

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Sixth Semester

**Electronics and Communication Engineering
20ECPC603 - WIRELESS COMMUNICATION**

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. The Two-Ray ground reflection model is more accurate for (a) Short distances (b) Large distances and line-of-sight links (c) Urban microcells (d) Indoor propagation	1	K1	CO1
2. Slow fading is mainly due to (a) Multipath propagation (b) Shadowing (c) Doppler shift (d) High mobility	1	K1	CO1
3. In FDMA, the guard band is used to (a) Increase data rate (b) Reduce interference between adjacent channels (c) Increase number of users (d) Decrease noise power	1	K1	CO2
4. The capacity of a CDMA system depends on (a) Processing gain and Eb/No (b) Symbol rate only (c) Time slot length (d) Channel spacing	1	K1	CO2
5. Dynamic channel assignment improves capacity by (a) Reusing frequencies randomly (b) Allocating channels based on traffic demand (c) Increasing transmit power (d) Reducing reuse distance	1	K1	CO3
6. In a cellular system, capacity is inversely proportional to (a) Cluster size (b) Channel bandwidth (c) Reuse distance (d) Frequency reuse factor	1	K1	CO3
7. The main advantage of OQPSK over standard QPSK is (a) Better bandwidth efficiency (b) Constant envelope (c) Higher data rate (d) Easier synchronization	1	K1	CO4
8. The windowing technique in OFDM is used to (a) Reduce spectral leakage (b) Increase symbol rate (c) Increase noise (d) Reduce orthogonality	1	K1	CO4
9. Which of the following is a nonlinear equalizer? (a) Zero Forcing equalizer (b) MMSE equalizer (c) Decision Feedback Equalizer (d) LMS equalizer	1	K1	CO5
10. Transmit diversity techniques like Alamouti scheme require (a) One antenna (b) Two transmit antennas and one receive antenna (c) Two receive antennas (d) Multiple users	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. Define Link Budget and its components.	2	K1	CO1
12. What are the effects of Doppler spread on signal performance?	2	K1	CO1
13. Define processing gain in CDMA.	2	K1	CO2
14. What are the main interference sources in CDMA systems?	2	K2	CO2
15. What is frequency reuse?	2	K1	CO3
16. How the adjacent channel interference can be mitigated?	2	K1	CO3
17. Define error performance in fading channels.	2	K1	CO4
18. Why is high PAPR undesirable in OFDM systems?	2	K1	CO4
19. Write the drawback of ZF equalizer.	2	K1	CO5

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| 20. Differentiate between micro and macro diversity. | 2 | K2 | CO5 |
| 21. List the types of diversity techniques in MIMO. | 2 | K1 | CO6 |
| 22. How does CSI affect system performance? | 2 | K1 | CO6 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

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| 23. a) Explain in detail the Free Space Propagation Model and derive the expression for received power. | 11 | K2 | CO1 |
| OR | | | |
| b) Explain the time dispersion parameters of multipath channels. Derive relationships between delay spread, coherence bandwidth, and coherence time. | 11 | K2 | CO1 |
| 24. a) Differentiate FDMA, TDMA, and CDMA in terms of bandwidth efficiency, synchronization, interference, and implementation complexity. | 11 | K2 | CO2 |
| OR | | | |
| b) Discuss how system capacity is affected by bandwidth, SNR, and spreading factor in multiple access systems. | 11 | K2 | CO2 |
| 25. a) Describe the concept of Handoff and explain how to prioritize handoff mechanisms with diagrams. | 11 | K2 | CO3 |
| OR | | | |
| b) Explain the concept of Trunking and Grade of Service. Derive the Erlang B formula and explain its use in capacity planning. | 11 | K2 | CO3 |
| 26. a) Explain the working of GMSK modulation scheme. Explain its spectral characteristics and advantages in mobile communication. | 11 | K2 | CO4 |
| OR | | | |
| b) Describe the principle of OFDM with block diagram and explain how orthogonality is maintained. | 11 | K2 | CO4 |
| 27. a) Explain adaptive equalization using LMS algorithm. Derive the weight update equation. | 11 | K2 | CO5 |
| OR | | | |
| b) Explain the working principle of a Rake receiver and its role in CDMA systems. | 11 | K2 | CO5 |
| 28. a) Construct a spatial multiplexing MIMO systems with suitable assumptions and channel schemes. | 11 | K3 | CO6 |
| OR | | | |
| b) Derive the capacity of MIMO channels under fading and non-fading conditions. | 11 | K3 | CO6 |