

**ARCH 631. Questions from Remaining Lectures of Final Exam**  
(also see Equations of Exams 1-3)

Lecture 21

1. Why do we need fire suppression or protection for structural steel?
2. Can you describe the difference between a plate girder and a wide flange standard shape?
3. Do you know why stiffeners are used with plate girders?
4. What are the buckling problems and solutions with wide flange shapes?
5. Can you identify from the four end conditions identified for wide flange shapes what the stress or strain design concern is?
6. Can you see the similarity of the distribution of stress over a width in the web of a wide-flange shape from a bearing load and the distribution of the wall above a lintel with arching action?
7. Can you identify the differences between the K, LH, DLH and SLH series of open web joists by loads or lengths in the open web joist tables?
8. Do you know what the design criteria are for open web joists and what the tables report?
9. Do you know how to calculate an equivalent distributed load for an open web joist?
10. Do you have any clue of the ASTM designations or what the difference between A36, A992 or A572 is?
11. Do you know the difference between  $f_y$  and  $f_u$  by now?
12. Do you know what we mean by unbraced length for selection of beam moment capacities and why it is important?
13. Do you know what a plastic hinge is and the stress distribution for a fully stresses section?
14. Do you know what Z is for LRFD bending design of beams?
15. What resists shear stress in wide flange sections?
16. Do you know about calculations for deflection in LRFD?
17. Do you know what a composite steel deck floor is?
18. There are stressed-skin space frames in steel! How are these different or similar to our stressed skin panels in timber?
19. Why are the space frames supported by walls shown as having longer span ranges than the space frames supported by columns?
20. What is the identifier in ASD based on to determine if a column is short, intermediate or slender?
21. Why are the column capacity charts given for effective length with respect to the least radius of gyration ( $r_y$ )?
22. Do you know what “compact” section means with respect to local buckling?
23. Is P- $\Delta$  (delta) a concern in steel column design?
24. Would you be concerned if your steel fabricator supplied A36 steel beams and columns when your documents specified A992?
25. Why is it recommended to shop-weld and field-bolt your frame connections?
26. Do you know what “nominal strength” means by now?
27. Can you trace a load by now?
28. Can you answer the question about ductile material behavior from exam 1?
29. Do you know what stresses are considered in design of column base plates?
30. Why would a plate girder be more suited to being a transfer girder than a standard wide flange shape?
31. Why is steel used extensively for cables rather than other materials?
32. What is the primary difference between a trial section and a final section selection for a beam?

Lecture 23 (Case)

1. Do you know how to use a decking chart with total loads?
2. Do you know how to use a load table for open web steel joists and pick with the total load and live load?
3. Do you know about load combinations and factors?
4. Do you know what internal forces/moments are transferred with a beam shear splice?
5. Do you know what internal forces/moments must be resisted by the bolts and the plate in a beam shear splice?
6. Can you use a beam diagram for moment vs. unbraced length to choose a beam?
7. Do you know what resists beam shear in a wide flange section?
8. Can you use a column load capacity chart and choose a column knowing unbraced length?
9. Can you identify block shear rupture from a picture?
10. Can you calculate the shear capacity for LRFD design?

Lecture 24

1. Can you identify a masonry unit that is solid or has hollow cores?
2. Do you know the composition and function of grout?
3. Do you know the composition, function and types (names) of masonry mortar?
4. Do you know what a masonry prism is and what it is for?
5. Do we need to protect masonry materials from fire?
6. Why do we need to consider the effect of moisture (from weathering) on masonry?
7. Do you know what a virtual eccentricity is?
8. Can there be tensile stresses (allowed) in masonry that is in bending?
9. What is the difference in stresses when the masonry is unreinforced vs. reinforced? What is the differences in flexure? In shear?
10. What is the difference in  $f_s$  and  $f_y$  for reinforced masonry design?
11. How is a concentrated load distributed in a bearing wall?
12. If arching action exists, how is the load above a lintel distributed?
13. What would prevent arching action from happening for a lintel?
14. Why do we usually put the reinforcing in the center of a masonry wall that must resist bending? (think wind loading)
15. Bearing walls can act as shear walls, so how does the compression stress aid the shear resistance?
16. Can you identify the flexure reinforcement and shear reinforcement in a shear wall?
17. What is the intent of requiring a minimum eccentricity for design of a column?
18. What is the purpose(s) of pilasters in masonry walls?
19. Why would we want to protect the fresh mortar when constructing in cold weather?
20. Can you find the maximum shear allowed for a reinforced masonry wall and can you check that it doesn't exceed allowable shear stress in the masonry?
21. Can you calculate the capacity of a reinforced masonry column?

Lecture 25

1. How is soil different from a structural building material?
2. What is the difference between ultimate bearing capacity and allowable bearing capacity (between  $q_u$  and  $q_a$ )?
3. Can soil fail in shear?

4. Can soil rupture or liquefy?
5. Are foundation settlements easy to calculate?
6. Are foundation settlements important to consider for design?
7. Can you properly use the terms for settlement types (vertical vs. tilting vs. distortion)?
8. Is the construction the same for every type of foundation?
9. The design requirements have one more item to consider other than normal strength, serviceability, and economy. What is that?
10. There are two major steps in footing design that are a function of loading/stresses. Identify them (with respect to sizing and structural design)
11. Can you use the right terms for a picture of a footing?
12. Do you know the difference between one-way shear and two-way shear?
13. Do you remember the purpose of development length?
14. Do you know what an eccentrically loaded footing is and what happens to the pressure distribution in the soil?
15. Do you know what the factor of safety against overturning is and how big it should be?
16. Do you know what the factor of safety against sliding is and how big it should be?
17. Do you know the primary reasons for using the different shapes/depths of footings if a spread footing doesn't work?
18. Is there an equivalent of a "drop panel" in a mat foundation?
19. How do we model "flexible" or compactable soils?
20. Do you know the parts and features of retaining walls (with names)?
21. Do you know what common materials are used for what type of footings (typically)?
22. Can you see the statics (balanced forces) for deep foundations?
23. Do you know how friction resists forces?
24. Can you identify the toe and the heel of a retaining wall?

### Lecture 28

1. Do you have to inspect welds in steel construction?
2. Do you have to verify the concrete mix in concrete construction?
3. Do you have to inspect where the grout is going before it is placed in masonry construction?
4. Do you need to protect your wood from weather before construction or during construction?
5. Are there significant historic structures because of their construction or structural systems?

### Repeated Material and Systems Emphasis

1. How is steel typically constructed to resist lateral loads?
2. How is masonry typically constructed to resist lateral loads?
3. How are cable or tent systems designed to reduce effect of wind loading and vibration?
4. Why are moment redistribution important for rigid frames? How does P- $\Delta$  (delta) (with stress combinations, eccentricity, etc.) affect the design of column of rigid frames?
5. Do you know how to design for strength and serviceability?
6. Do you know the primary requirements (including self weight) for beam design?
7. Do you know how to design for flexure (bending) for reinforced concrete (including steel and capacity)?
8. Have you finally associated material properties with stresses and strains and design requirements for reinforced concrete, steel, timber and masonry design?