Code No: **R1642041** **R16** **Set No. 1**

IV B.Tech II Semester Regular Examinations, September - 2020

CELLULAR AND MOBILE COMMUNICATIONS

(Electronics and Communication Engineering)

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

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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]

PART–B *(4x14 = 56 Marks)*

2. a) Explain the concept of frequency reuse with the help of a neat diagram. [7]
   b) 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]

3. a) Derive the expression for carrier-to-interference ratio in a cellular system for normal case and worst-case scenario with an omni-directional antenna. [7]
   b) Explain the various types of non-cochannel interferences in a cellular environment? [7]

4. a) What are the various channel assignment strategies with respect to cell sites? Explain in detail. [7]
   b) Explain the effects of human made structures for mobile propagation in open area. [7]

5. a) Explain the role of directional antennas for interference reduction if cellular systems. [7]
   b) Write short notes about Roof mounted antennas in cellular systems. [7]

6. a) What type of handoff is used when a call initiated in one cellular system and enters another system before terminating? Explain how it works? [7]
   b) Explain the various vehicle locating methods in detail. [7]

7. a) What are the different types of channels for GSM? Explain. [7]
   b) Explain the basic architecture of 3G cellular system with a neat sketch. [7]

Code No: **R1642041** **R16** **Set No. 2**

IV B.Tech II Semester Regular Examinations, September - 2020

CELLULAR AND MOBILE COMMUNICATIONS

(Electronics and Communication Engineering)

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
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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]

PART–B *(4x14 = 56 Marks)*

2. 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
      (ii) i=3 and j=3. [7]

3. 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]

4. 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]

5. 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]

6. a) What is different handoff strategies based on algorithms of handoff? Explain. [7]
   b) What is dropped call rate? Explain how it is evaluated? [7]

7. a) Describe the various features and services of GSM system. [7]
   b) Explain the principle of TDMA and its frame structure with a neat diagram. [7]

Code No: **R1642041** **R16** **Set No. 3**

IV B.Tech II Semester Regular Examinations, September - 2020

CELLULAR AND MOBILE COMMUNICATIONS

(Electronics and Communication Engineering)

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

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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]

PART–B *(4x14 = 56 Marks)*

2. a) 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 1st 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) What are the various handoff initiation techniques? Explain. [7]
   b) What is intersystem handoff? Explain with necessary diagram. [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]

Code No: **R1642041** **R16** **Set No. 4**

IV B.Tech II Semester Regular Examinations, September - 2020

CELLULAR AND MOBILE COMMUNICATIONS

(Electronics and Communication Engineering)

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

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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]

PART–B *(4x14 = 56 Marks)*

2. a) Explain the principle of cell splitting and cell sectoring in cellular systems. [7]
   b) Draw the frequency reuse pattern for a cluster size of N=3 and N=7. [7]

3. a) Derive the expression for C/I for worst case scenario in an omni directional antenna system. [7]
   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-channel cells in the first tier and all of them are at the same distance from the mobile. Use suitable approximations. [7]

4. a) What is the importance of frequency management chart? Explain. [7]
   b) Derive the expression for the path difference between the direct and reflected paths in a mobile environment. [7]

5. a) Explain the different types of antennas used for coverage and interference reduction in cellular systems. [7]
   b) Write short notes about Roof mounted antennas in cellular systems. [7]

6. a) Explain the differences between handoff initiation in analog and digital cellular systems. [7]
   b) How dropped call rate is defined using general formula? Explain. [7]

7. a) Explain the GSM architecture with a neat sketch. [7]
   b) Compare and contrast the various multiple access schemes. [7]