

4.461 Building Technology I: Materials and Construction Quiz 2

Professor John E. Fernandez

Quiz 1: Covers Chapters 1, 2 and first portion of Chapter 3 (to page 101)

Duration: 1.5 hours

Grading: 100 possible points

Quiz 1 + Quiz2 + Quiz3 + Quiz4 = 50% of total grade

True or False: 10 questions (1 point each)

1. Balloon framing is inherently more fire resistant than platform framing.
2. Timber framing uses metal strapping as the primary lateral resistance system.
3. OSB should never be used as a structural material in engineered lumber.
4. Roof trusses are used widely because of their speed of erection, moment joints and long spans.
5. A pile is driven into the ground as opposed to drilled and poured.
6. A noncurrent, noncoplanar force system is applied to a rigid body in three-dimensional space. Six equations of equilibrium are required to establish translational and rotational equilibrium.
7. A downward vertical force, P , applied directly to a pin joint will result in an upward vertical reaction of $P/2$.
8. In timber construction, tie rods counter lateral thrusts from arches and other sloped members of a rigid frame.
9. In light wood framing construction, a header is used to redirect the vertical forces from the structure above as they encounter an opening.
10. Let-in diagonal bracing is used with nonstructural sheathing to provide lateral resistance to a light wood frame.

Short Answers: 10 questions (2 points each)

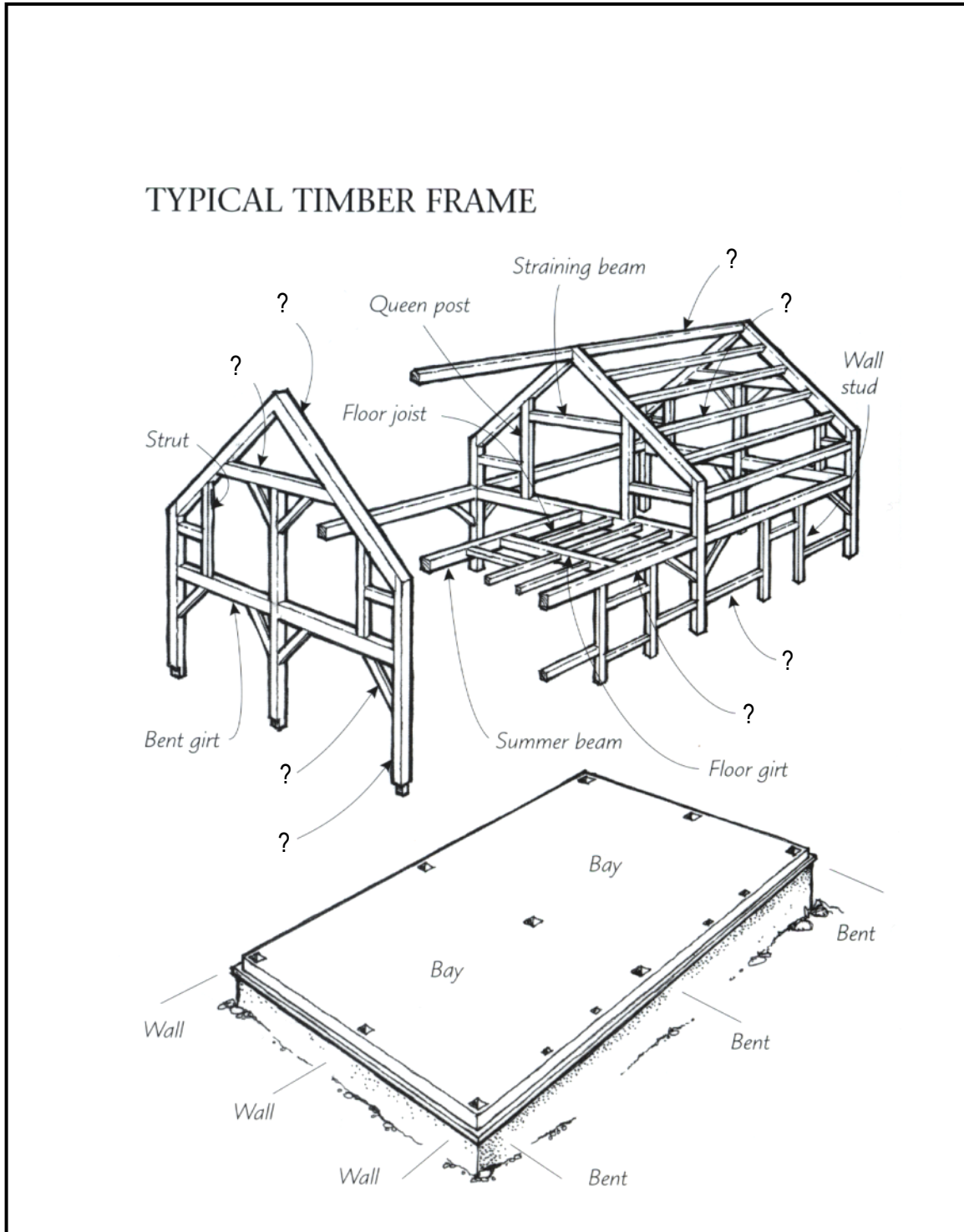
11. What value does redundancy of structure provide in light wood framing construction?
12. Why is timber framing generally costly in comparison to light wood framing?
13. Why is engineered lumber a cost effective alternative to natural lumber for structural members such as joists.
14. In Europe, and increasingly in the US, why is siding applied to wood framing usually in the form of a rainscreen?

