

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems.

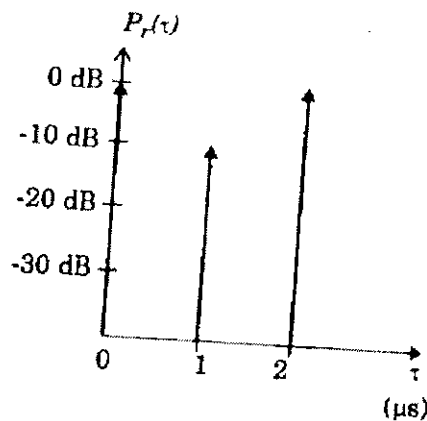
Q1. a) What is multipath fading and factors affecting the multipath fading? [2][CO-1]

b) Define coherence time and coherence bandwidth. Determine the proper spatial sampling interval required to make small-scale propagation measurements which assume that consecutive samples are highly correlated in time. How many samples will be required over 10m travel distance if $f_c = 1900$ MHz and $v = 50$ m/s. How long would it take to make these measurements, assuming they could be made in real time from a moving vehicle? What is the Doppler spread B_D for the channel? [1+4][CO3]

Q2 a) Provide the expression for the base band impulse response of multi path channel along with its parameters description. [1][CO-3]

b) A local spatial average of a power delay profile is shown in Figure below:

[1+1+1.5+1.5][CO-6]



- Determine the rms delay spread and mean excess delay for the channel.
- Determine the maximum excess delay (20 dB).
- If a mobile traveling at 30 km/hr receives a signal through the channel, determine the time over which the channel appears stationary (or at least highly correlated).
- If the channel is to be used with a modulation that requires an equalizer whenever the symbol duration T is less than $10\sigma_\tau$, determine the maximum RF symbol rate that can be supported without requiring an equalizer.

Q3. a) Categorize different types of small-scale fading in terms of time delay spread and Doppler spread. [3][CO-3]

b) Differentiate between circuit switching and packet switching with examples. An upper-layer packet is split into 10 frames, each of which has an 80% chance of arriving undamaged. If no error control is done by the data link protocol, how many times must the message be sent on average to get the entire thing through? [1.5+1.5][CO-4]

Q4. a) What is the role of OSI model? Provide the functioning of different layers of OSI model. [3][CO-2]

b) Provide the transmitted codeword using CRC method for 1001 data word and 1011 generator. How the error detection is possible with CRC? [3][CO-2]