Q. 6 (a) Cellular service provider decides to use a digital TDMA scheme which can tolerate a signal-to-interference ratio of 15 dB in the worst case. Find the optimal value of N for (i) omni-directional antennas, (ii) 120^0 sectoring, and (iii) $60°$ sectoring. Assume that there are 6 co-channels cells in the first tier for omni-directional antenna, and all of them are at the same distance from the mobile. Given a path loss exponent $n = 4$.

Hint: Sectoring reduces the number of interferer cells. For eg., for 120^0 sectoring, the number of interferers in the first tier reduced from 6 to 2. **(4 marks)**

(b) Write time domain and frequency domain equations for the single toned SSB-USB modulated signal. Plot the spectrum as well. **(2 marks)**

(c) Write a short note on VSB. What is the practical use of VSB signal. **(2 marks)**
