Hall Ticket Number:

Code No. : 22558

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
M.E. (E.C.E.) II-Semester Main Examinations, September-2022
Wireless Communications & Networking
(Communication Engineering & Signal Processing)

Time: **3 hours**   Max. Marks: **60**

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10× 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	List out the radio interface specifications of GSM system.	2	1	1	3
2.	In CDMA, each channel transmission data rate is 9.6 kbps and a channel chip rate is 1.2288 Mchips per sec. Calculate the spreading factor and processing gain?	2	2	2	4
3.	Define the terms coherence bandwidth and coherence time with respect to multipath fading channel.	2	1	1	3
4.	With reference to 2-ray ground reflected model, the path length of the multipath wave is 100m longer than that of the direct wave. Calculate the delay experienced by the multipath wave compared to direct wave.	2	2	2	4
5.	Explain the difference between equalization and diversity.	2	1	3	3
6.	The bit rate of a wireless communication system is 10 kbps. The modulation used in BPSK. Calculate the minimum bandwidth for ISI free transmission.	2	2	4	4
7.	Compare the air interface specifications of CDMA-2000 and W-CDMA systems.	2	2	4	3
8.	How EDGE network offers 3 times faster data rates than GPRS network.	2	1	3	3
9.	Write the functionality of different common control channels of GSM system.	2	1	3	3
10.	Define Grade of Service (GoS) and Quality of Service (QoS) parameters.	2	1	4	3
	Part-B (5 × 8 = 40 Marks)				
11. a)	Draw the block diagram of CDMA reverse channel modulation process and explain.	3	1	1	3
b)	A GSM mobile cellular system uses TDMA/FDD as multiple access technique. It uses a 3 start bits, 3 stop bits, 26 guard bits and 2 bursts of 58 bits of encrypted data which is transmitted at 270.833 Kbps in the channel estimated the following. i) Number of overhead bits per time slot and per frame ii) Total number of bits carried by each time slot and frame. iii) Duration of each time slot and frame. iv) Frame rate and efficiency of TDMA	5	4	3	4
12. a)	What is Doppler spread? Discuss the fading efforts due to Doppler spread.	4	2	1	3

			M	L	CO	PO

	b)	Consider a Tx which radiates a sinusoidal carrier frequency of 1850 MHz. for a vehicle moving 60 mph, compute the received carrier frequency if the mobile is moving.
		
		  i) Directly towards the Tx
		  ii) Directly away from the Tx, in a direction which is perpendicular to the direction of arrival of the transmitted signal.
			4	4	3	4

13.	a)	What is Inter Symbol Interference (ISI)? Explain the zero forcing equalizer algorithm to combat ISI.	4	2	3	3
	b)	Find the first zero-crossing RF bandwidth of a rectangular pulse which has $T_s = 41.06$ µs. Compare this to the bandwidth of a raised cosine filter pulse with $T_s = 41.06$ µs and $\alpha = 0.35$.	4	4	3	4
14.	a)	Analyze and compare the key technology features of 3G and 4G wireless networks.	4	2	4	3
	b)	Draw the architecture block diagram of Universal Mobile Telecommunication System (UMTS) and explain its key features.	4	4	4	3
15.	a)	Draw the architecture block diagram of SS7 signaling network and describe its salient features.	4	3	4	3
	b)	Illustrate the steps for implementing the location update procedure with the help of signal flow diagram.	4	4	3	3
16.	a)	State and explain the conditions for the wireless multipath channel is to be flat fading channel and frequency selective fading channel.	4	2	3	3
	b)	Calculate the RMS delay spread for the following power delay profile.	4	4	6	4

Received power $P(\tau)$ in dB	Corresponding delay τ in micro seconds
0 dB	1 µ sec
-10 dB	2 µ sec
-20 dB	3 µ sec

			M	L	CO	PO
17.		Answer any *two* of the following:				
	a)	Derive expressions for path difference, path delay, phase difference between the received signals in a 2-Ray propagation model with the help of neat sketch.	4	4	4	4
	b)	Draw the LTE network architecture block diagram and describe its key features.	4	3	5	3
	c)	Describe the functionality of different types of forward channels used in CDMA system.	4	4	4	3

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	30%
iii)	Blooms Taxonomy Level – 3 & 4	50%

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