B.Tech DEGREE EXAMINATION, NOVEMBER 2023

Seventh Semester

18ECC301T - WIRELESS COMMUNICATION

(For the candidates admitted during the academic year 2020 - 2021 & 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

		Marks	BL	CO
1.	While locating a co-channel cell, a RF site engineer will do the following mapping after moving 'i' cells along any particular direction (A) Turn 90 deg counter clockwise & move j cells (B) Turn 60 deg clockwise & move j cells (C) Turn 60 deg counter clockwise & Move j cells (D) Move j cells and Turn 60 deg counter clockwise	1	1	1
2.	Resultant of imperfect receiver filters (A) Adjacent channel interference (B) Co channel interference (C) Network interference (D) Stop band interference	1	1	1
3.	The width of the Guard band is addressed by (A) how sharp the transceiver filter roll off factor is (B) how sharp the transmitter filter roll off factor is (C) how sharp the receiver filter roll off factor is (D) how sharp the mobile station roll off factor is	1	1	1
4.	What will be the total number of users if each user generates is 0.1 Erlang and the total offered traffic is 3.96? (A) 39 (B) 4 (C) 40 (D) 11	1	3	1
5.	Find the far – field distance for an antenna with maximum dimension of 2 m and operating frequency of 1000 MHz (A) 20.64 m (B) 26.64 m (C) 22.64 m (D) 28.64 m	1	3	2
6.	____ occurs when a propagating electromagnetic wave impinges upon an object which has very large dimensions when compared to the wavelength of the propagating wave (A) Refraction (B) Reflection (C) Diffraction (D) Scattering	1	1	2
7.	Calculate the Brewster angle for a wave impinging on ground having a permittivity of $\varepsilon_r = 5$. (A) 21.09 (B) 22.09 (C) 23.09 (D) 24.09	1	3	2
8.	The path loss exponent 'n' value for free space is (A) 1 (B) 1.5 (C) 2 (D) 3	1	1	2

9.	For fast fading channel, the coherence time of the channel is smaller than _____ of transmitted signal (A) bandwidth (B) Doppler spread (C) coherence bandwidth (D) symbol period	1	1	3
10.	Narrowband channels are referred as _____ (A) Phase varying channel (B) Amplitude varying channel (C) Frequency varying channel (D) Wideband channel	1	1	3
11.	For a Rayleigh fading signal, mean and median differ by _____ (A) 0.42 dB (B) 0.25 dB (C) 0.1 dB (D) 0.55 dB	1	3	3
12.	Which of the following is not a characteristic of flat fading? (A) Mobile radio channel has constant gain (B) Non-linear phase response (C) Linear phase response (D) Bandwidth is greater than the transmitted signal bandwidth	1	2	3
13.	Shannon capacity of a fading channel with receiver CSI only is _____ the Shannon capacity of an AWGN channel with the same average SNR. (A) greater than (B) greater than or equal to (C) equal to (D) less than	1	2	4
14.	Which of the following is not a category of space diversity technique? (A) Selection diversity (B) Time diversity (C) Feedback diversity (D) Equal gain diversity	1	2	4
15.	RAKE receiver uses separate _____ to provide the time shifted version of the signal (A) IF receiver (B) Equalizer (C) Correlation receiver (D) Channel	1	3	4
16.	Consider the spectrum of a channel is 100 Hz and SNR of 30 dB. Calculate the maximum channel capacity, in bits per second. (A) 996.72 bps (B) 99.672 Mbps (C) 0.9977 bps (D) 9.96 Mbps	1	3	4
17.	GSM committee specified a common mobile communication system in _____band (A) 900MHz (B) 900KHz (C) 100KHz (D) 900Hz	1	1	5
18.	The reverse channel user data stream is first convolutionally encoded with a rate_____. (A) 1/4 (B) 3/4 (C) 1/3 (D) 1/8	1	1	5
19.	How many types of masks are used in the long code generator? (A) 4 (B) 3 (C) 2 (D) 1	1	2	5
20.	AMPS stands for _____. (A) Advanced Mobile Phone System (B) Advanced Modulation Phone System (C) Advanced Mobile Packet System (D) Advanced Machine Packet System	1	1	5

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	C
21.	Elaborate on the classification of Hand-off techniques	4	2	1

23.	Write notes on Cell coverage area.	4	1	2
24.	Discuss about the various parameters of mobile multipath channel	4	1	3
25.	Compare selection combining and feedback combining techniques	4	2	4
26.	Differentiate between FDM and OFDM.	4	2	5
27.	Enumerate the applications of wearable antennas.	4	2	5

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

		Marks	BL	CO
28.	(a) If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses (a) 4-cell reuse, (b) 7-cell reuse (c) 12-cell reuse. If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell for each of the three systems.	12	3	1
	(OR)			
	(b) 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 (a) n = 4 , (b) 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.			
29.	(a) Explain the three significant wave propagation mechanisms that affect the propagation of EM waves in detail	12	3	2
	(OR)			
	(b) Discuss the Okumura and Hata outdoor propagation models in detail.			
30.	(a) Describe the measurement techniques of small scale multipath channels.	12	3	3
	(OR)			
	(b) Explain the fading effects due to multipath time delays spread and doppler spread			
31.	(a) Explain the working principle of RAKE receiver in CDMA systems with a neat block diagram	12	4	4
	(OR)			
	(b) Derive an expression for capacity of the flat fading channel and its outage when the CSI is known at both transmitter and receiver.			
32.	(a) With the help of system architecture, explain the various subsystems of the GSM in detail.	12	4	5
	(OR)			
	(b) Explain with necessary diagram, the operation of OFDM transceiver			

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