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B.Tech. DEGREE EXAMINATION, JUNE 2023

Seventh Semester

18ECE220T - ADVANCED MOBILE COMMUNICATION SYSTEMS

(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 40 minutes.
ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

		Marks	BL	CO
	Part - A (20 × 1 Marks = 20 Marks) Answer **All** Questions			
1.	Select the correct match for the following (a) OFDM (i) 2G (b) WCDMA (ii) 3G (c) GSM (iii)1G (d) TACS (iv) 4G (A) (a)-(i),(b)-(ii),(c)-(iii),(d)-(iv) (B) (a)-(iv),(b)-(iii),(c)-(ii),(d)-(i) (C) (a)-(iv),(b)-(ii),(c)-(iii),(d)-(i) (D) (a)-(iv),(b)-(ii),(c)-(i),(d)-(iii)	1	3	1
2.	The 3GPP started to work on 4G because (A) Data rates and spectral efficiencies of WCDMA would not meet the demand of future applications. (B) The 3G system suffered from high Inter Symbol Interference (C) The existing infrastructure in 3G supports only Voice (D) 3G system fails to expand the coverage probability	1	1	1
3.	The main objective of CELL in a cellular mobile system is (A) Frequency reuse (B) Higher bandwidth (C) Simple modulation technique (D) Hand-off	1	1	1
4.	In wireless communication "the time for a handset to transition from various non-active states to active states" is termed as (A) Transit latency (B) Round trip latency (C) User-plane latency (D) Control plane latency	1	1	1
5.	In a single carrier communication system if the channel bandwidth is 'B'. what is the symbol time? (A) 2/B (B) 1/B (C) B/2 (D) 2B	1	2	2
6.	What is the main limitation of the broadband system? (A) More Inter Symbol Interference (ISI) (B) More broadband, which leads to more power consumption. (C) More broadband, which leads to more system complexity. (D) Symbol time is greater than the delay spread.	1	1	2
7.	____ and ____ are the main principles of Orthogonal Frequency Division Multiplexing (OFDM) (A) IFFT/FFT processing. Subcarrier mapping (B) IFFT/FFT processing. Cyclic prefix (C) Subcarrier mapping. Cyclic prefix (D) Subcarrier mapping, Frequency division	1	1	2

8.	Frequency offset in OFDM system leads to (A) Inter Symboi Interference (B) High PAPR (C) Orthogonality (D) Inter Carrier Interference (ICI)	1	1	2
9.	Select the incorrect one related to the MIMO system. (A) Data rate (B) Reliability (C) Capacity (D) Low SNR	1	1	3
10.	___ algorithm is used for allocation power in the MIMO system when the channel state is known. (A) Simulated annealing (B) Water filling (C) Power optimization (D) Evolutionary learning	1	1	3
11.	The non-linear MIMO receiver uses ___ to decode the transmitted symbols. (A) Maximal Ratio Combiner (B) Zero forcing (C) Successive Interference Cancellation (D) MMSE	1	1	3
12.	If a MIMO system is represented as 4x3, what are the numbers of transmitter antenna? (A) 4 (B) 6 (C) 3 (D) 12	1	2	3
13.	___ assigns different priorities for users in the cognitive network. (A) Dynamic exclusive (B) Open sharing (C) Cooperative (D) Hierarchical access	1	1	4
14.	___ frequency ranges are considered to travel for long distances. (A) Semi-permeable zone (B) Permeable zone (C) Non-Line of Sight Zone (D) Line of Sight Zone	1	1	4
15.	___ is not a type of non-cooperative sensing. (A) Energy (B) Matched (C) External (D) Eigen-Value	1	1	4
16.	Identify the correct approach related to Cognitive Radio spectrum management. (A) Datalink-layer design (B) Network-layer design (C) Physical-layer (D) Cross-layer design	1	1	4
17.	Milli-meter wave (mmWave) has the wavelengths between _____ in Electro-Magnetic spectrum. (A) 5 mm and 10 mm (B) 0.01 mm and 1 mm (C) 1 mm and 10 mm (D) 10 mm to 1 mm	1	1	5
18.	The combination of amplitude modulation and phase shift keying results into (A) QPSK (B) QAM (C) DPSK (D) ON/OFF keying	1	2	5
19.	Diode detectors do not have___ (A) Phase shifter (B) Amplifier (C) Mixer (D) Low Pass Filter	1	1	5
20.	Match the following 1. mmWave - (i) High Capacity 2. Cognitive radio - (ii) IFFT/FFT 3. OFDM - (iii) Wireless personal area network 4. MIMO - (iv) Utilizing unused spectrum (A) 1-(i),2-(iii),3-(iv),4-(ii) (B) 1-(iv),2-(iii),3-(i),4-(ii) (C) 1-(iii),2-(iv),3-(i),4-(ii) (D) 1-(iii),2-(iv),3-(ii),4-(i)	1	3	6

Part - B (5 × 4 Marks = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	Compare the Long-Term Evolution (LTE) with the existing 3G technologies.	4	3	1
22.	Explain the technical evolution of wireless communication technologies.	4	3	1
23.	Let a wireless communication system has a bandwidth of 10 MHz with 1000 subcarriers, calculate its sub-band spacing, and symbol duration, and analyze the effect of ISI on the given system.	4	5	2
24.	What are the causes of Inter-Carrier Interference in OFDM?	4	3	2
25.	Explain the MIMO-OFDM system.	4	2	3
26.	Explain the different models of dynamic spectrum access in cognitive radio.	4	3	4
27.	Write the four applications of milli-meter Wave in real time scenarios with neat diagram.	4	2	6

Part - C (5 × 12 Marks = 60 Marks)

Answer **All** Questions

		Marks	BL	CO
28.	a. i. What are the important features of 3GPP technology? [2 Marks] ii. Explain the WiMax architecture. [10 Marks] **(OR)** b. Draw and explain the following (i) Frame structure of LTE [6 Marks] (ii) Architecture of LTE [6 Marks]	12	3	1
29.	a. Explain the advantages of introducing IFFT/FFT processing, and Cyclic prefix in the OFDM system and compare it with the multi-carrier transmission. **(OR)** b. Define PAPR. Calculate the PAPR in a single carrier and OFDM system, and also write its effect in the OFDM system	12	4	2
30.	a. Explain the V-BLAST MIMO receiver. **(OR)** b. What is the need for the Alamouti code? Calculate its SNR and compare it with MRC.	12	3	3
31.	a. Explain the framework of spectrum management in cognitive radio applications. **(OR)** b. Discuss the different types of spectrum sensing methods in cognitive networks.	12	3	4
32.	a. Explain the following. (i) Superheterodyne transceiver [8 Marks] (ii) Direct conversion transceiver [4 Marks] **(OR)** b. Explain the different types of antenna structures used in milli-meter wave communication.	12	3	5

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