**SRM Institute of Science and Technology**

**College of Engineering and Technology**

**Department of Electronics and Communication Engineering**

**Assignment II**

**18ECC301T - Wireless Communications**

**Year & Sem: IV/VII Max. Marks: 50**

Part - 1

1. If the received power at reference distance d0=1 km is equal to 1 microwatt, find the received powers at distances of 2 km, 5 km, 10 km and 20 km from the same transmitter for the following path loss models:

(a) Free space; (4)

(b) two ray ground reflection using the exact expression; (4)

(c) Extended Hata model for a large city environment. (4)

Assume f=1800 MHz, ht =3 m, Gt =Gr =0dB.

1. If a base station transmitter radiates an EIRP of 0.5 kW at a carrier frequency of 1800 MHz, what will be the power at the receiver (in mW) for d = 30 km, hte = 90 m, hre = 5 m and G = 0.9 in an urban environment using Okumara Model. (4)
2. Explain the three different wave propagation mechanisms that affects the propagation of EM waves in detail. (9)

Part - 2

1. Draw a block diagram of binary spread spectrum sliding correlator multipath measurement system. Explain in words how it is used to measure power delay profiles.

(4)

1. If the transmitter chip period is 10 ns, the PN sequence has length 1023, and a 6 GHz carrier is used at the transmitter, find the time between maximal correlation and the slide factor if the receiver uses a PN sequence clock that is 30 KHz slower than transmitter. (2)
2. If an oscilloscope is used to display one complete cycle of the PN sequence (that is if two successive maximal correlation peaks are to be displayed on the oscilloscope), and if 10 divisions are provided on the oscilloscope time axis, what is the most appropriate sweep setting (in seconds/division) to be used? (2)
3. What is the required IF passband bandwidth for this system? How is this much better than a direct pulse system with similar time resolution? (3)
4. Please give a brief explanation as to why small-scale fading occur in wireless systems. Explain the fading effects due to multipath time delay spread and doppler spread. Bring out the significance and differences on its types. (10)
5. Consider two different wireless systems ***a*** and ***b***. For ***a***, the signal bandwidth of the system is much smaller than the coherence bandwidth of the channel. Conversely, ***b*** employs a signal bandwidth that is much larger than the coherence bandwidth of the channel. Which system (***a*** or ***b***) is best suited for employing frequency diversity techniques? Motivate your answer. (4)