

IV B.Tech II Semester Regular Examinations, April/May - 2017

**CELLULAR MOBILE COMMUNICATION**

(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 THREE questions from Part-B*

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**PART-A (22 Marks)**

1. a) Explain the concept of Cell splitting [3]
- b) What is Co-channel Interference Reduction Factor [4]
- c) Roof mounted antennas. [3]
- d) Compare the Omni cells and sectorized cells [4]
- e) What is the commonly used formula for interference limited system. [4]
- f) What are main subsystems of GSM architecture? [4]

**PART-B (3x16 = 48 Marks)**

2. a) Describe the digital cellular land mobile systems and the limitations of AMPS standard. [8]
- b) During a busy hour the no. of calls per hour  $Q_i$  for each 10 cells is 2000, 1500, 3000, 500, 1000, 1200, 1800, 3200, 2600, 800. Assume that 60% of the car phones will be used during this period and that one call is made per car phone. Find the no. of customers in the system. [8]
3. a) Explain the effects of Antenna parameters in designing cellular system. [8]
- b) Draw the setup for space diversity antennas used at cell site and explain how to design it. [8]
4. a) Explain about High gain antennas [8]
- b) Discuss about the minimum separation of cell site antennas? [8]
5. a) Write about fixed channel assignment schemes in detail. [10]
- b) Explain about paging channels. [6]
6. a) Explain the following terms: i) Mobile Assisted Handoff ii) Soft Handoff  
iii) Delaying Handoff iv) Cellsite Handoff [8]
- b) What are the different factors that limit the size of splitting cells? [8]
7. a) Discuss some of the reservation based multiple access protocols for wireless networks, with suitable illustrations. [8]
- b) What are the channel types of GSM system? Explain [8]

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**PART-A (22 Marks)**

1. a) What is the difference between long term and short term fading. [4]
- b) Explain real time Co- Channel interference. [3]
- c) Explain vertically oriented mobile antennas. [3]
- d) What are the advantages of sectorized cells? [4]
- e) Define the General formula for noise limited system. [4]
- f) What are the channel types of GSM system? [4]

**PART-B (3x16 = 48 Marks)**

2. a) Differentiate the analog & digital cellular systems with their operating capacities. [8]
- b) Mention the two frequency reuse schemes and explain N-Cell reuse pattern in detail for four & seven cell reuse with illustrative diagrams. [8]
3. a) Explain ground incident angle, elevation angle, ground reflection and reflection point with respect to signal coverage. [8]
- b) From the free space propagation model derive the equation for received power. [8]
4. a) Explain about Umbrella pattern antennas [8]
- b) Explain space diversity antennas. [8]
5. a) Discuss the concept of frequency management concern to the numbering the channels and grouping into the subset. [8]
- b) Write the concept of the self location scheme at the mobile unit and the autonomous registration. [8]
6. a) Explain how the handoffs implemented based on signal strength? [8]
- b) Explain the following terms:  
i) Forced Handoff      ii) Hard Handoff      iii) Delaying Handoff [8]
7. a) Discuss the salient features of FDMA and TDMA techniques. [8]
- b) With suitable block diagram explain the GSM system. [8]

Code No: RT42041

R13

Set No. 3

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Max. Marks: 70

*Question paper consists of Part-A and Part-B*

*Answer ALL sub questions from Part-A*

*Answer any THREE questions from Part-B*

\*\*\*\*\*

**PART-A (22 Marks)**

1. a) What are the limitations of conventional mobile telephone system [3]
- b) Explain the phase difference between direct and reflected paths [3]
- c) Explain horizontally oriented mobile antennas. [4]
- d) Explain about paging channels. [4]
- e) Define Handoff. What are the different types of handoffs? [4]
- f) What are the interfaces used in the GSM? [4]

