

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)**

**CLASS: BE  
BRANCH: ECE**

**SEMESTER : VII  
SESSION : MO/19**

**SUBJECT: EC7201 MOBILE AND CELLULAR COMMUNICATION**

**TIME: 3:00 HOURS**

**FULL MARKS: 60**

**INSTRUCTIONS:**

1. The question paper contains 7 questions each of 12 marks and total 84 marks.
  2. Candidates may attempt any 5 questions maximum of 60 marks.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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- Q.1(a) The IEEE 802.11 WLAN operates at 2 Mbps. Determine the data transfer time of 20-kbytes file. [2]  
Q.1(b) Describe briefly at least four applications and limitations of GPRS networks. [4]  
Q.1(c) List the significant improvements introduced in the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> generation standards of cellular communication system. [6]
- Q.2(a) Explain, how capacity of a cellular system and co channel interference is related to the cluster size of the mobile system? [2]  
Q.2(b) Define co-channel reuse ratio and prove that for hexagonal geometry  $Q = \sqrt{3N}$ , where  $N = i^2 + ij + j^2$ . [4]  
Q.2(c) Discuss various methods to increase the cellular system capacity and range extension in detail. [6]
- Q.3(a) Fixed channel assignment schemes do not utilize the available spectrum efficiently. Justify the statement. [2]  
Q.3(b) Explain the concept of channel sharing and channel borrowing techniques. [4]  
Q.3(c) Suggest four different means to increase the radio coverage of a cell in cellular system. The transmitted power of a cell site is increased by 6 dB. For the same minimum received signal power and all other factors remaining unchanged, compute the percentage increase in the coverage area. Assume path loss exponent value as 4. [6]
- Q.4(a) What is log normal shadowing? [2]  
Q.4(b) Determine the maximum speed of a vehicle in a mobile communication system experiencing a maximum Doppler shift of 70 MHz and frequency of transmission 900 MHz. [4]  
Q.4(c) Describe the factors in the propagation channel that influence the small scale fading. Discuss the different types of small scale fading based on delay spread and Doppler spread in detail. [6]
- Q.5(a) Write three different techniques to combat the channel impairments in mobile communication. [2]  
Q.5(b) Distinguish between macroscopic and microscopic diversity. [4]  
Q.5(c) What are various diversity combining techniques? Show analytically that SNR out of the diversity combiner is simply the sum of the SNRs in each branch. [6]
- Q.6(a) Write features of cell-site antennas. [2]  
Q.6(b) Discuss smart antenna in details. [4]  
Q.6(c) Explain schematically normal antenna configuration at the base station for 120 degree sectors. Write important steps in choosing base station location. [6]
- Q.7(a) How does near-far effect influence CDMA system? [2]  
Q.7(b) Define frame efficiency for TDMA system. If a normal GSM time slot consists of six trailing bits, 8.25 guard bits, 26 training bits, and two traffic bursts of 58 bits of data, find the frame efficiency. [4]  
Q.7(c) What are the key issues of contention based and contention free multiple access technique? Explain the main properties of the basic multiple access techniques- FDMA, TDMA and CDMA. [6]

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