Code No: **R42041** **R10** **Set No. 1**

IV B.Tech II Semester Regular Examinations, April/May - 2014

CELLULAR AND MOBILE COMMUNICATIONS

(Electronics and Communication Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions

All Questions carry equal marks

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1 a) Describe the principle of operation of cellular mobile system and explain the cellular concept with a neat diagram. [10]

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. [5]

2 a) What are the various components in a cellular system? Explain briefly. [7]

b) List the various techniques used to expand the capacity of a cellular system. Explain in detail. [8]

3 a) What are the different types of non co-channel interference in a cellular system? Explain. [8]

b) Explain the effects of antenna design parameters for the interference in a cellular system. [7]

4 a) Describe the form of a point-to-point model and explain its types. [8]

b) Explain the mobile signal propagation over water and flat area. [7]

5 a) What are the different types of antennas used for improving coverage and interference reduction at cell site? Explain them. [9]

b) Draw the structure of horn antenna and explain its operation. [6]

6 a) What is the importance of frequency management chart? Give the structure of the channels in 800 MHz system with frequency ranges. [8]

b) Explain the overlaid cells concept in detail. [7]

7 a) What are the various handoff strategies based on algorithms of handoff? Explain in detail. [8]

b) What are the different vehicle locating methods? Explain in detail. [7]

8 a) What are the advantages of digital cellular systems over analog? [3]

b) Explain a simple GSM network architecture with the help of a neat diagram. [12]

Code No: **R42041** **R10** **Set No. 2**

IV B.Tech II Semester Regular Examinations, April/May - 2014

CELLULAR AND MOBILE COMMUNICATIONS

(Electronics and Communication Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions

All Questions carry equal marks

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1 a) Why does the mobile phone cell, the basic geographic unit of cellular system, have a hexagonal shape? Explain. [7]

b) Describe the analog and digital cellular systems and limitations of AMPS standard. [8]

2 a) What is the purpose of cell sectoring? Explain how co-channel interference in a cellular system may be reduced? [8]

b) Draw the frequency reuse pattern for a cluster size of N=3 and N=7. [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. [10]

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. [5]

4 a) Explain in detail about near and long distance mobile propagation. [7]

b) Describe the various steps involved in finding antenna height gain in a mobile environment. [8]

5 a) What are the different types of antennas used at cell site? Explain them in detail. [8]

b) Define space diversity technique and explain horizontally and vertically oriented space diversity antennas. [7]

6 a) What are the different types of channel assignment approaches? Explain the channel assignment approach that can be effectively deployed to handle increased traffic situation. [9]

b) Explain how paging channels are used for the land originating calls? [6]

7 a) Why do the micro cellular structures have more number of handoffs per second as compared to macro cellular structures? Explain. [7]

b) What type of handoff is used when a call initiated in one cellular system enters another system before terminating? Explain how it works? [8]

8 a) Explain the frame structure of GSM with a neat diagram. [8]

b) Describe the principle, advantages and disadvantages of CDMA technique. [7]

Code No: **R42041** **R10** **Set No. 3**

IV B. Tech II Semester Regular Examinations, April/May - 2014

CELLULAR AND MOBILE COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any Five Questions
All Questions carry equal marks
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1 a) What are the limitations of conventional mobile telephone system and Describe the various generations of wireless mobile systems. [10]
b) What are the main advantages and disadvantages of various cellular structures? [5]

2 a) What is the need for frequency reuse? Prove that for a hexagonal geometry, the co-channel reuse ratio is $\sqrt{3N}$, where $N = i^2 + ij + j^2$. [10]
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 [5]

3 a) How the interference is different from noise in a cellular system? Explain. [7]
b) What are the different types of interference for a cellular system? Explain in detail. [8]

4 a) Explain the effects of human made structures for mobile propagation in open area. [8]
b) What is mean by foliage? Explain foliage loss. [7]

5 a) What are the directional antennas? Explain how the directional antennas are useful for reducing the interference. [8]
b) How can a high gain broadband umbrella pattern antenna be constructed for cell site? Explain. [7]

6 a) Describe the concept of frequency management concern to the numbering the channels and grouping into the subset. [8]
b) Explain the channel assignment to the cell sites based on the adjacent channels. [7]

7 a) What are the various methods of delaying the handoff? Explain briefly. [7]
b) What is meant by a dropped call? Explain the factors that influence the dropped call rate. [8]

8 a) Describe the features and services of GSM. [5]
b) Explain the principle of TDMA and CDMA techniques with the help of neat diagrams. [10]

Code No: **R42041** **R10** **Set No. 4**

IV B.Tech II Semester Regular Examinations, April/May - 2014

CELLULAR AND MOBILE COMMUNICATIONS

(Electronics and Communication Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions
All Questions carry equal marks
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1 a) Compare the basic technological differences between the GSM and CDMA standards. [8]
b) The GSM utilizes the frequency band 935-960 MHz for forward link and 890-915 MHz for reverse link. Each 25 MHz band is broken into radio channels of 200 kHz. Each radio channel consists of 8 time slots. Find the number of users that can be accommodated in GSM, if
(i) No guard band is assumed. [3]
(ii) A guard band of 100 kHz is provided in the upper and lower end. [4]

2 a) Describe the frequency reuse concept in cellular communication system and derive the equation for the frequency reuse ratio. [10]
b) Why do all cells not have uniform size in a practical cellular network? Explain. [5]

3 a) Explain the co-channel interference reduction factor and derive the general formula for C/I. [8]
b) What are the various techniques to measure CCI? Explain in detail. [7]

4 a) Explain the mobile radio propagation over water and flat open area and write the general expression. [8]
b) Describe the effect of antenna height in near and long distance mobile propagation. [7]

5 a) What are the different types of antennas are used as mobile antenna? Draw the structure of patch antenna and explain its operation. [8]
b) Explain the concept of diversity antenna spacing in cell site with a simple diagram. [7]

6 a) Describe the grouping of the voice, set-up and paging channels. [8]
b) Explain in detail the non-fixed channel assignment. [7]

7 a) What is meant by handoff? Describe the classification of handoff processes. [5]
b) What is meant by handoff initiation? Explain the different methods of handoff initiation with suitable diagrams. [10]

8 a) What ate the different types of GSM channels? Explain in detail. [7]
b) Explain the principle of CDMA with a neat sketch and write its advantages and disadvantages. [8]