Reg. No.														

B.Tech. DEGREE EXAMINATION, NOVEMBER 2022
Sixth and Seventh Semester

18ECE314T –WIRELESS COMMUNICATION NETWORKS
(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

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** should be answered in answer booklet.

Time: 2½ Hours | Max. Marks: 75

PART – A (25 × 1 = 25 Marks)
Answer **ALL** Questions

	Marks	BL	CO	PO
1. Interference effects in cellular systems results in _____ (A) The distance between the area (B) Introducing bit errors in the received signal (C) The ratio of the distance between the areas to the transmitted power of the area (D) Power of the transmission	1	1	1	1,1 2
2. Co-channel interference is a function of _____ (A) Radius of cell (B) Transmitted power (C) Received power (D) Frequency of mobile user	1	1	1	1
3. Name the process of subdividing a congested cell into smaller cells (A) Cell splitting (B) Sectoring (C) Microcell technique (D) Repeaters	1	1	1	1,1 2
4. Umbrella cell approach is possible by using_____ (A) Antenna of same heights (B) Antenna of different heights (C) Different voice channels (D) Different control channels	1	1	1	1,1 2
5. In near-far effect, a near by transmitter captures the _____ (A) Receiver of the subscriber (B) Transmitter of the subscriber (C) Nearby MSC (D) Neighboring base station	1	1	1	1,1 2
6. The propagation models, that characterize the ratio fluctuations of the received signal strength over very short travel distances are called (A) Large scale propagation models (B) Small scale propagation models (C) Free-space propagation models (D) Medium- scale propagation models	1	1	2	1,3 ,4

PART – B (5 × 10 = 50 Marks)
Answer **ALL** Questions

	Marks	BL	CO	PO
26. a. Illustrate the different handoff strategies employed in mobile cellular system with a neat sketch.	10	2	1	1,1 2
(OR)				
b.i. Explain in detail about the frequency reuse scheme.	5	2	1	1,1 2
ii. If a signal to interference ratio of 15 dB is required for satisfactory forward channel performance of a cellular system, what is the frequency reuse factor and cluster size that should be used for maximum capacity if the path loss exponent is (1) n=4 (2) n =3. Assume that there are 6 co-channels cells in the first tier, and all of them are at the same distance from the mobile. Use suitable approximations.	5	3	1	1,1 2
27. a. Derive the expression for the path loss in two ray ground reflection model.	10	2	2	1,2 ,3, 4
(OR)				
b.i. If a transmitter produces 50 watts of power, express the transmitted power in units of (1) dBm (2) dBW. If 50 watts is applied to a unity gain antenna with a 900 MHz carrier frequency, find the received power. In dBm at a frees space distance of 100 m from the antenna, what is $\Pr(10\,km)$? Assume unity gain for the receiver antenna.	5	3	2	1,2 ,3, 4
ii. Derive an expression for outage probability under path loss and shadowing.	5	2	2	1,2 ,3, 4
28. a. Elucidate the principle of impulse response model of multipath propagation.	10	2	3	1,2 ,3
(OR)				
b. Consider a transmitter which radiates a sinusoidal carrier frequency of 1850 MHz. for a vehicle moving 60 mph, computer the received carrier frequency if the mobile is moving (i) Directly towards the transmitter (ii) Directly away from the transmitter (iii) In a direction which is perpendicular to the direction of arrival of the transmitted signal	10	3	3	1,2 ,3
29. a. Explain the principle and operation of rake receiver in CDMA system with a neat block diagram.	10	2	4	1,2
(OR)				
b. Discuss the various MIMO configurations and derive the MIMO capacity on fading channels.	10	2	4	1,2
30. a. Explain with a neat block diagram, the process involved in forward and reverse CDMA channel.	10	2	5	1
(OR)				
b.i. Elaborate the operation of an OFDM transmitter.	5	2	5	1
ii. Discuss the various interfaces used in GSM.	5	2	5	1

