Repair and rehabilitation of structures

Homework no.2

For the composite beam and the two loading cases show below, determine the following:

I. Stress in extreme fiber of concrete;
II. Stress in steel rebars;
III. Stress in top fiber of steel beam;
IV. Stress in bottom fiber of steel beam; and
V. Size and number of required shear studs. Also, calculate the ultimate moment for both loading cases.

$f'_c = 4850$ psi (33.4 MPa)

$(F_y)_{rebar} = 60$ ksi (413.7 MPa)

$(F_y)_{beam} = 54$ ksi (372.3 MPa)

$E_c = 3850$ ksi (26.5 GPa)

$E_s = 29000$ ksi (200 GPa)