U.S.N.										

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

Autonomous Institute Affiliated to VTU

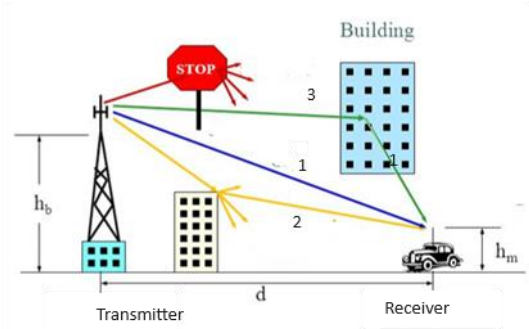
October 2024 Supplementary Examinations

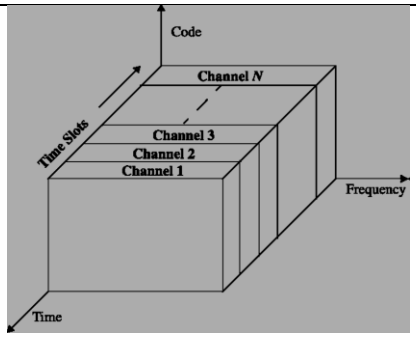
Programme: B.E. **Semester: VI**
Branch: Electronics & Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 22ET6PCWCN **Max Marks: 100**
Course: Wireless and Cellular Networks

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)	Analyze the advancements of mobile communication in the last decade and provide a detailed analysis of its advantages and disadvantages	*CO2*	*PO1*	**08**
	b)	A cellular system has a total of 70 MHz bandwidth allocated for communication. Each simplex channel requires 25 kHz of bandwidth. The system is designed using a frequency reuse factor of 7. Calculate the following: i) The total number of simplex channels available. ii)The number of duplex channels available. ii)The number of channels available per cell.	*CO2*	*PO1*	**07**
	c)	With a neat diagram, explain the spectrum allocated for U.S cellular telephone	*CO2*	*PO1*	**05**
		OR			
2	a)	Technically there has been significant evolution from 3G to 5G networks. Compare and analyze the 3G, 4G and 5G networks based on their technical characteristics.	*CO2*	*PO1*	**08**
	b)	Illustrate with a neat diagram, cellular frequency reuse concept with appropriate equations	*CO2*	*PO1*	**07**
	c)	A cellular system operates with a total of 50 MHz of spectrum allocated for downlink communication. Each cell uses a frequency reuse factor of 4. The system uses LTE technology, where each channel has a bandwidth of 200 kHz. i)If the frequency reuse factor is 4, how many channels per cell are available? ii) Calculate the increase in capacity (in percentage) per cell when reducing the frequency reuse factor from 4 to 3	*CO3*	*PO2*	**05**
		UNIT - II			
3	a)	Find the far field distance for a circular antenna with maximum dimension of 1 m and operating frequency of 900 MHz	*CO2*	*PO1*	**05**
	b)	Given f=900MHz, $d_1=d_2=1$km, h=25m, Compute the diffraction loss.	*CO2*	*PO1*	**05**

		c)	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.  	*CO2*	*PO1*	**05**
		d)	Analyze the empirical path-loss formula of Okumara Model at distance d parameterized by the carrier frequency f_c.	*CO2*	*PO1*	**05**
			OR			
	4	a)	A unit gain antenna with a maximum dimension of 1 m produces 50 W power at 900 MHz. Find the received power at a free space distance of 5 m and 100 m	*CO3*	*PO2*	**06**
		b)	Analyze the empirical path-loss formula of Hata Model	*CO2*	*PO1*	**05**
		c)	A wireless signal at a frequency of 5 GHz reflects off a surface, causing a phase shift. The direct path distance is 50 meters, and the reflected path distance is 55 meters. Calculate the phase shift introduced by the reflection.	*CO2*	*PO1*	**05**
		d)	Equalization and diversity techniques are crucial for improving signal quality and reliability in wireless communication. Justify this statement with supporting arguments	*CO2*	*PO1*	**04**
			UNIT - III			
	5	a)	Analyse the various sub systems of GSM with a neat diagram	*CO3*	*PO2*	**08**
		b)	Analyze and compare logical and physical channels with a detailed analysis of the purpose and implementation	*CO2*	*PO1*	**08**
		c)	Given the duration of a time slot is 576.92µs. Calculate the time duration of a frame, multiframe and superframe.	*CO2*	*PO1*	**04**
			UNIT - IV			
	6	a)	Analyze the reasons to improve communication technology to increase the system capacity	*CO2*	*PO1*	**06**
		b)	Analyse the diagram and its features in the context of wireless communication	*CO3*	*PO2*	**07**

						
		c)	Provide a brief analysis of primary components of LTE i) the Evolved Packet Core (EPC) ii) the Evolved Universal Terrestrial Radio Access Network (E-UTRAN)	*CO2*	*PO1*	**07**
			UNIT - V			
	7	a)	Analyze the spectrum requirements of 5G based on different frequency bands	*CO2*	*PO1*	**06**
		b)	Analyze the Ultra-high reliability and availability feature of 5G with an example	*CO3*	*PO2*	**06**
		c)	5G can be successful only if the pillars it is built on work to their optimum capacity. 5G is based on 10 pillars. Explain the significance of any 4 of the pillars	*CO1*		**08**

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