CEL332 Mazor Exam 1/5/2015

There are two parts of the question, closed book and open book. Once the closed book answer paper is returned, you receive the open book answer paper.

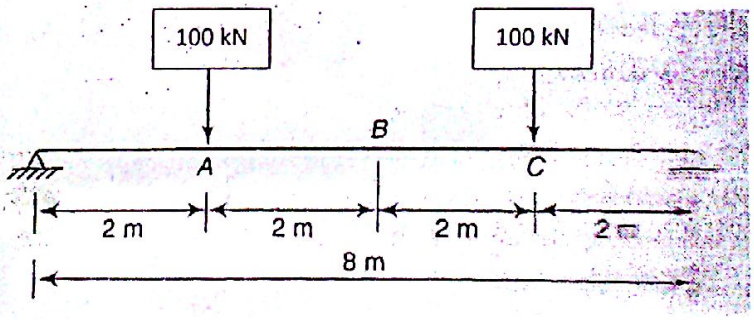
No exchange of material is allowed

Closed book:

1. Explain how to calculate the shear stress across a T section 5
2. Explain the following in proper context, explain the type of beam and terms used in these equations: 8
   a. $M_d = Z_p f_y/1.1 \leq 1.2 Z_e f_y/1.1$ for plastic and compact section,
   b. $M_d = Z_e f_y/1.1$ for class 3 semi-compact section,
   c. $M_d = Z_e f_y'$ for class 4 slender section,
3. Explain Lateral Torsional Buckling of symmetric sections with diagram and equations. Explain relevance of each terms. 8
4. Draw and show the different possibilities of three type stiffeners used in a plated girder bridge. Explain in simple words, the necessity of these stiffeners. 5
5. Draw a simply supported 20 m beam made with plate girder, with horizontal stiffener only at 0.2 D, with web splicing. This beam is connected to two columns, show possible connections. Clear drawing will be appreciated. 4

Open book

6. Design the following beam, with maximum deflection of L/240. Use fy=250 MPa. Check the bearing stress at the support also. 25



7. The design bending moment is 1000kNm including dead weight. Assume a rolled section about that has deficiency of section modulus by about 100 to 120 x 10^4 m^3. Select cover plates for this case. Draw proper diagram. Check the flange and web for relevant checks. 10
8. Design a stiffened seat angle for a reaction of 160 kN from a beam of ISMB 300 using M16 bolts of grade 4.6. The beam has to be connected to ISHB 200 column. Use Fe 410 grade steel with fy = 250 MPa (Q. no 14 page 432). 20
9. Design a bolted splice connection for ISBM 300 section to transfer a factored bending moment of 100 kNm and factored shear force of 60kN. Assume flange splice carried all the moment and web splice carries all the shear. Use M16 bolts. 15