Q. Code: 411889

Reg. No. | | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE

EXAMINATIONS, MAY 2024

Sixth Semester

EC18604 – WIRELESS COMMUNICATION

(Electronics and Communication Engineering)

(Regulation 2018 / 2018A)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	To characterize wireless channel and evaluate the various wave propagation models.	**5**
CO 2	To analyze various multiple-access techniques adopted in wireless applications and methodologies applied to increase the capacity of cellular systems.	**4**
CO 3	To examine various digital signaling under fading conditions and calculate its error performance.	**5**
CO 4	To investigate various multipath mitigation techniques to retrieve signals under various channel conditions and evaluate its error probability.	**4**
CO 5	To be familiar with wireless standards, generations and analyze its evolutions.	**4**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Mention the features of multipath propagation.	**1**	**2**
2.	Calculate the Doppler spread if the carrier frequency is 900 MHz and velocity is 40 m/s	**1**	**3**
3.	Why the hexagon used as a cell shape in cellular mobile communication?	**2**	**4**
4.	If total transmission bandwidth is 30MHz, zero guard bands, and channel bandwidth is 50KHz, then calculate number of channels in a FDMA based cellular system.	**2**	**4**
5.	Why MSK referred to as fast FSK?	**3**	**3**

6.	Infer the benefits of cyclic prefix.	**3**	**3**
7.	List the techniques used to improve the received signal quality.	**4**	**1**
8.	State the principle of diversity.	**4**	**2**
9.	List the sub-systems of UMTS Terrestrial Radio Access Network.	**5**	**1**
10.	State the purpose of the Authentication Center (AuC) in the GSM security aspects.	**5**	**2**

PART- B (5 x 14 = 70 Marks)

			Marks	CO	RBT LEVEL
11. (a)	**(i)**	Illustrate the free space propagation model with appropriate equations and diagrams, considering a scenario with no obstacles between the transmitter and receiver.	**(10)**	**1**	**3**
	(ii)	Determine the far-field distance for a base station antenna with largest dimension D=1.5m, when the frequency of operation is fc=900MHz, 1800MHz and comment on the result	**(4)**	**1**	**3**
		(OR)			
	(b)	Elucidate the two-ray ground reflection model, deriving the path loss expression and highlighting its significance in wireless communication systems.	**(14)**	**1**	**3**
12. (a)	**(i)**	Investigate the channel allocation strategies employed in cellular radio systems, evaluating their efficiency and impact on system performance.	**(8)**	**2**	**4**
	(ii)	Assume a cellular system of 32 cells with cell radius 1.6km. A total spectrum supports 336 traffic channels and reuse pattern of 7.	**(6)**	**2**	**4**

Calculate the total service area covered with this configuration, the number of channels per cell and a total system capacity.

(OR)

(b)	**(i)**	Analyze the various multiple access techniques, comparing and contrasting their strengths, weaknesses, and suitability for different wireless communication scenarios.	**(10)**	**2**	**4**
	(ii)	Distinguish between co-channel interference and adjacent channel interference, analyzing various aspects.	**(4)**	**2**	**4**
13. (a)		Illustrate the generation and demodulation processes of Minimum Shift Keying signals, incorporating relevant diagrams, equations, and practical applications.	**(14)**	**3**	**3**

(OR)

(b)		Construct a comprehensive block diagram and explain the operational principles of OFDM systems, emphasizing their advantages and real-world applications.	**(14)**	**3**	**3**
14. (a)		Assess the different types of diversity techniques used in wireless communication with necessary analytical models	**(14)**	**4**	**3**

(OR)

(b)	**(i)**	Explain Rake receiver with many correlators to separately detect multiple strongest components.	**(10)**	**4**	**3**
	(ii)	Summarize about the importance of equalization for the mitigation of interference in multipath propagation model.	**(4)**	**4**	**3**
15. (a)		Analyze the features and services of GSM and also explain the GSM system architecture with a neat sketch.	**(14)**	**5**	**4**

(OR)

(b)	Analyze the special features of various standards from 1G to 5G, including their data rates, bandwidth, and capacity. Identify the strengths and weaknesses of each standard, and explain how they have evolved over time.	**(14)**	**5**	**4**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Analyze the various techniques employed to enhance coverage and increase channel capacity in cellular systems by doing a comprehensive analysis	**(10)**	**2**	**4**

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