Hall Ticket Number:

Code No. : 17442 S N/O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. (E.C.E.) VII-Semester Supplementary Examinations, May/June-2023
Mobile Cellular Communication (PE-I)

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.	Draw the frequency reuse pattern for a cluster size of N=7.	2	2	1	1,12
2.	What is adjacent channel interference in a cellular system?	2	1	1	1,12
3.	Distinguish flat fading and frequency selective fading.	2	2	2	1,2,12
4.	Define EIRP and ERP	2	1	2	1,12
5.	Differentiate TDMA and FDMA.	2	2	3	1,12
6.	Consider codes C0=[1 1 1 1], C1=[1 1 -1 -1] and symbols 1.5, -2.5 for users 0,1 respectively. What is the net transmitted signal?	2	2	3	1,12
7.	What is the metric used to measure the performance of a communication receiver?	2	1	4	1
8.	Consider SNR=65 dB in a 1×4 MISO system. Evaluate the BER with transmit beamforming?	2	2	4	1,2
9.	Draw the block diagram of OFDM transmitter.	2	1	5	1,12
10.	Emphasis on the concept of cyclic prefix in OFDM.	2	2	5	1,12

Part-B (5 × 8 = 40 Marks)

11. a)	Describe the basic cellular system and its operation with neat sketch of cellular structure.	4	1	1	1,12
b)	Determine the number of cells in clusters for the following values of the shift parameters i and j in a regular hexagon geometry pattern: (i) i=2 and j=4 (ii) i=3 and j=3.	4	2	1	1,12
12. a)	If a transmitter produces 20W of power, which is applied to a unity gain antenna with a 900MHz carrier frequency, Evaluate the receiver power in (a) in watts, (b) in dBW, and (c) in dBm at a free space distance of 1km? Assume unity gain for the receiver antenna.	4	3	2	1,2,4, 12
b)	What are the three basic propagation mechanisms? Explain each in detail.	4	1	2	1,2,12

		M	L	CO	PO
13. a)	Consider noise power is 13dB and spreading length N=512. It is targeted to achieve a BER=5X 10-5 at the output in a flat fading CDMA scenario with a single user. Approximate the required transmit power to such a scenario?	4	3	3	1,12
b)	Describe near far problem in CDMA. Suggest a technique to avoid it.	4	3	3	1,12
14. a)	Explain maximal ratio combining receiver with necessary mathematical expressions.	4	3	4	1
b)	What is deep fade event? Suggest a technique to avoid it.	4	3	4	1
15. a)	Consider a bandwidth B=20 MHz and number of subcarriers N=1024 in an OFDM system. Estiamte the OFDM symbol time without cyclic prefix.	4	3	5	1,4,12
b)	Consider the channel matrix H given as $H=\begin{bmatrix} 1 & -1 \\ 3 & 0 \\ -1 & 2 \end{bmatrix}$. What is the corresponding zero-forcing receiver matrix?	4	2	5	1,4,12
16. a)	What is Handoff process? What are the factors influencing handoffs?	4	2	1	1,12
b)	Explain the practical path loss estimation techniques	4	2	2	1,2,12
17.	Answer any *two* of the following:				
a)	List the properties of spreading sequence in CDMA	4	2	3	1,12
b)	Estimate BER of AWGN Channel.	4	3	4	1,2,4
c)	Consider an OFDM system with L=32 IID Rayleigh fading channel taps of average power 2, N=512 subcarriers, SNR =75 dB. Estimate the BER of the OFDM system.	4	3	5	1,4,12

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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