U.S.N.										

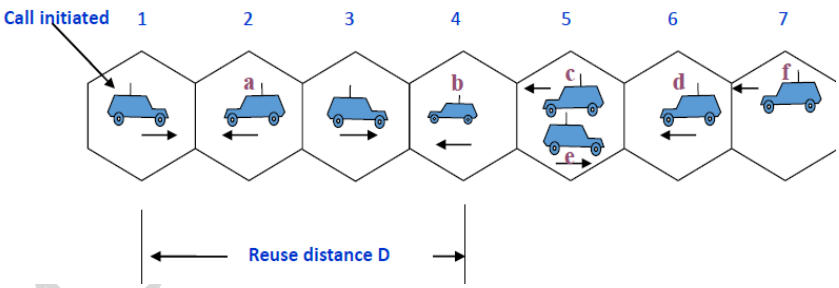
B.M.S. College of Engineering, Bengaluru-560019

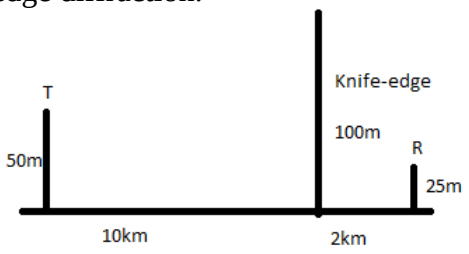
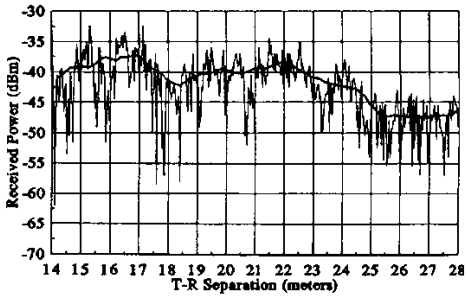
Autonomous Institute Affiliated to VTU

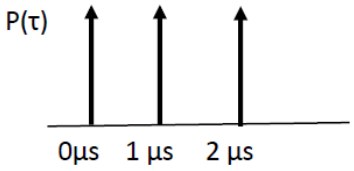
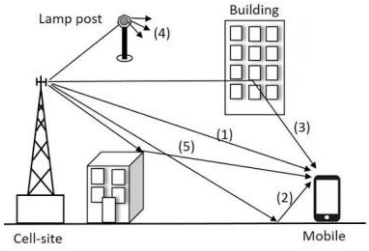
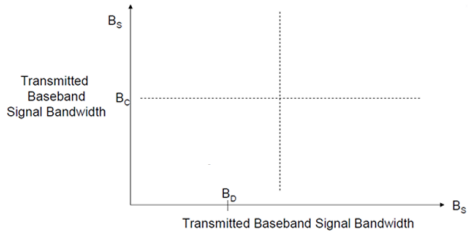
January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: Electronics and Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 19ET7PCWCM **Max Marks: 100**
Course: Wireless Communication

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	CO	PO	Marks
1	a)		Briefly discuss the evolution of wireless communication from 1G to 5G in terms of speed, technology and key features	CO1	-	**08**
	b)		There are 7 cells in the given cellular system. A call is initiated by a high-speed mobile user in cell1. (1) Which channel would be assigned to the user? (2) If a mobile user in cell 2 is a pedestrian user, which channel is assigned? (3) Which channel is assigned to a user in cell3 assuming that the users in cell 6 and 7 are stationary? Justify your answer. 	CO2	PO1	**06**
	c)		A spectrum of 30 MHz is allocated to a wireless FDD cellular 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 re use (b) Seven cell reuse Comment on the capacity of the system with increase in the frequency reuse	CO2	PO1	**06**
			OR			
2	a)		Explain the channel assignment strategies for efficient utilization of the radio spectrum	CO1	-	**08**
	b)		Analyse the near far effect under 2 different scenarios with a neat diagram, suitable justification, and solution to overcome the effect	CO3	PO2	**06**

