## *KFUPM - COMPUTER ENGINEERING DEPARTMENT* COE-543 – Mobile Computing and Wireless Networks Student Name:

## Student Number:

## **<u>1) (10 points)</u>** Capacity expansion techniques.

AMPS is a cellular system is that requires 18 dB SIR to utilize 30 kHz channels. However, it is possible to utilize 15 kHz channels but the SIR requirement increases to 24 dB. Assume that band splitting is employed as explained in Example 5.13 of textbook page 248 or class notes slide 38. However, it is required to have the frequency reuse factor N1 (for the underlay cells) to be 7 while the frequency reuse factor N2 (for the overlay cells) to be 3. Assume a path loss exponent equal to 4.

a) Determine the capacity increase relative to a conventional network using frequency reuse of 7.

b) It is possible to extend the concept of band splitting and utilize channels of bandwidth equal to 7.5 kHz by implementing another level of overlay cells. However, designers must weigh the capacity increase against the drawbacks of multi-overlay approach. Explore the drawbacks of the multi-overlay approach.