Dr Amit Basu

17/11/2023

Roll No.....

National Institute of Technology, Hamirpur (HP)

Name of Examination: Dual Degree End- Semester Examination (November-2023)

Department: **Electronics & Communication Engineering** Semester: **9th**

Title of the Course: **Mobile Communication** Course Code: **EC-612**

Time: **180 Minutes** Maximum Marks: **50**

Note:

1. **All the questions are compulsory.**
2. **The Marks of each question is indicated against the question.**

Q. 1. What are the engineer role for starting a cellular system? **[4 Marks]**

Q. 2. Why cell splitting is required and how cell splitting will be done? **[4 Marks]**

Q. 3. Consider a cellular system in which the total available voice channels to handle the traffic are 1,200. The area of each cell is 9 km^2 and the total coverage area of the system is 3,600 km^2. (a) Calculate the system capacity if the cluster size, N is 4. (b) Calculate the system capacity if the cluster size is 7. Does decreasing the reuse factor N, increases the system capacity? Explain and (c) How many times should a cluster of size 7 be replicated to cover the entire cellular area? **[5 Marks]**

Q. 4. Find the signal-to-interference ratio (SIR) for a seven-cell-cluster layout with 120° sectors. Assume that the path loss exponent = 4. **[4 Marks]**

Q. 5. A cellular system uses a frequency reuse factor N = 4 (i = 0, j = 2). If the path loss exponent $\gamma = 4$ and cell radius R = 5 km, fi nd the following quantities in decibels: (a) The SIR for the system with no cell sectoring (b) The SIR for the system when 120° cell sectoring is used (note that worst occurs whenmobile phone is at the furthest point from the interfering towers) and (c) The SIR for the system when 60° cell sectoring is used (note that worst occurs when mobile phone is at the furthest point from the interfering towers). **[5 Marks]**

Q. 6. Discuss relationship between co-channel reduction factor and frequency reuse factor. **[4 Marks]**

Q. 7. Discuss Macro-Cell Propagation Model and COST 231 Model. **[4 Marks]**

Q. 8. With suitable diagram explain different multiple access techniques in detail. **[4 Marks]**

Q. 9. Discuss path loss phenomenon for human made structure. **[4 Marks]**

Q. 10. Discuss GSM channel type in detail. **[4 Marks]**

Q. 11. With Suitable block diagram explain 4G/LTE architecture. **[4 Marks]**

Q. 12. In the two-ray path loss model in Fig. 4.32 if the height of the antenna is h_t and height of the receiver is h_r, then prove that $(d_2 - d_1) \cong 2\, h_t h_r / d$, given that $d >> h_t$ and $d >> h_r$. **[4 Marks]**

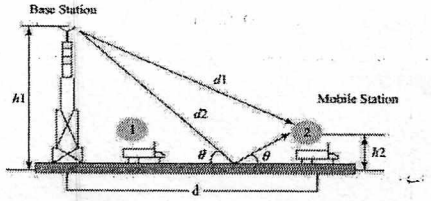

Fig. 1. Two ray model.

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