**PART-B (3x16 = 48 Marks)**

2. a) Explain the significance of following cellular concepts in detail [8]
  - i) Interference
  - ii) System Capacity
- b) If the maximum no of calls per hour  $Q_i$  in one cell be 5000 and an average calling time  $T$  be 1.76 min. The blocking probability is 2%. Find the offered load. If  $Q_i$  is 30000. Find the offered load compare this with no. of channels by using Erlang B model charts. [8]
3. a) Explain the designing of the directional antenna, for  $k=4$ ,  $k=12$  and  $k=7$  with all suitable values explaining each of them, consider a noise margin of 6dB. [8]
- b) With neat sketch explain about Signal reflections in flat and hilly terrain. [8]
4. a) Draw the symmetrical difference pattern and compare it with symmetrical sum pattern. [8]
- b) Explain about Umbrella pattern antennas. [8]
5. a) What are the different techniques to utilize the frequency spectrum, give a brief explanation? [8]
- b) Explain in detail access channels and operational techniques. [8]
6. Write short notes on the following [16]
  - (a) Cell splitting
  - (b) Vehicle locating methods
  - (c) Dropped cell rate
7. a) Why CDMA is needed and explain it with an example? [8]
- b) List the difference between TDMA/FDMA/CDMA. [8]

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**PART-A (22 Marks)**

1. a) Explain the different parts of basic cellular system [3]
- b) Define frequency reuse distance [3]
- c) Draw the antenna equivalent circuit [4]
- d) Explain about access channels. [4]
- e) Define a dropped call rate and explain how it differ from blocked call? [4]
- f) What is BCCH and CCCH? [4]

**PART-B (3x16 = 48 Marks)**

2. a) Explain delay spread, coherence bandwidth and amplifier noise in mobile radio environment. [8]
- b) Explain how co-channel interference is measured in real time mobile radio transceivers. [8]
3. a) Explain about the co-channel interference reduction factor and derive the general formula for C/I. [8]
- b) Briefly explain about multiple knife edge diffraction. [8]
4. a) Explain Sum and difference patterns and their synthesis. [8]
- b) Explain the role of directional antennas for interference reduction. [8]
5. a) What do you understand by non-fixed channel assignment? Describe the corresponding algorithms. [8]
- b) Explain about the Underlay-Overlay Arrangement. [8]
6. a) What are the different types of handoffs? Explain how to implement them? [8]
- b) How the dropped call rate is related to the capacity and voice quality. [8]
7. a) Explain about the TDMA. [8]
- b) With suitable block diagram explain the GSM system. [8]

**IV B.Tech II Semester Supplementary Examinations, July/August - 2017****CELLULAR AND MOBILE COMMUNICATION****(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 THREE questions from Part-B*

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**PART-A (22 Marks)**

1. a) What are the advantages of cellular systems over conventional telephone systems? [4]
- b) What are the various types of non-cochannel interference? [3]
- c) Define the gain of an antenna and write the expression for it. [4]
- d) Explain the advantages of cell sectorization over cell splitting. [4]
- e) What is handoff? Describe its classification. [4]
- f) List out the features of GSM. [3]

**PART-B (3x16 = 48 Marks)**

2. a) Why the shape of a cell is represented with hexagon? Explain with an example. [8]
- b) Define the co-channel interference reduction factor and derive the expression for it. [8]
3. a) Explain the effects of human made structures on mobile propagation. [8]
- b) Explain the functions of diversity receiver with the help of a neat diagram. [8]
4. a) Explain how the interference is reduced by means of directional antennas. [8]
- b) What are the different types of antennas used for mobile station? Explain any one. [8]
5. a) Draw the diagram of frequency management chart and explain different channels in cellular system. [8]
- b) Explain the non-fixed channel assignment technique in detail. [4]
- c) Explain how 'grouping' of channels is achieved. [4]
6. a) What are the various handoff initiation techniques? Explain any one. [8]
- b) Define the dropped call rate and obtain the expression for it. [8]
7. a) What are the various functional blocks in GSM architecture? Explain Network switching subsystem. [8]
- b) Explain the concept of CDMA and write its advantages over TDMA. [8]

