

BWS  
3.01.05 v4

Topics covered for exam 1 in 560.320

What is the difference between a “code” and a “specification”?

What does LRFD stand for?

What is ASCE-7?

What is the principle advantage of LRFD over safety factor based design?

What role does  $\beta$  play in the LRFD derivation? Which is more conservative a high  $\beta$  or a low  $\beta$ ?

Is  $\beta$  the same for all members and connections designed by the LRFD spec.?

Define the terms in the expression  $\phi R_n > \sum \gamma_i Q_i$

Why are there +/- signs in some of the load combinations?

In a given load combination what is the difference between the load with the largest multiplier ( $\gamma$ ) and the loads with smaller multipliers?

If you had a new load to consider in design, how would you add it into the existing load combinations?

What happens if the load combinations result in both a positive and a negative solution?

Define:  $\epsilon_y$ ,  $\epsilon_{st}$ ,  $\epsilon_u$ ,  $f_y$ ,  $f_u$ ,  $E$ ,  $E_{st}$

For a tension member how do you calculate the capacity for yielding in the gross section?

Is there an upper limit on the slenderness of a tension member? Why not / Why?

For a tension member how do you calculate the capacity for fracture in the net section?

Newer high strength steel's have much lower  $f_u/f_y$  ratios than traditional steels. What impact does the steel's  $f_u/f_y$  ratio have on the required areas and the expected failure mode for a tension member?

If you could pick (in design) between a yielding in the gross failure mode and a fracture in the net failure mode, which would you choose, or should you be indifferent?

Why is  $\phi$  less for fracture in the next section than yielding in the gross section?

In calculating the net area what is the diameter to be used to account for holes?

How do you calculate the net area when the bolt holes are staggered?

What is the difference between effective area and net area?

How do you calculate the effective and net area when two legs of an angle are fastened as a tension member?

How do you calculate the net and effective area of a channel in tension when only the web is fastened to the gusset plate?

Why is  $U$  in the effective area calculations often a number less than 1?

If you know the tensile yield stress ( $f_y$ ) what is the shear yield stress? Using Mohr's circle or equivalent formula, motivate that this answer makes at least approximate sense.

How do you calculate the block shear strength of a connection, what is  $A_{gv}$   $A_{nt}$   $A_{nv}$   $A_{gt}$ ?

For a block shear failure when can you ignore the gusset plate in the calculation?

For a flat plate tension member welded to a gusset plate, can  $U$  be less than 1?

What is the difference between service loads and factored loads?

What is the difference between a simple connection and an eccentric connection?

What role does the number of shear planes play in the shear capacity of a bolt? What is a shear plane?

What is expression for the capacity of a bolt in shear?

What should one assume about the threads of a bolt if no information is given?

What are the minimum spacing and edge requirements for bolts?

How do you calculate the bearing capacity of a bolted connection?

Why is there an upper limit on the bearing capacity of connections?

Which welding process results in a more controlled and refined weld: SMAW (shielded metal arc welding) or SAW (submerged arc welding)?

What is the leg of a fillet weld? the throat? What is the importance of the throat?

What is the capacity of a fillet weld in tension?

Why does one check the weld metal and the base metal when designing welds?

What is the strength of an E70 electrode? When would you use an E80 electrode?

What is the difference between a partial penetration weld and a full penetration weld? Give an example of each weld type.

What effect does the loading direction have on the weld capacity? In which loading "mode" is a weld weakest?

What is the difference between serviceability criteria and strength criteria?

Does changing member A, or I affect the internal forces in a statically determinate structure? What if the structure is statically indeterminate?

What influence does the determinacy of a structure have on the design process?

List all the items you would check to insure a tension members and its connection are adequate.

Why do imperfections decrease the strength of columns?

What effect do residual stresses have on the strength of columns?

Define the two theoretical limiting curves for column strength – how do they relate to the two column curves given in the AISC design method?

How do you prevent local buckling in a hot-rolled member?

What is warping torsion? What is shear center?

What is flexural-torsional buckling?

Can you find it in the AISC-LRFD?

Basis for LRFD?

A for an angle?

$r_y$  for an I-beam?

load combinations?

$f_y$  and  $f_u$  for a given steel?

capacity for yielding in the gross?

capacity for fracture in the net?

area net calculation?

effective area calculation?

block shear calculation?

bolt shear capacity?

spacing?

edge distance?

bearing?

fillet weld capacity?

Deflection of a beam?

origin of column curve?

column capacity?

column effective length?

local buckling b/t limits?

flexural-torsional buckling equations?

Not covered in 2004/2005

Why would one use a slip-critical connection?

What is the shear capacity of a slip-critical connection?

Why is  $K$  for a sidesway uninhibited frame  $>1.0$  and  $K$  for sidesway inhibited frame  $< 1$ ?

What is  $G$ ? what is SRF? How do you calculate  $G$ ?

What tables and charts can be used for the design of a column?

Why/when is  $(KL)_x/(r_x/r_y)$  used in the design of a column?

Why would slenderness  $(KL/r)$  be limited in the design of a column?

Find it...

slip-critical connection capacity?

column design tables?

SRF?