

**K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22**  
**(Autonomous College Affiliated to University of Mumbai)**

**End Semester Exam**

Nov – Dec 2022

(B.Tech.) Program: EXTC

Examination: LY Semester: VII

Course Code: EXC702 Course Name: Mobile Communication Systems

**Duration: 03 Hours Max. Marks: 60**

**Instructions:**

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT Level
<b>Q 1</b>	<b>Solve any six questions out of eight:</b>	<b>12</b>		
i)	What are the different channel assignment strategies used in cellular network.	02	1	U
ii)	List factors influencing small scale fading.	02	2	U
iii)	List GSM identifies.	02	3	U
iv)	Write objectives of UMTS Technology.	02	4	U
v)	List technical parameters of LTE.	02	5	U
vi)	Explain features of smart antenna systems in mobile communication.	02	6	U
vii)	Define multipath fading in small scale wave propagation.	02	2	U
viii)	Compare technical parameters of GSM and IS 95 CDMA system.	02	3	U
<b>Q.2</b>	<b>Solve any four questions out of six.</b>	<b>16</b>		
i)	If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses (a) four-cell reuse, (b) seven-cell reuse, and (c) 12-cell reuse. If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell for each of the three systems.	04	1	U

ii)	Explain knife edge diffraction model with required equations and diagram.	04	2	U
iii)	Discuss GSM call procedures with flow diagrams.	04	3	U
iv)	Compare technical specifications of UMTS and CDMA 2000 technology.	04	4	U
v)	Write about Frequency Bands and Spectrum Flexibility in LTE.	04	5	U
vi)	Describe the concept of MIMO antenna systems.	04	6	U
<b>Q.3</b>	<b>Solve any two questions out of three.</b>	<b>16</b>		
i)	Explain techniques used to improve the coverage and capacity of cellular network with diagrams and appropriate equations.	08	1	U
ii)	Explain GPRS architecture with neat diagram.	08	3	U
iii)	Describe Physical, Transport and Logical channels in 4G LTE.	08	5	U
<b>Q.4</b>	<b>Solve any two questions out of three.</b>	<b>16</b>		
i)	A mobile is located 5 km away from a base station and uses a vertical $\lambda/4$ monopole antenna with a gain of 2.55 dB to receive cellular radio signals. The E- field at 1 km from the transmitter is measured to be $10^{-3}$ V/m. The carrier frequency used for this system is 900 MHz. (a) Find the length and the gain of the receiving antenna. (b) Find the received power at the mobile using 2-ray ground reflection model assuming the height of the transmitting antenna is 50 m and the receiving antenna is 1.5 m above ground.	08	2	U
ii)	Describe high level architecture of UMTS with Core network and radio access network with interfaces diagram.	08	4	U
iii)	Explain spectrum sensing in Cognitive Radio Networks with diagram.	08	6	U

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