ENGG 202 W2011 Midterm 1 Answers

Version 1

Q1   T=   200 kN   y   120

                                         z   130

$\theta = $ **54.52** degrees

T =   116.1 **i** +   -100.0 **j** +   -128.6 **k**

Q2   0   = A dot C

Q3   C is at   14   14   0

               u_{AB} =   0.6 **i** +   -0.8 **k**

               T   1000 N

$T_{parallel\ AB}$ =   693.1 N

$T_{perp\ AB}$ =   720.9 N

Q4   FBD of B: upward spring force, gravity force, tension upward

              FBD of A: normal force to the right, gravity force, tension up and to the right

Q5   m1   50 kg

           m2   12.5 kg

Q6   MB   -1.75 kN-m

           MC   -4.2 kN-m

           AB   350 mm

           F=   10 kN

           L_{AC}=   447 mm

Q7   TAB =   400 N

         T_{AC} =   190.38 N

         T_{AD} =   196.49 N

         T_{AE} =   105.26 N

Q8   plate is   4 m   by   4 m

              z_E 2 m

              x_E 6 m

              T   75 N

T =(29.55 **i** +   -52.73 **j** +   44.40 **k**) **N**

$u_{AB} \cdot (r_{AE} \times T)$ =   207.3 Nm

M$_{AB}$ = (194.81 **i** +   0.00 **j** +   -70.91 **k**) **N**