* * * * *

7. Calculate the path loss, if the wavelength is 0.6 m and Fraunhofer distance is 7 m. assume unity gain for antennas. 1 2 2 1,2,3,4
   (A) 33 dB (B) 43 dB
   (C) 53 dB (D) 63 dB

8. The variations in received signal strength due to specific geometries of the path between the transmitter and receiver is known as 1 1 2 1,3,4
   (A) Shadowing (B) Diffraction
   (C) Interference (D) Near-far effect

9. Calculate the Brewster angle for a wave impinging on ground having a permittivity of $\xi_r = 3$. 1 2 2 1,2
   (A) 84.7 (B) 74.7
   (C) 64.7 (D) 54.7

10. The frequency range of Okumura model is typically extra polated upto 1 2 2 1,2,3,1
   (A) 1000 MHz (B) 2000 MHz
   (C) 3000 MHz (D) 200 kHz

11. The factor that does not influence small scale fading is 1 1 3 1,2,3
   (A) Speed of mobile (B) Power density of base station
   (C) Multipath propagation (D) Speed of surrounding objects

12. The discretization of multipath delay axis of impulse response into equal time delay segments is termed as 1 1 3 2,3
   (A) Delay bins (B) Discrete bins
   (C) Excess delay bins (D) Digital bins

13. What is the range of frequency of Doppler spread in the available Doppler spectrum? 1 2 3 1,2,3
   (A) Zero (B) Infinite
   (C) One (D) Non zero

14. Which of the following is not a statistical model for multipath fading channels? 1 1 3 1,2,3
   (A) Clarke's model for flat fading (B) Two ray Rayleigh fading model
   (C) Saleh and valenzuella indoor statistical model (D) Faraday model

15. The envelope of a sinsoid plus bandpass norse has _____distribution. 1 1 3 1,2,3
   (A) Uniform (B) Rayleigh
   (C) Ricean (D) Gaussian

16. Which is used to obtain time diversity in a digital communication system without adding any overhead? 1 1 4 1,2
   (A) RAKE receiver (B) Interleaving
   (C) Search window (D) Diversity reception

17. _____improves the quality of a wireless link without altering the common air interface without increasing power or bandwidth. 1 1 4 1,2
   (A) Equalization (B) Diversity
   (C) Channel coding (D) Modulation

18. _____is performed after the data scrambling on forward link in forward CDMA channel. 1 1 4 1,2
   (A) Interleaving (B) Quadrature modulation
   (C) Orthogonal covering (D) Burst formatting

19. Space diversity is also known as _____diversity. 1 1 4 1,2
   (A) Polarization (B) Antenna
   (C) Time (D) Angle

20. In MIMO, which factor has the greatest influence on data rates 1 1 4 1,2
   (A) The size of antenna (B) The height of the antenna
   (C) The number of transmitting antenna (D) The area of receiving antenna

21. When band of orthogonal frequency division multiplexing(OFDM) is divided into sub bands, it diminishes effects of _____ 1 1 5 1,12
   (A) Channel noise (B) Collision
   (C) Interference (D) Signals absence

22. GSM uses _____ modulation scheme. 1 1 5 1,12
   (A) Binary phase shift keying (B) Quadrature phase shift keying
   (C) Gaussian minimum shift keying (D) Binary frequency shift keying

23. Capacity of CDMA can be increased by operating in DTX, which stands for _____ 1 1 5 1,12
   (A) Discrete transmission mode (B) Discrete transmission modulation
   (C) Discontinuous transmission mode (D) Digital transmission mode

24. _____is the interference at a base station receiver that comes from hat subscriber units in the surrounding cells. 1 1 5 1,12
   (A) Forward channel interference (B) Carrier interference
   (C) Receiver interference (D) Reverse channel interference

25. The air interface that connects a base transceiver station to a base station controller in GSM is called _____ 1 1 5 1,12
   (A) A interface (B) A_{bis} interface
   (C) Radio air interface (D) G interface