15. Why are homasote and regular gypsum board not used as exterior sheathing materials.
16. What is a temperature gradient and how is it affected by the assembly materials of an exterior envelope?
17. What are the two distinct ways for water vapor to be forced to condense?
18. What is the purpose of a radiant barrier and what materials behave most effectively in that role?
19. In light wood framing, a vapor barrier can be achieved using the typical interior materials used to construct interior walls. What materials are used and what is this vapor barrier approach called?
20. Historically, three types of walls have been used to produce a viable barrier system to the elements. What are they, and how did each type satisfy the requirements of a working exterior envelope?

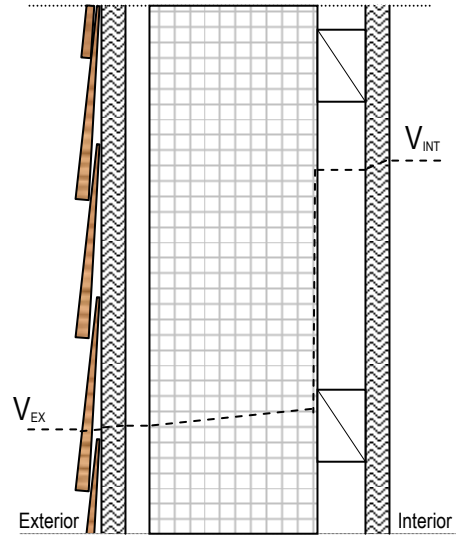
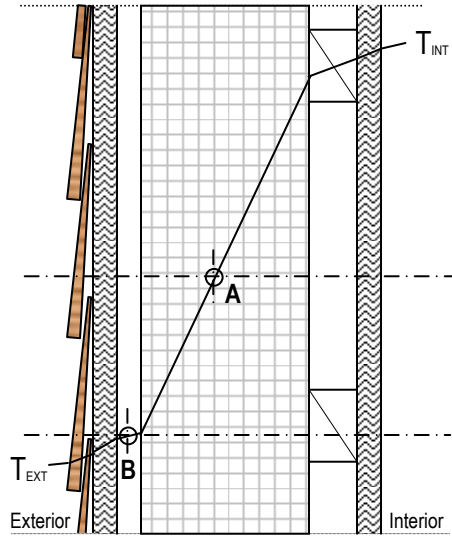
Long Answers: 3 questions (10 points each)

21. In the construction of contemporary buildings, what are the primary issues that form the discourse regarding sustainable wood structures?
22. What are the primary global sources of wood? (from: *Wood Fiber Consumption and the World's Forests*). What are the trends in the global consumption of wood?
23. What are the future trends in the development of wood-based products for construction?

25. Label the components of the timber frame. (10 points)



26. Consider each scenario. (18 points)



A. Describe two distinct ways in which the condensation point can be moved from Point A to Point B.

B. Explain the vapor pressure gradient shown above.

C. Improve the following section.

Vapor barrier
 Air barrier - - - - -
 Radiant barrier - · · - · · -

$T_{EXT} > T_{INT}$

