CME 451 Assignment 1 (Due: January 30, 2017)

Completed assignments must be submitted on the specified due date by 4:30pm in the CME451 assignment box (second floor, across Room 2C94E). Late assignments will not be marked, and will be given a mark of zero.

Marking scheme:

- 30% completion mark
- 70% based on a selected set of problems below

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0. Read chapters 1, 2 and 3 in the textbook (Iniewski *et al*, 2008).

1. As a transmission medium, what are the PROs and CONs with air?

2. What network topology should be used with air transmissions? Explain your answer.

3. What is the IEEE? Using an Internet connection on campus (or via VPN), you can access articles from the digital library IEEEXplore (http://ieeexplore.ieee.org). Locate and read the article "Fiber-Optic Communications" from the IEEE Signal Processing Magazine, July 2011. List 4 other journals or magazines from the IEEE that are relevant to this course.

4. Explain why the fiber core is doped, and list possible dopants (Hint: see article in Problem 3).

5. Describe the two main processes leading to chromatic dispersion (Hint: see article in Problem 3).

6. What factors determine whether a fiber is SMF or MMF?

7. What are the two main light sources for fiber optic systems? Under what conditions do they exhibit similar behavior?

8. Explain the type of bias needed in: (a) optical source; (b) optical detector.

9. Without suitable optical amplification, how much loss should be expected with an optical link between Saskatoon and Vancouver? What type of optical modulation should be used in this case?

10. Why are dispersive effects a problem in communication networks?

11. Compute the power density in a typical SMF fiber, and explain whether this is a problem in transmission.