U.S.N.										

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

Autonomous Institute Affiliated to VTU

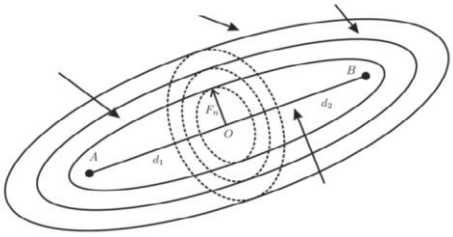
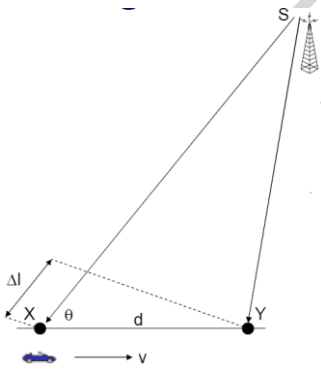
January 2024 Semester End Main Examinations

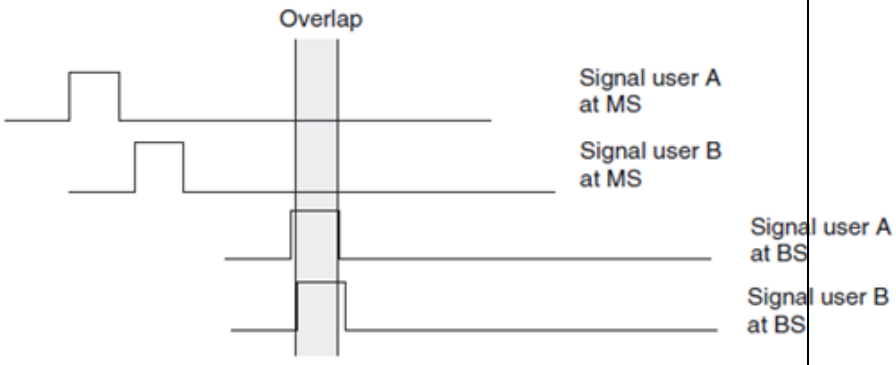
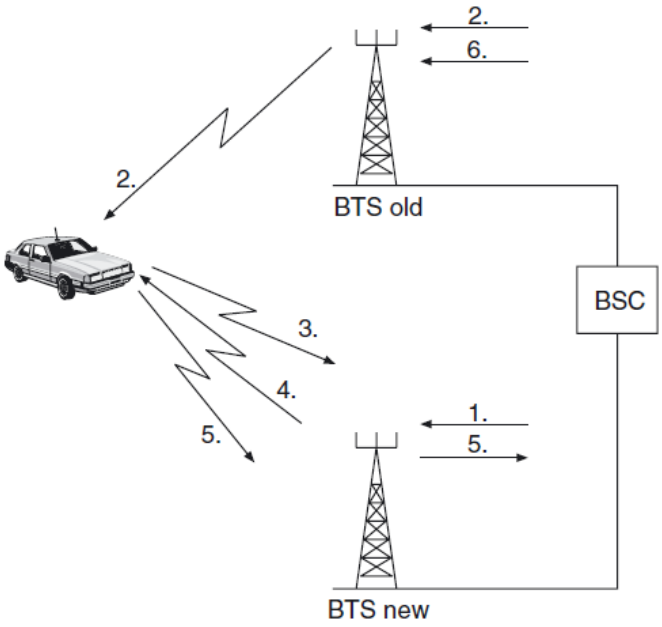
Programme: B.E. **Semester: VII**
Branch: Electronics and Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 19ET7PCWCM **Max Marks: 100**
Course: Wireless Communication

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

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)		Explain the channel assignment strategies for efficient utilization of the radio spectrum	*CO1*	-	**08**
	b)		Derive the relation between any two nearest co-channel cells having hexagonal geometry	*CO 2*	*PO1*	**06**
	c)		A cellular service provider decides to use a digital TDMA scheme which can tolerate signal to interference ratio of 15dB in the worst case. Find the optimal value of N for (a) Omni directional antennas (b) 120^0 sectoring (c) 60^0 sectoring. Should sectoring be used? If so, which case: (60^0 or 120^0) should be used? (Assume a path loss exponent of n=4 and consider trunking efficiency).	*CO2*	*PO1*	**06**
			OR			
2	a)		Illustrate with a neat diagram, handoff scenario at cell boundary	*CO2*	*PO1*	**08**
	b)		Design a cellular system using suitable approach to expand the capacity with optimized handoffs. Clearly indicate the reasons for your design approach	*CO3*	*PO2*	**06**
	c)		Certain area in a cellular system is congested with both high speed and pedestrian users. Design a suitable method to handle both high speed and low speed traffic. Justify your design approach	*CO3*	*PO2*	**06**
			UNIT - II			
3	a)		Analyze the most widely used model for signal prediction in urban areas.	*CO3*	*PO2*	**08**
	b)		Analyze the diagram shown in Fig 3b and derive the expression for F_n.	*CO3*	*PO2*	**06**

			 Fig 3b			
		c)	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 900 MHz carrier frequency, find the receiver power in dBm at a free space distance of 100 m from the antenna. What is P_r (10km)? Assume unity gain for the receiver antenna	*CO2*	*PO1*	**06**
			UNIT - III			
	4	a)	Illustrate with a neat matrix and conditions, a type of fading experienced by a signal as a function of baseband signal bandwidth and as a function of symbol period.	*CO2*	*PO1*	**08**
		b)	For the figure shown in Fig 4b, derive the relation between Doppler shift and the angle θ.  Fig 4b	*CO2*	*PO1*	**06**
		c)	Consider a transmitter which radiates a sinusoidal carrier frequency of 1850 MHz. For a vehicle moving 60 mph, compute 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.	*CO2*	*PO1*	**06**
			OR			
	5	a)	Create a detailed visual representation illustrating the functionality of a RAKE receiver and elucidate its operational principles in the context of wireless communication systems.	*CO3*	*PO2*	**08**
		b)	Analyze and evaluate the practical space diversity considerations.	*CO3*	*PO2*	**06**
		c)	Analyze various techniques employed for enhancing received signal quality in wireless communication	*CO3*	*PO2*	**06**
			UNIT - IV			
	6	a)	Evaluate the architecture of GSM by illustrating a comprehensive diagram	*CO2*	*PO1*	**08**

		b)	Analyze the problem shown in the Fig 6b and suggest a suitable solution to overcome the same.  Fig 6b	*CO3*	*PO2*	**06**
		c)	Identify the type of handover in the Fig 6c and analyze the steps for handover  Fig 6c	*CO3*	*PO2*	**06**
			UNIT - V			
	7	a)	Explain the FDD : Frame Structure Type 1 of LTE	*CO1*	-	**08**
		b)	Discuss the principle of OFDMA with a neat diagram.	*CO1*	-	**06**
		c)	Illustrate the evolutionary system architecture shift from GSM and UMTS to LTE with a neat diagram.	*CO2*	*PO1*	**06**

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