The Edward S. Rogers Sr. Department
of Electrical & Computer Engineering
UNIVERSITY OF TORONTO

ECE320H1F: Fields and Waves
Laboratory 3: Design of a Double Stub Matching Network

Marking Scheme

Show your calculations for *all* work, including theoretical diagrams and plots. **Measurement** graphs refer to intrumentation screen captures obtained in the laboratory. **Include the full name, student number and PRA session for all group members on the laboratory report.**

4.2 [1] **Measurement** Smith chart plot of load impedance versus frequency.

[1] **Measurement** Smith chart plot of load impedance versus frequency, de-embedded by 0.2 ns.

[3] Equivalent electrical distance (in wavelengths) at 800 MHz associated with the 0.2 ns port extension. Demonstrate that this additional distance corresponds to the Smith chart transformation seen in the measurement.

4.3 [5] Determination of z_{A} by rotating z_{L} by $d_0 = 3.4$ cm on the Smith chart, and transformation of z_{A} to y_{A} on the Smith chart.

4.4 [20] Design of the double stub matching network for the load provided using a Smith chart. Show the calculated stub lengths $\hat{l}_1$ and $\hat{l}_2$ in terms of wavelengths, and l_1 and l_2 in terms of cm. *Determine all lengths for both fundamental solutions.*

4.5 [3] Experimental determination of the final stub lengths *for both fundamental solutions* to achieve a match between the load and the line.

[2] **Measurement** Smith chart plots of the matched load *for both fundamental solutions.*

4.6 [5] **Measurement** plot of the final VSWR and measurement of bandwidth *for both fundamental solutions.* Relate the VSWR bandwidth criteria to the reflection coefficient and its value in decibels ($20\log|\Gamma|$). Give some reason for the bandwidth limitation.

[5] Discussion of how the measured results compare to the theoretically calculated ones; outline any potential sources of errors.

[5] Presentation and neatness.

[ ] Indicates the number of marks out of **50 total marks**