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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VI**

Branch: Electronics and Communication Engineering **Duration: 3 hrs.**

Course Code: 23EC6PCWCN **Max Marks: 100**

Course: Wireless Communication and Networks

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.
3. Relevant Diagrams are to be illustrated wherever applicable.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Elaborate on a multiple access scheme where multiple users share a single carrier frequency and each user occupies a cyclically repeating Time slot	1	-	**6**
	b)		Consider a mobile station moving from its Home network to visitor network. Comment on how Internet protocol plays a role in the data transfer.	2	*1*	**8**
	c)		Discuss the features of Wi-Fi technology	1	-	**6**
			OR			
2	a)		Explain the architecture of Global System for Mobile Communications with relevant block diagram	1	-	**8**
	b)		Comment with a relevant diagram, how Piconets and Scatternets aid in the transmission and reception of data using master slave topology	2	*1*	**6**
	c)		Consider a narrow Band channel system. Propose a multiple access technique that would be preferred to mitigate interference between forward and reverse link for each of the subcarriers.	1	-	**6**
			UNIT - II			
3	a)		Assume a system of 32 cells with a cell radius of 1.6 km. Total spectral allocation supports 336 traffic channels with a frequency reuse factor of 7. Compute the distribution of number of channels per cell and the total system capacity.	2	1	**6**
	b)		Consider a scenario of a mobile user moving from one cell to another. Discuss in detail the decision to be taken at the boundary of the cells and the strategies to be adopted	2	*1*	**8**

		c)	Define the channel assignment strategies of a cellular network.	2	*1*	**6**
			OR			
	4	a)	Consider a GSM system that uses a TDMA/FDD system with a 25 MHz band for the forward link. This band is divided into radio channels of 200 kHz each. If 8 speech channels (time slots) are supported on a single radio channel, find the number of simultaneous subscribers that can be accommodated in GSM, assuming no guard band.	2	1	**6**
		b)	Consider cellular network in an urban scenario. Propose different methods to improvise capacity of the system when the number of users are scaled up.	2	1	**9**
		c)	Define traffic intensity and Grade of Service in in cellular networks	2	*1*	**5**
			UNIT - III			
	5	a)	Discuss three basic radio wave propagation mechanisms in cellular network	2	*1*	**6**
		b)	If a transmitter produces 50W of power, express the transmit power in units of (a) dbm and b) dBw. If 50 W is applied to a unity gain antenna with a 600 Mhz carrier frequency. Find the received power in dBm at a free space distance of 100 m from the antenna. What is P_r(5 Km) ? Assume unity gain for the receiver antenna	2	1	**6**
		c)	Explain the Ground Reflection (Two-Ray) Model with a neat Schematic diagram and equation. Mention the application where the model is widely used.	3	2	**8**
			OR			
	6	a)	Elaborate on the Free space propagation model	3	2	**6**
		b)	A base station located at a height of 30 m transmits to a user at the distance of 5km at a frequency of 900Mhz. The height of the receiver is 2m. The transmitter's power is 10mW and the gains of the transmitter and the receiver antennas are 8dB and 3dB respectively. 1)find the received power in dBm using free space pathloss model 2)compute the received power in dBm at 1000 MHz	2	1	**6**
		c)	Highlight the features of Explain the Okumara and Hata Model. List applications where these models are applicable	3	2	**8**
			UNIT - IV			
	7	a)	With a relevant block diagram explain the architecture of Evolved Packet Core (EPC) in a LTE Network and explain functions of each entity.	2	*1*	**10**
		b)	Propose a system for transmitting multiple carriers in a LTE network with relevant diagram and detailed explanation. The	2	1	**10**

			system needs to provide a subcarrier spacing of 15KHz. Other assumptions can be suitably made.			
			OR			
	8	a)	Present the frame structure and resource block structure for 20MHz bandwidth in LTE and indicate number of sub carriers	2	*1*	**10**
		b)	Suggest a system for LTE network to receive multiple carriers wherein the receiver is a bank of intermediate frequency demodulators. Discuss in detail its functionality.	2	1	**10**
			UNIT - V			
	9	a)	Consider an urban scenario. Propose a 5G Core Network service based Architecture for the same and explain its functionalities.	3	2	**10**
		b)	Compare D2D and M2M communications in 5G networks	2	*1*	**6**
		c)	Enumerate the features of 5 G network	1	-	**4**
			OR			
	10	a)	Justify the relevance of Ultra-reliable low latency and Machine-Type communication (uMTC) service of 5G network for Autonomous vehicle control and Industrial automation respectively	3	2	**8**
		b)	Propose a radio antenna technology for a 5G network which uses MIMO and mention its primary benefits.	2	1	**6**
		c)	Highlight the requirements and key performance indicators for a 5G network.	1	-	**6**

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