SRM Institute of Science and Technology

College of Engineering and Technology

DEPARTMENT OF ECE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2023-2024

Assignment II

18ECC301T - Wireless Communications

Year & Sem: IV/VII **Submission Deadline:** 04.10.2023 **Max. Marks:** 50

---

1. Calculate the length of an antenna which is operating at a frequency of 900 MHz and having a gain of 2.55. Assume the antenna to be a monopole radiator. For the same antenna, calculate the effective aperture area. If this antenna is used to transmit the data in a wireless system, assuming the wave exhibited by the antenna impinges on a surface with dielectric constant 10. What is the Brewster angle for the same? (5)
2. If a 50 W power is transmitted by a unity gain antenna with a 900 MHz carrier frequency, find the received power in dBm at a free space distance of 100m from the antenna. Also calculate the power received at 10 km for the aforementioned Tx-Rx wireless system. (5)
3. 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. (5)
4. Assume the speed of an aircraft (which is moving towards the airport control tower with an elevation angle of 25^0) to be 500 km/hr. What is the expected doppler shift of the received signal if the communication between the aircraft and control tower operations are at 128MHz? Also determine the coherence time using the maximum Doppler shift. (5)
5. Give suitable expressions to represent free space propagation and two-ray

ground reflection models. (4)

6. Discuss the Okumara and Hata outdoor propagation models in brief. (8)
7. Brief about the direct pulse and frequency domain channel sounding techniques with neat diagrams. (8)
8. List various factors influencing small scale fading. (2)
9. Differentiate the fading types based on Multipath Delay Spread and Doppler Spread. Also draw neat schematic diagram to depict the different types of small scale fading. (4)
10. What is the significance of Rayleigh fading distribution and how is it related to Ricean distribution? (4)

****