

Question Paper Code: 56401A

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2021

Sixth Semester

Electronics and Communication Engineering

15UEC601-WIRELESS COMMUNICATION SYSTEMS
(Regulation 2015)

Duration: 1:45hrs

Maximum: 50 Marks

PART A 10X2 =20 Marks

Answer any ten of the following questions

- 1 Higher the number of cells in a cluster, lesser will be the co-channel Interference. Justify this with proper relations. (CO1 - Understand)
- 2 If a total of 33MHz of bandwidth is allocated to a particular FFD cellular telephone system which uses two 25kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses (a) four cell reuse (b) seven cell reuse (c) Twelve cell reuse. (CO1 - Apply)
- 3 Show that for a particular coverage area, a decrease in cluster size results in an increase in the cellular system capacity. (CO1 - Understand)
- 4 Calculate the Brewster angle θ_B for a wave impinging on poor ground having a permittivity $\epsilon_r=4$ at the frequency of 100 MHz. Also calculate the same for typical ground with permittivity of $\epsilon_r=15$. (CO2 - Apply)
- 5 Compare Coherence time and coherence bandwidth with necessary equations (CO2 - Understand)
- 6 Differentiate flat fading and frequency selective fading. (CO2 - Understand)
- 7 Assume that $\theta_0=0^\circ$. The bit stream 0 0 1 0 1 1 is to be sent using $\pi/4$ DQPSK. The leftmost bits are first applied to the transmitter. Determine the phase of θ_k , and the values of I_k, Q_k during transmission (CO3 - Apply)
- 8 How MSK is advantageous over QPSK? (CO3 - Understand)
- 9 How the effects of multi- fading affect the overall system performance of wireless communication? (CO3 - Understand)
- 10 Compare linear equalizers and nonlinear equalizers(CO4 – Understand)

- 11 Why LMS algorithm have more preference over other algorithms in wireless system?(CO4 – Understand)
- 12 Differentiate Microdiversity and Macrodiversity. (CO4 – Understand)
- 13 Consider Global System for Mobile, which is a TDMA/FDD system that uses 25 MHz for the forward link, which is broken into radio channels of 200 kHz. If 8 speech channels are supported on a single radio channel, and if no guard band is assumed, find the number of simultaneous users that can be accommodated in GSM.(CO5 – Apply)
- 14 How the CDMA technique is superior over FDMA? (CO5 – Understand)
- 15 Compare and Contrast 2G and 3G Cellular networks. (CO5 – Understand)

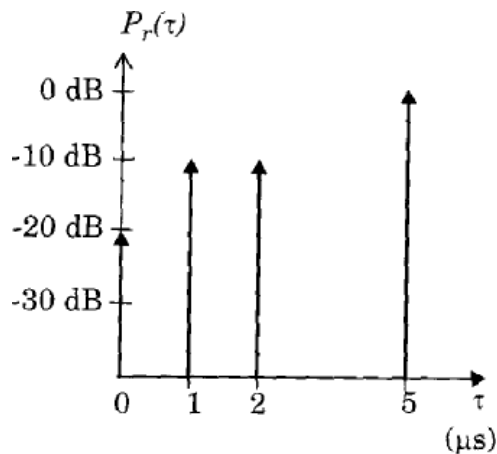
PART B

3X10 =30 Marks

Answer any three of the following questions

- 16 For given path loss exponent a) $n=4$ and b) $n=3$, Find the frequency reuse factor and the cluster size that should be used for maximum capacity. The signal to Interference ratio of 15 db is minimum required for satisfactory forward channel performance of a cellular system. There are six co-channel cells in the first tier and all of them are at the same distance from the mobile. Use suitable approximations (CO1) (Apply) 10

- 17 Calculate the mean excess delay, rms delay spread and the maximum excess delay (10dB) for the multipath profile given in the figure below. Estimate the 50% coherence BW of the channel. Would this channel be suitable for GSM service without the use of an Equalizer? (CO2) (Apply)



- 18 Derive the probability of error expressions for DPSK and noncoherent orthogonal binary FSK in a slow flat-fading channel, where the received signal envelope has a Rician probability distribution. Compare the results. (CO3) (Analyze) 10

- 19 Consider the design of the U.S Digital Cellular Equalizer. If the carrier frequency is 900MHz and the maximum Doppler shift is 66.67Hz.
1. Calculate the maximum mobile velocity for the given Doppler shift.
 2. Calculate the Coherence time of the Channel.
 3. Find the Doppler spread.
 3. Assuming that the symbol rate is 24.3ksymbols/sec, calculate the maximum number of symbols that can be transmitted without updating the equalizer. 10
 4. Assuming that there are 5 delay elements in an equalizer and there are 10 μ s delay in each, calculate the maximum number of taps.
 5. Calculate the maximum multipath delay spread that could be equalized.
- (CO4) (Apply)
- 20 Explain the architecture and interfaces of GSM in detail. (CO5) (Understand) 10