, an ankle brace, a K-brace, a chevron, and a diagonal brace?
11. Do you know what materials are commonly used for the different lateral resisting systems?
12. What is “frame action”? And do you need it both axis directions of a building?
13. What are the common choices for lateral resistance in buildings greater than 10 stories? Will an elevator core alone adequately resist lateral forces?
14. How do we model the overturning effect on a tall structure from lateral load?
15. What is “tube action”?
16. Can you name the serviceability problems with lateral loads and tall structures? Can you identify solutions for these problems?
17. Can you name all the effects of wind loading (pressure) with the proper terms? And which way the wind may load a surface?
18. What effect does exposure or location on a structure have on the static wind pressure for design?
19. Is a 100 year flood a common event? Do we design for that or greater?
20. Can you name all the effects of flood loading from pressure with the proper terms? And which way the hydraulics may load a surface?
21. Do you remember the letters for wind load and hydraulic load if you see a load combination (ASD or LRFD)?
22. Do you know the problems associated with providing lateral stability of long span structures?

Lecture 16

1. What are the main differences in dynamic vs. static loading (using the appropriate vocabulary)?
2. Can you identify the hazard cause/type?
3. Can you identify the primary (fundamental) considerations for seismic design? Can you recognize how to attain it or when it hasn't been properly considered?
4. Can you identify the response of a shape to ground acceleration, and can you identify when parts of a structure respond differently and the resulting problems?
5. Do you know the difference between the center of mass and the center of rigidity?
6. Do you know what drift is?

7. Do you know the vocabulary for dynamics (period, frequency, etc.) and can you identify what short period and long period means in terms of building stiffness?
8. Do you know how springs are used to model dynamic behavior? If static models are misleading according to the book, why do we use them?
9. Is NEHRP a design code?
10. Do you know what an “inertial” force is?
11. Do you know what “base shear” is and what is involved in determining it? Are the individual story weights important to how the shear is distributed per floor?
12. Why is absorbing energy important in seismic design? How can it be accomplished?
13. Are soft stories really “soft”? What is the problem with them and the solutions for fixing them?
14. What are passive damping systems? Aren't they really “active”?
15. Is a continuous structure inherently redundant?
16. What materials/structural systems are good for continuity and energy absorption?
17. For an earthquake, what does the Richter magnitude tell you as opposed to the (Modified Mercalli) intensity level measure?

Lecture 17

1. What is “deforming” in connection design?
2. Do you know what force or moment is transferred by connection type? And then what the subsequent stress is?
3. Can you see the difference between a single shear connector and a double shear connector?
4. What causes longitudinal shear in a bending member? Do you know what Q (first moment area) is determined from?
5. What are the stresses or failure types we have to consider in tension member design?
6. Why is shear stress such a concern in wood connections and how do we resist these stresses with the different types of connectors?
7. Do you know what end shear rupture or block shear rupture is?
8. Do you know the difference between yielding and rupture as limit states in LRFD steel design?
9. Do we have to be concerned about yield (or only shear) with welded connections?
10. Where is the shear failure plane in a weld, and what do we call the short dimension in the plane?
11. Can you identify a common steel connection type from a picture?
12. Have you finally figured out the difference between f_y and f_u ?
13. Can you recognize in the design formulas for support load capacity and interior load capacity on the flanges of a standard wide flange section that they are based on yielding in bearing of the web and not the flanges?!
14. Do you know what kind of stress glue normally is used for?

Lecture 19

1. Do you know the difference between non-engineered timber and engineered timber?
2. What is dimensional stability? Or what are the causes/names for dimensional instability?
3. Do you know what light-framing is? Or what heavy-timber construction is? (Do you know the difference?)
4. Can you identify the difference between a timber shear wall and a timber floor diaphragm?

5. What does “composite construction” mean when related to timber (as opposed to say...reinforced concrete)?
6. Do you know what makes timber strengths go down for a wood species? Or go up (like with respect to load duration...)?
7. Are the “skins” really stressed in stressed-skin elements?
8. Do folded plates of timber need to have the compression edges laterally braced or the tension edges?
9. If lamella is the biological name of the “glue” that holds plant and animal cell walls together, why does it mean a form of construction and not the single layer in a glue-laminated beam?
10. What is a tabulated stress? Why do we apply adjustment factors (multipliers) for ASD?
11. Do we apply load combination factors for deflection calculations?
12. Do we have to worry about P- Δ (delta) for timber columns? Is there an interaction formula?
13. Can you identify the material problems associated with the construction requirements for moisture, insect treatment, crawl spaces and fire stops?
14. Do you recognize what timber systems are common for low spans? What systems are common for intermediate spans? For long spans?
15. Where is the higher grade lumber typically utilized in a glue-lam beam or frame?
16. Do you remember the specific shear stress formula for a rectangular beam section?
17. What is considered too slender for a timber column? Do we ever have to design beam-columns in timber?

Lecture 20 (Case)

1. Can you apply adjustment factors to tabulated strengths?
2. Can you calculate the self weight of a timber beam given density and cross section area?
3. Can you distribute a wind load on a wall to the perpendicular shear walls (using tributary widths)? And calculate overturning?
4. Can you pick a load duration factor off a table or chart based on the most significant load type (seismic, snow, live roof load, etc.)?
5. Can you choose a section based on bending and re-evaluate the section required with the actual self weight included in the loading?
6. Can you calculate shear per unit length of diaphragm dimension to choose a sheathing system?
7. Can you calculate a chord force in a diaphragm?
8. Can you calculate shear per unit length of shear wall transmitted by a diaphragm?
9. Can you use a bolt capacity table knowing if the bolt is in single shear or double shear?