

[illegible]

B.Tech DEGREE EXAMINATION, MAY 2024

Seventh Semester

18ECE314T - WIRELESS COMMUNICATION NETWORKS

(For the candidates admitted during the academic year 2018-2019 to 2021-2022)

Note:

- i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
- ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours

Max. Marks: 100

PART - A (20 × 1 = 20 Marks)

Answer all Questions

PART - A (20 × 1 = 20 Marks)		Marks	BL	CO
Answer all Questions				
1.	What is the condition for intersystem interference? (A) Mobile moves from one cell to another cell (C) Mobile moving from one cellular system to another cellular system	1	1	1
	(B) Mobile remains in the same cell (D) Mobile remains in the same cluster			
2.	Which type of transmission technique is employed by paging system? (A) Simulcasting (C) Unicasting	1	1	1
	(B) Multicasting (D) Hybrid			
3.	What is the common shape of the cell present in the cellular system? (A) Circular (C) Hexagonal	1	2	1
	(B) Square (D) Triangular			
4.	The interference between the neighbouring base stations is avoided by (A) Assigning different group of channels (C) Using different antennas	1	2	1
	(B) Using transmitters with different power level (D) Using different base stations			
5.	The major disadvantage with the Okumura model is _____ (A) Less accuracy (C) Complexity model	1	2	2
	(B) Not practical (D) Slow response			
6.	Hata model is applicable and valid for frequencies in the range of _____ (A) 150MHz-1920MHz (C) 150MHz-1500MHz	1	3	2
	(B) 150KHz-1500KHz (D) 1800KHz-2300KHz			
7.	The probability that the received power at a given distance falls below a target minimum received power level is called _____ (A) Empirical Probability (C) Error Probability	1	1	2
	(B) Posteriori Probability (D) Outage Probability			
8.	Name the model that is well suited for large cell mobile systems, but not for personal communications. (A) Okumura Model (C) Walfish and Bertoni Model	1	2	2
	(B) Hata Model (D) Ericsson Multiple Breakpoint Model			
9.	Discretization of multipath delay axis of impulse response into equal time delay segments is called _____ (A) Delay bins (C) Excess delay bins	1	2	3
	(B) Discrete bins (D) Digital bins			

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|---|---|---|---|
| 10. Which of the following is not a statistical model for multipath fading channels? | 1 | 2 | 3 |
| (A) Clarke's model for flat fading | | | |
| (B) Saleh and Valenzuela indoor statistical model | | | |
| (C) Two ray Rayleigh fading model | | | |
| (D) Faraday model | | | |
| 11. Which is used to obtain time diversity in a digital communications system without adding any overhead? | 1 | 2 | 3 |
| (A) Rake receiver | | | |
| (B) Interleaving | | | |
| (C) Search window | | | |
| (D) Diversity reception | | | |
| 12. The Okumura model is applicable for distances of _____ | 1 | 3 | 3 |
| (A) 1 m to 10 m | | | |
| (B) 1 km to 100 km | | | |
| (C) 100 km to 1000 km | | | |
| (D) 10 km to 10000 km | | | |
| 13. _____ is performed after the data scrambling on forward link in forward CDMA channel. | 1 | 1 | 4 |
| (A) Interleaving | | | |
| (B) Quadrature modulation | | | |
| (C) Orthogonal covering | | | |
| (D) Burst formatting | | | |
| 14. Diversity employs a decision making at _____ | 1 | 1 | 4 |
| (A) Transmitter | | | |
| (B) Receiver | | | |
| (C) Channel | | | |
| (D) Decision | | | |
| 15. Interleaving does the following | 1 | 1 | 4 |
| (A) Forward error correction | | | |
| (B) Backward error correction | | | |
| (C) Linear estimation | | | |
| (D) Correlation | | | |
| 16. The envelope of a sinusoid plus bandpass noise has _____ distribution. | 1 | 1 | 4 |
| (A) Uniform | | | |
| (B) Rayleigh | | | |
| (C) Ricean | | | |
| (D) Gaussian | | | |
| 17. The advantage of using CDMA over other spread spectrum is _____ | 1 | 1 | 5 |
| (A) Security | | | |
| (B) BER performance | | | |
| (C) Equalization | | | |
| (D) Diversity | | | |
| 18. Capacity of CDMA can be increased by operating in DTX, which stands for _____ | 1 | 1 | 5 |
| (A) Discrete transmission mode | | | |
| (B) Discrete transmission modulation | | | |
| (C) Discontinuous transmission mode | | | |
| (D) Digital transmission mode | | | |
| 19. _____ allows subscribers to monitor neighbouring base stations. | 1 | 1 | 5 |
| (A) TDMA | | | |
| (B) MAHO | | | |
| (C) FDMA | | | |
| (D) ACA | | | |
| 20. _____ is the interference at a base station receiver that comes from the subscriber units in the surrounding cells. | 1 | 1 | 5 |
| (A) Forward channel interference | | | |
| (B) Carrier interference | | | |
| (C) Receiver interference | | | |
| (D) Reverse channel interference | | | |

PART - B (5 × 4 = 20 Marks)

Answer any 5 Questions

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|---|---|---|---|
| 21. Explain the cell splitting process in improving capacity in cellular systems. | 4 | 2 | 1 |
| 22. What is co channel reuse ratio and how is it related to cluster size? | 4 | 2 | 1 |
| 23. Assume a receiver is located 10 km from a 50 W transmitter. The carrier frequency is 900 MHz, free space propagation is assumed, $G_t = 1$, and $G_r = 2$, find (a) the power at the receiver, (b) the magnitude of the E-field at the receiver antenna (c) the rms voltage applied to the receiver input assuming that the receiver antenna has a purely real impedance of 50Ω and is matched to the receiver. | 4 | 4 | 2 |
| 24. List out the factors influencing small signal fading. | 4 | 2 | 2 |

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|---|---|---|---|
| 25. Write short notes on Direct RF Pulse system. | 4 | 1 | 3 |
| 26. Explain the significance of diversity in wireless systems | 4 | 2 | 4 |
| 27. Illustrate the frame structure of GSM. | 4 | 3 | 5 |

PART - C (5 × 12 = 60 Marks)

Answer all Questions

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|-----|--|----|---|---|
| 28. | (a) i. Explain in detail about the frequency reuse schemes.
ii. Locate the co-channel cells in a cellular system for N=19
(OR)
(b) Explain about the interference & system capacity. How can it be improved in cellular systems? | 12 | 6 | 1 |
| 29. | (a) Calculate the mean pathloss using Okumura's model for d=50km, h _{te} =100m, h _{re} =10m in a suburban environment. Given carrier frequency is 900MHz, A _{mu} =43dB and G _{area} =9dB.
(OR)
(b) Elaborate on the Hata model suited for large scale communication systems. | 12 | 3 | 2 |
| 30. | (a) Demonstrate the parameters of mobile multipath channels with their significance.
(OR)
(b) Explain the major classification on fading behaviour of the received signal in mobile radio channel. | 12 | 2 | 3 |
| 31. | (a) Explain the following with neat diagram (i) Selection combining (ii) Feedback combining (iii) Maximal ratio combining
(OR)
(b) Discuss the various MIMO configurations and derive the MIMO capacity on fading channels. | 12 | 2 | 4 |
| 32. | (a) Explain with necessary diagram the operation of OFDM transceiver
(OR)
(b) Discuss about the 5G architecture in detail. Compare 4G with 5G communication systems. | 12 | 2 | 5 |

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