		c)	Given a cellular system with a total bandwidth of 30MHz which uses two 25KHz simplex channels to provide full duplex voice and control channels. Assuming that the system uses a none-cell reuse pattern and 1MHz of the total bandwidth is allocated for control channels. (i) Calculate the total available channels (ii) Determine the number of control channels (iii) Determine the number of voice channels per cell (iv) Determine an equitable distribution of control and voice channels in each cell	*CO2*	*PO1*	**06**
			UNIT - II			
	3	a)	For the knife edge geometry, prove that $$v = \alpha\sqrt{\frac{2d_1d_2}{\lambda(d_{1+}d_2)}}$$	*CO2*	*PO1*	**08**
		b)	Explain three basic propagation mechanisms	*CO1*		**06**
		c)	Given the following geometry, determine the loss due to knife-edge diffraction. 	*CO2*	*PO1*	**06**
			OR			
	4	a)	If a transmitter produces 50W of power, express the transmit power in units of (a) dBm (b) dBW. If 50W is applied to a unity gain antenna with a 900MHz carrier frequency, find the receiver power in dBm at a free space distance of 100 m from the antenna. What is Pr (10km)? Assume unity gain for the receiver antenna.	*CO2*	*PO1*	**08**
		b)	Explain with necessary equations, the Okumara model for signal prediction in urban areas	*CO1*		**06**
		c)	Analyse the graph shown in the fig. and comment on the fading effects 	*CO3*	*PO2*	**06**
			UNIT - III			
	5	a)	Analyze and evaluate fading effects due to Doppler spread.	*CO3*	*PO2*	**08**
		b)	Consider a transmitter which radiates a sinusoidal carrier frequency of 1850 MHz. For a vehicle moving 60 mph, compute	*CO2*	*PO1*	**06**

			the received carrier frequency if the mobile is moving (a) directly towards the transmitter, (b) directly away from the transmitter, (c) in a direction which is perpendicular to the direction of arrival of the transmitted signal.			
		c)	For the following power delay profile (a) Calculate the rms delay spread (b) Mean excess delay. 	*CO2*	*PO1*	**06**
			OR			
	6	a)	Explain the physical factors that influence small scale fading	*CO1*		**08**
		b)	Analyze the diagram and comment on the main effects due to which the RF signal suffers when propagating through a wireless medium. With proper justification, indicate the direct and multipath components. 	*CO3*	*PO2*	**06**
		c)	Analyse the fading matrix given below and complete the matrix with appropriate fading techniques in four quadrants with proper justification 	*CO3*	*PO2*	**06**
			UNIT - IV			
	7	a)	Discuss the teleservices provided by GSM	*CO3*	*PO2*	**08**
		b)	Analyze the various fields of a normal transmission burst in GSM	*CO2*	*PO1*	**06**
		c)	Analyze the handover between BTSs belonging to the same BSC	*CO3*	*PO2*	**06**
			OR			
	8	a)	Analyze the air interfaces in GSM with a neat diagram	*CO3*	*PO2*	**08**
		b)	Explain the major benefits of power control in GSM	*CO1*		**06**
		c)	Explain the types of broadcast control channels	*CO1*		**06**

			UNIT - V			
	9	a)	Summarize the cell search and synchronization procedure in LTE with a neat diagram.	*CO1*		**08**
		b)	Discuss the principle of OFDMA with a neat diagram.	*CO1*		**06**
		c)	Discuss the type 1 frame structure in LTE.	*CO1*		**06**
			OR			
	10	a)	With a neat diagram, explain the evolution of system architecture from GSM and UMTS to LTE.	*CO1*		**08**
		b)	Discuss the radio spectrum of LTE.	*CO1*		**06**
		c)	How does OFDMA differ from traditional Frequency Division Multiplexing (FDM)? Explain with diagrams.	*CO1*		**06**

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