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**R10**

**Set No. 1**

**IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015**  
**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) Explain the basic cellular system with neat diagram. [8]  
b) Discuss the propagation attenuation and severe fading in a mobile radio transmission medium. [7]
- 2 a) What is the concept of frequency reuse channels? [8]  
b) Explain the general view of cellular telecommunications system. [7]
- 3 a) Define co-channel interference. How is it measured at the mobile unit and cell site? [8]  
b) What is tilting antenna? How can these antenna patterns reduce the co-channel interference? [7]
- 4 a) Explain the phase difference between a direct path and a ground-reflected path. [8]  
b) Briefly explain the effects due to human made structures. [7]
- 5 a) How interference can be reduced by using the directional antennas at cell site. [8]  
b) Write the short notes on spaced diversity antennas. [7]
- 6 a) Explain about set-up channels. [8]  
b) Write the channel sharing algorithms. [7]
- 7 a) What are the different types of handoffs? Explain how to implement them. [8]  
b) Plot the signal strength for a two level handoff scheme and explain it. [7]
- 8 a) Explain the terms GSM and GPRS. [8]  
b) What is TDMA? Explain TDMA architecture with neat diagram. [7]

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**R10**

**Set No. 2**

**IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015**  
**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 performance criteria of mobile communication systems. [8]  
b) Explain the operation of a cellular system in detail. [7]
- 2 a) Derive the expression for co-channel interference reduction factor. [8]  
b) Why cell splitting and explain the cell splitting. [7]
- 3 a) Explain how co-channel interference is measured in real time mobile radio transceivers. [8]  
b) Write a brief note on designing directional antenna system considering the effect of interference. [7]
- 4 a) Explain the propagation over water or flat open area. [8]  
b) Determine the phase difference between direct path and reflected path. [7]
- 5 a) Explain sum and difference patterns and their synthesis. [8]  
b) Explain about umbrella pattern antennas. [7]
- 6 a) Write notes on channel assignment to travelling mobile units. [8]  
b) Describe various non-fixed channel assignment algorithms. [7]
- 7 a) Discuss the delayed handoffs and advantages. [8]  
b) Discuss various vehicle locating methods at the cell site. [7]
- 8 a) Draw the TDMA frame structure and explain the significance of each slot. [8]  
b) Write notes on reverse CDMA channel signals. [7]

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**R10**

**Set No. 3**

**IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015**  
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**Time: 3 hours**

**Max. Marks: 75**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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- 1 a) Explain the performance of cellular mobile system. [8]  
b) Write short notes on mobile fading characteristics. [7]
- 2 a) Distinguish between the permanent splitting and dynamic splitting. [8]  
b) Describe about desired C/I from a normal case in an omni-directional antenna system. [7]
- 3 What are the different types of non-co-channel interference? [15]
- 4 Explain the designing of the omni-directional antenna under the practical case conditions for  $k=7$ ,  $k=12$  and  $k=19$  with all the suitable values and explaining each of them. [15]
- 5 a) Explain space diversity antennas used at cell site. [8]  
b) Describe the effects of cell site antenna heights and signal coverage cells. [7]
- 6 a) Explain how setup channels are act as control channels in cellular system. [8]  
b) Explain about channel assignment to travelling mobile units [7]
- 7 a) Explain the difference between soft handoff and hard handoff. [8]  
b) How do you find the values of  $\delta$  and  $\mu$  related to the call? [7]
- 8 a) Explain GSM channels and channel modes. [8]  
b) Explain in detail about multiple access scheme. [7]



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**R10**

**Set No. 4**

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**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) Write some limitations of conventional mobile telephone systems. [8]  
b) Explain about the importance of the amplifier noise in the cellular systems. [7]
- 2 a) Explain the concept of frequency reuse channels and frequency reuse distance. [8]  
b) Derive the co-channel interference reduction factor. [7]
- 3 a) Explain the co-channel interference in cellular systems. [8]  
b) Explain the importance of the antenna height in reduction of co-channel interference. [7]
- 4 a) Explain signal reflections in flat and hilly terrain. [8]  
b) Discuss the "Lee Model" for point to point propagation. [7]
- 5 Explain in detail the unique situation of the antenna with neat diagram. [15]
- 6 a) Write notes on non-fixed channel assignment algorithms. [8]  
b) Explain in detail access channels and operational techniques [7]
- 7 a) With a neat diagram explain intersystem handoff. [8]  
b) Write about microcells. [7]
- 8 a) Why HLR and VLR are required in network and switching subsystem? Differentiate them. [8]  
b) Explain GSM services and features. [7]