SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Coimbatore-35

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

19ECT311- WIRELESS COMMUNICATION

Two Marks Questions and Answers

UNIT II- MOBILE RADIO PROPAGATION

1. What are the propagation mechanisms of EM waves?

The four propagation mechanisms of EM waves are

i. Free space propagation

ii. Reflection

iii. Diffraction

iv. Scattering

2. What is the significance of propagation model?

The major significance of propagation model are:

i. Propagation model predicts the power received at receiver.

ii. It predicts the average received signal strength at a given distance from the transmitter.

3. What do you mean by small scale fading?

Rapid fluctuations of the amplitude, phase as multipath delays of a radio signal over a short period of time is called small scale fading.

4. What are the factors influencing small scale fading?

The factors which influence small scale fading are:

Multipath propagation, Speed of the mobile, Speed of surrounding objects and the transmission bandwidth of the signal.

5. When does large scale propagation occur?

Large scale propagation occurs due to general terrain , density and height of the buildings and vegetation.

6. Differentiate the propagation effects with mobile radio.

Slow Fading	**Fast Fading**
Slow variations in the signal strength.	Rapid variations in the signal strength.
Mobile station (MS) moves slowly.	Local objects reflect the signal causes fast fading.
It occurs when the large reflectors and diffracting objects along the transmission paths are distant from the terminal. Eg. Rayleigh fading, Rician fading and Doppler shift	It occurs when the user terminal (MS) moves for short distances.

7. Define Doppler shift.

If the receiver is moving towards the source, then the zero crossings of the signal appear faster and the received frequency is higher.The opposite effect occurs if the receiver is moving away from the source. The resulting chance in frequency is known as the Doppler shift (fD).

$$F_D = f_r - f_0 = -f_0 V/C$$

Where f_0 -> transmission frequency

f_r -> received frequency

8. Differentiate time selective and frequency selective channel.

The gain and the signal strength of the received signal are time varying means then the channel is described as time selective channel. The frequency response of the time selective channel is constant so that frequency flat channel. The channel is time invariant but the impulse response of the channel show a frequency-dependent response so called frequency selective channel.

9. Define coherence time and coherence bandwidth.

Coherence time is the maximum duration for which the channel can be assumed to be approximately constant. It is the time separation of the two time domain samples.

Coherence bandwidth is the frequency separation of the two frequency domain samples.

10. What is free space propagation model?

The free space propagation model is used to predict received signal strength, when unobstructed line-of-sight path between transmitter & receiver. Friis free space equation is given by,

$$P_{RX}(d) = P_{TX}G_{TX}G_{RX}\left(\frac{\lambda}{4\pi d}\right)^2$$

The factor $(\lambda/4\pi d)^2$ is also known as the free space loss factor.

11. Define EIRP.

EIRP (Effective Isotropic Radiated Power) is the product of transmitter power and antenna gain in a given direction relative to an isotropic antenna.

$EIRP=P_tG_t$

Where P_t -transmitted power in W

G_t -transmitting antenna gain

12. Explain path loss.

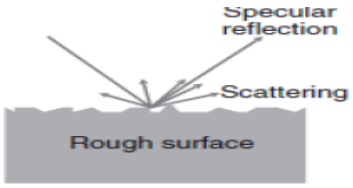
The path loss is defined as the difference (in dB) between the effective transmitted power and the received power. Path loss may or may not include the effect of the antenna gains.

13. What is intrinsic impedance and Brewster angle?

Intrinsic impedance is defined by the ratio of electric to magnetic field for a uniform plane wave in the particular medium.

Brewster angle is the angle at which no reflection occurs in the origin. Brewster angle is denoted by θB as shown below,

14. What is scattering?



When a radio wave impinges on a rough surface, the reflected energy is spread out in all directions due to scattering.

15. Define radar cross section.

Radar Cross Section of a scattering object is defined as the ratio of the power density of the signal scattered in the direction of the receiver to the power density of the radio wave incident upon the scattering object & has units of squares meters.

16. Name some of the outdoor propagation models?

Some of the commonly used outdoor propagation models are

i. Longely-Rice model

ii. Durkin's model

iii. Okumura model.

17. Define indoor propagation models.

The indoor propagation models are used to characterizing radio propagation inside the buildings. The distances covered are much smaller, and the variability of the environment is much greater for smaller range of Transmitter and receiver separation distances. Features such as lay-out of the building, the construction materials, and the building type strongly influence the propagation within the building.

18. Mention some indoor propagation models?

Some of the indoor propagation models are:

i. Long –distance path loss model

ii. Eriksson multiple break point model

iii. Attenuation factor model.

19.What is the necessity of link budget?

The necessities of link budget are:

i. A link budget is the clearest and most intuitive way of computing the required Transmitter power. It tabulates all equations that connect the Transmitter power to the received SNR.
ii. It is reliable for communications.

iii. It is used to ensure the sufficient receiver power is available.

iv. To meet the SNR requirement link budget is calculated.