

Name in Arabic :
Number:

Lecture time :

KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
CIVIL ENGINEERING DEPARTMENT

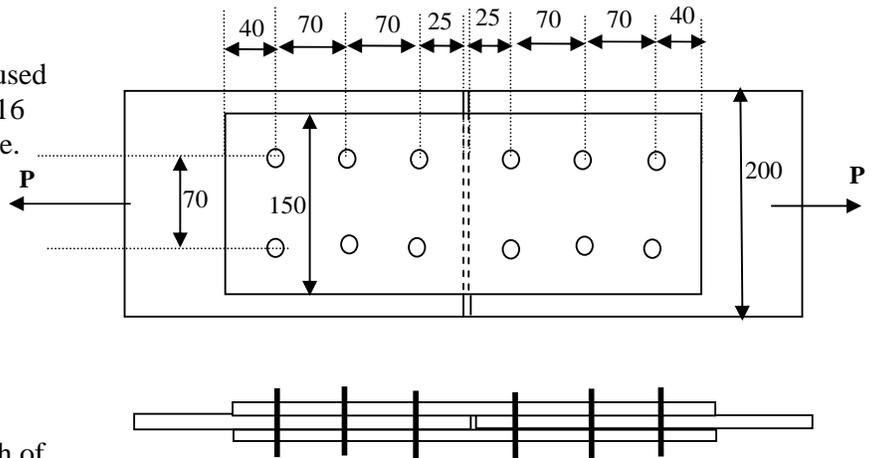
STEEL STRUCTURES : CE 473
FIRST SEMESTER, 1425/1426 H
TIME : 90 min

FIRST MID TERM EXAM

Answer all problems in the provided spaces

Problem 1:

A pair of cover plates of width 150mm is used
To splice 2 plates of 200 x 8mm with 6 M16
bolts A325 on each side as shown in Figure.
(all dimensions in mm)
Diameter of hole = 19mm
For steel , $F_y = 250$ Mpa, $F_u = 400$ Mpa
For bolts : $F_u = 620$ MPa, $F_v = 400$ Mpa



1- Determine the maximum tensile strength of the plates, Consider

a) Yielding at A_g

b) Fracture at A_e

c) Block shear rupture

Maximum Tensile strength of plates =

2- If $P_u = 360$ kN, determine the minimum thickness of the cover plate, Consider:

a) Yielding at A_g

b) Fracture at A_e

c) Bearing failure of cover plates

Minimum thickness of cover plate =

3- If the thickness of cover plates is 6mm and $P_u = 600$ kN, determine the maximum strength of bolts, assume $\mu = 0.50$ and standard holes, Consider:

a) Slip-critical connection

b) Shear failure

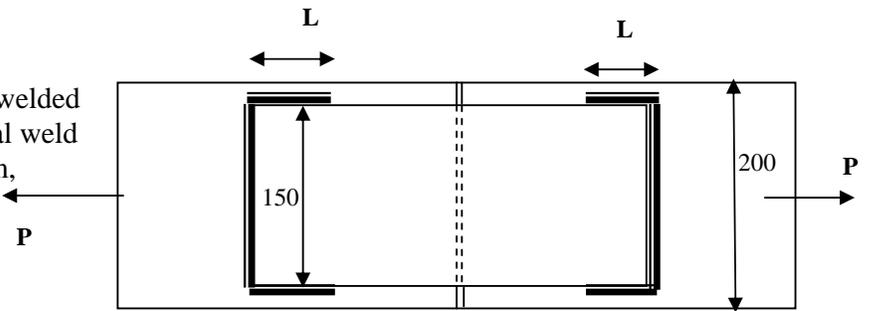
c) Bearing failure of plates

Maximum strength of bolts =

will the bolts be sufficient to resist P_u ? Why?

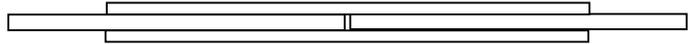
Problem 2 :

If the two cover plates 150x6 mm were welded to the 200 x 8mm plate with a transversal weld of length equal 150mm, and size of 6mm, **on both sides**, as shown in figure, and $P_u = 700$ kN.
For weld : $F_{E70} = 500$ MPa



1- Will the transversal weld only be sufficient to resist the P_u ?

Consider,



a) Failure of transversal weld

b) Tensile fracture of cover plate

Is the transversal weld sufficient ?

2- If the transversal weld is not sufficient to resist the P_u , what would be the required length of longitudinal weld (L) needed for the splice? Consider;

a) Failure of longitudinal weld

b) Shear fracture of cover plate

Required length of longitudinal weld =