(145)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2026

B.Tech-VII Semester (ECE/Minor ECE)

COURSE CODE (CREDITS):18B11EC611(3) MAX. MARKS: 25

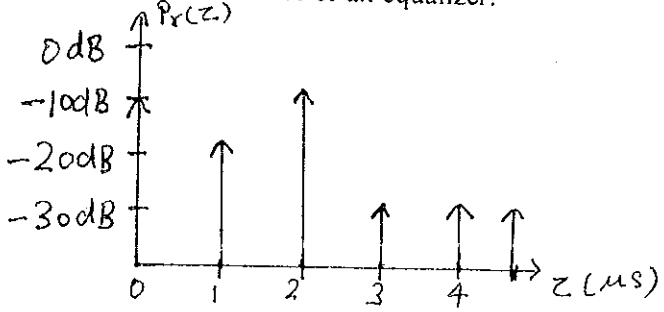
COURSE NAME: Wireless and Data Communication

COURSE INSTRUCTOR: Dr. Shweta Pandit MAX. TIME: 1.5 Hours

Note: *(a) All questions are compulsory.*

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

(c) Use of calculators is allowed

Q.No	Question	CO	Marks
Q1.	Categorize various types of small scale fading in terms of time dispersive and frequency dispersive parameters. Represent diagrammatically the transmitted signal behavior at the receiver when passed through these various types of fading channels.	1	[5]
Q2.	**a)** For a channel with Doppler spread B_d= 80 Hz, what time separation is required in samples of the received signal such that the samples are approximately independent. **b)** Differentiate among Rayleigh and Rician fading channels. **c)** Give the mathematical formulation of capacity of AWGN and flat fading channels with known CSI and average SNR γ.	3	[1] [2] [2]
Q3.	**a)** Define channel impulse response. Give mathematical formulation of multipath channel impulse response detailing each of the components involved. **b)** Calculate the mean excess delay and rms delay spread for the multipath profile given in the figure below. Estimate the 90% coherence bandwidth of the channel. Would this channel be suitable for AMPS or GSM service without the use of an equalizer? 	3	[2] [3]
Q4.	**a)** Consider a cellular system designed so that $P_{min} = \bar{P}_r(R)$, i.e. the received power due to path loss and average shadowing at the cell boundary equals the minimum received power required for acceptable performance. Find the coverage area for path loss values γ= 4, 6 and $\sigma_{\psi dB}$=8, 12 and comment on its results.	3	[2] [3]

	b) Given two wireless systems with outage probabilities of 0.01 and 0.15, identify which system provides better reliability and justify your choice. Find the outage probability at 150 m for a channel based on the combined path loss and shadowing models for K= -31.54dB, γ=3.71, $\sigma^2_{\psi dB}$= 13.29 assuming a transmit power of P_t= 10 mW and minimum power requirement P_{min}= −110. 5 dBm.		
Q5.	Clearly outline the role of each of the layers of OSI model and specify the protocols used in each layer.	2	[5]