

Set No. 1

IV B.Tech II Semester Regular Examinations, September - 2020 CELLULAR AND MOBILE COMMUNICATIONS (Electronics and Communication Engineering)

Time: 3 hours

(Electronics and Communication Engineering)

Max. Marks: 70

Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B *****

PART-A (14 Marks)

1.	a)	Define cell sectoring.	[2]
	b)	What is co-channel interference?	[2]
	c)	What is channel sharing and borrowing in cellular systems?	[3]
	d)	List out the types of antennas used at cell site.	[2]
	e)	What are the various handoff initiation techniques?	[2]
	f)	Write the features of OFDMA.	[3]

<u>PART-B</u> (4x14 = 56 Marks)

2.	a) b)	Explain the concept of frequency reuse with the help of a neat diagram. The 2G GSM has 125 channels in the uplink and 125 channels in the down link. Each channel has a bandwidth of 200 kHz. What is the total bandwidth occupied in both uplink and down link.	[7] [7]
3.	a) b)	Derive the expression for carrier-to-interference ratio in a cellular system for normal case and worst-case scenario with an omni-directional antenna. Explain the various types of non-cochannel interferences in a cellular environment?	[7] [7]
4.	a) b)	What are the various channel assignment strategies with respect to cell sites? Explain in detail. Explain the effects of human made structures for mobile propagation in open area.	[7] [7]
5.	a) b)	Explain the role of directional antennas for interference reduction if cellular systems. Write short notes about Roof mounted antennas in cellular systems.	[7] [7]
6.	a) b)	What type of handoff is used when a call initiated in one cellular system and enters another system before terminating? Explain how it works? Explain the various vehicle locating methods in detail.	[7] [7]
7.	a) b)	What are the different types of channels for GSM? Explain. Explain the basic architecture of 3G cellular system with a neat sketch.	[7] [7]

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Set No. 2

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Time: 3 hours

(Electronics and Communication Engineering)

Max. Marks: 70

Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B *****

PART-A (14 Marks)

1.	a)	Write the differences between macro and micro cellular structures?	[3]
	b)	Write the different types of non co-channel interference.	[2]
	c)	Describe the major factors causing propagation loss in cellular systems.	[3]
	d)	Write the features of omni directional antennas?	[2]
	e)	What is forced handoff? Describe.	[2]
	f)	Write the features of CDMA.	[2]

<u>**PART-B**</u> (4x14 = 56 Marks)

a)	Explain the principle of operation of cellular mobile system and its components with a neat diagram.	[7]
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 $j=4$	
	(11) $l=3 \text{ and } j=3.$	[7]
a)	What is cochannel interference in cellular systems? Explain the different methods of reducing the co-channel interference.	[7]
b)	Explain the various functions of diversity receiver with a neat diagram.	[7]
a)	What are the set-up channels? Explain, how set-up channels acts as control channels in a cellular system?	[7]
b)	Describe the various steps involved in finding antenna height gain in a mobile	
	environment.	[7]
a)	Explain the principle and advantages of umbrella pattern antennas in cellular systems.	[7]
b)	Write short notes about Glass mounted antennas in cellular systems.	[7]
a) b)	What is different handoff strategies based on algorithms of handoff? Explain.	[7]
0)	what is dropped can rate? Explain now it is evaluated?	[7]
a) b)	Describe the various features and services of GSM system. Explain the principle of TDMA and its frame structure with a neat diagram.	[7] [7]
	 b) a) 	 with a neat diagram. b) Determine the number of cells in clusters for the following values of the shift parameters <i>i</i> and <i>j</i> in a regular hexagon geometry pattern: (i) <i>i</i>=2 and <i>j</i>=4 (ii) <i>i</i>=3 and <i>j</i>=3. a) What is cochannel interference in cellular systems? Explain the different methods of reducing the co-channel interference. b) Explain the various functions of diversity receiver with a neat diagram. a) What are the set-up channels? Explain, how set-up channels acts as control channels in a cellular system? b) Describe the various steps involved in finding antenna height gain in a mobile environment. a) Explain the principle and advantages of umbrella pattern antennas in cellular systems. b) Write short notes about Glass mounted antennas in cellular systems. a) What is different handoff strategies based on algorithms of handoff? Explain. b) What is dropped call rate? Explain how it is evaluated?



Set No. 3

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Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any FOUR questions from Part-B *****

PART-A (14 Marks)

1.	a)	Write the differences between pico and femto cellular structure.	[3]
	b)	Define co-channel interference reduction factor.	[2]
	c)	What is the importance of frequency management chart?	[3]
	d)	List out the types of antennas used at cell site.	[2]
	e)	Define the dropped call rate.	[2]
	f)	Write the features of TDMA.	[2]

<u>**PART-B**</u> (4x14 = 56 Marks)

2.		What is co-channel reuse ratio? Prove that for a hexagonal geometry, the co- channel reuse ratio is $\sqrt{3N}$, where $N = i^2 + ij + j^2$.	[7]
	b)	List the various techniques used to expand the capacity of a cellular system. Explain in detail.	[7]
3.	a)	What is non-cochannel interference? Explain the various types of non-cochannel interference?	[7]
	b)	Determine the minimum cluster size for a cellular system designed with an acceptable value of C/I =18 dB. Assume the path loss exponent as 4 and co-channel interference at the mobile unit from six equidistant cells in the 1^{st} tier.	[7]
4.	a)	What are the various channel assignment strategies with respect to mobile units? Explain in detail.	[7]
	b)	Explain the point-to-point path loss prediction model and describe the factors that affect the accuracy of prediction.	[7]
5.	a)	What are the different types of antennas used for mobile unit? Explain any one with neat diagram.	[7]
	b)	Write short notes about mobile high gain antennas in cellular systems.	[7]
6.	a) b)	What are the various handoff initiation techniques? Explain. What is intersystem handoff? Explain with necessary diagram.	[7] [7]
7.	a)	What are the various subsystems in GSM architecture? Explain the network switching subsystem.	[7]
	b)	Describe the basic principle and advantages of OFDMA.	[7]



Set No. 4

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PART-A (14 Marks)

1.	a)	List the main features of 3G cellular systems.	[2]
	b)	What are the types of interferences in cellular system?	[2]
	c)	Describe the concept of overlaid cell.	[3]
	d)	Write the features of umbrella pattern antennas.	[2]
	e)	List out the different vehicle locating methods.	[2]
	f)	Compare the basic technological differences between GSM and CDMA.	[3]

<u>**PART-B**</u> (4x14 = 56 Marks)

2.	a) b)	Explain the principle of cell splitting and cell sectoring in cellular systems. Draw the frequency reuse pattern for a cluster size of $N=3$ and $N=7$.	[7] [7]
3.	a) b)	Derive the expression for C/I for worst case scenario in an omni directional antenna system. 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-channel cells in the first tier and all of them are at the same distance from the mobile. Use suitable approximations.	[7]
4.	a) b)	What is the importance of frequency management chart? Explain. Derive the expression for the path difference between the direct and reflected	[7]
		paths in a mobile environment.	[7]
5.	a) b)	Explain the different types of antennas used for coverage and interference reduction in cellular systems. Write short notes about Roof mounted antennas in cellular systems.	[7] [7]
6.	a)	Explain the differences between handoff initiation in analog and digital cellular	
	b)	systems. How dropped call rate is defined using general formula? Explain.	[7] [7]
7.	a)	Explain the GSM architecture with a neat sketch.	[7]
	b)	Compare and contrast the various multiple access schemes.	[7]