



**M.E DEGREE EXAMINATIONS: APRIL / MAY 2023**

(Regulation 2018)

Second Semester

**COMMUNICATION SYSTEMS**

P18COI2203: Wireless Communication Systems

**COURSE OUTCOMES**

- CO1:** Apply and analyze wireless channel models.
- CO2:** Analyze the performance of digital modulation schemes and diversity techniques over fading channel.
- CO3:** Design and operate Multi Carrier and Multiuser communication techniques.
- CO4:** Classify MIMO communication techniques.
- CO5:** Explain Massive MIMO concepts.

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

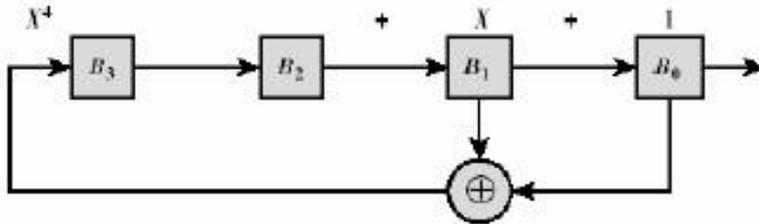
1. Identify the large-scale fading from the choices given CO1 [K<sub>2</sub>]
  - a) Flat fading b) Shadowing
  - c) Doppler spread d) Frequency selective fading
2. Which of the following is not a multipath channel parameter that can be determined from the power delay profile? CO1 [K<sub>2</sub>]
  - a) RMS delay spread b) Doppler spread
  - c) Mean excess delay d) Excess delay spread
3. Match the modulation techniques with their features. CO2 [K<sub>2</sub>]

List I	List II
A. BPSK	i. Non-Coherent detection
B. BFSK	ii. Quadrature Carriers
C. QPSK	iii. Antipodal signals

- a) A-i, B-iii, C-ii b) A-i, B-ii, C-iii
- c) A-iii, B-ii, C-i d) A-iii, B-i, C-ii

4. Space diversity is also known as \_\_\_\_\_ CO2 [K<sub>2</sub>]
- a) Frequency diversity b) Polarization diversity  
 c) Antenna diversity d) Time diversity

5. Determine the PN sequence generated by the circuit given below with the starting state 1000. CO3 [K<sub>2</sub>]



- a) 101000101011001 b) 010111000111010  
 c) 000111010011100 d) 000100110101111
6. The correct sequence of signal processing steps in OFDM receiver is. CO3 [K<sub>2</sub>]
- a) FFT  
 b) Remove the Cyclic prefix.  
 c) Demodulation  
 d) Parallel to serial converter

- a) b-a-c-d b) d-a-c-b  
 c) b-d-a-c d) c-d-a-b

7. What is the maximum number of resolvable channels in a 4X8 MIMO? CO4 [K<sub>2</sub>]
- a) 4 b) 2  
 c) 8 d) 3

8. Identify the MIMO technique, which gives maximum throughput from the choices given CO4 [K<sub>2</sub>]
- a) Space-Time Trellis Codes b) Space-Time Block Codes  
 c) Spatial Multiplexing d) Spatial Modulation

9. Assertion (A): Massive MIMO has high Spectral efficiency and increased capacity. CO5 [K<sub>2</sub>]  
 Reason (R): The Number of antennas in MIMO is directly proportional to the number of resolvable multipath components.

- a) both A and R are individually true and R is the correct explanation of A b) both A and R are individually true but R is not the correct explanation of A  
 c) A is false but R is true. d) A is true but R is false



**Answer any FOUR Questions**

**PART D (4 x 10 = 40 Marks)**

27. Define slow frequency selective fading channel and derive the channel capacity for the same when the channel is time-invariant. CO1 [K<sub>2</sub>]
28. Describe receiver diversity and contrast the maximum ratio and equal gain combining. CO2 [K<sub>3</sub>]
29. Explain in detail about Orthogonal Frequency Division Multiplexing technique using necessary illustrations. CO3 [K<sub>2</sub>]
30. What is space-time coding? Compare the Space-Time Block Codes and Space-Time Trellis Codes. Demonstrate Space Time Block Coding technique. CO4 [K<sub>3</sub>]
31. Explain the advantages and implementation challenges in Massive MIMO. CO5 [K<sub>3</sub>]

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