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Pages: 3

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (R, S) / S6 (PT) (R, S) Examination May 2024 (2019 Scheme)

Course Code: ECT402

Course Name: WIRELESS COMMUNICATION

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks.

		Marks
1	What is meant by frequency reuse in a cellular system.	(3)
2	What are the different types of interferences in Cellular system? Explain.	(3)
3	How does multipath propagation cause small scale fading?	(3)
4	Define Ergodic capacity in the context of wireless communication systems and explain its significance.	(3)
5	Name the multicarrier modulation scheme which completely eliminates the issues due to ISI. What is the principle /technique applied?	(3)
6	Write the expression for bit error probability in BPSK. Name the terms involved.	(3)
7	What are the different types of Diversity in wireless communication?	(3)
8	Differentiate between linear and nonlinear equalizers. Give examples for each	(3)
9	How does the spherical nature of the earth affect ground wave propagation?	(3)
10	Two aircrafts are flying at altitudes of 3 Km and 5 Km respectively. What is the maximum possible distance along the surface of the earth over which they can have effective point to point communication? (Use effective radius of earth with K=4/3)	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	Name any two methods to improve capacity in a cellular system. Explain the features with diagrams.	(8)
	b)	Define trunking and grade of service with relevant formulae.	(6)

OR

12	a)	Compare the important features of 1G,2G, 3G and 4G systems	(10)

b) In a cellular system using a 4-cell reuse pattern with a total bandwidth of 60MHz, if 2 channels of 30 kHz each are needed for a call, how many simultaneous calls can be accommodated in one cell and in one cluster? (4)

Module II

13 a) Define small scale fading. What are the main types of small scale fading? Differentiate between flat fading and frequency selective fading (6)

b) A communication link is to be established between two station using half wave length antenna for maximum directive gain. Transmitter power is 2 KW, distance between transmitter and receiver is 200 Km. What is the maximum power received by the receiver. Frequency of operation is 150 MHz. Gain of transmitter and receiver = 1.64 (8)

OR

14 a) With neat figure derive the expression for path loss in a Two-ray ground model. (8)

b) A wireless channel has channel bandwidth B = 320 kHz and AWGN with noise power spectral density $N_0/2$. It is required to obtain a data rate of 1.6Mbps. Calculate the minimum value of SNR required. (6)

Module III

15 a) What is Orthogonal Frequency Division Multiplexing? Explain the working of OFDM system with necessary block diagrams. (10)

b) What are the applications of OFDM? (4)

OR

16 a) Derive the expression for outage probability of a BPSK in flat fading channels. How is this related to Fade margin? (8)

b) What is Peak-to-Average Power-Ratio (PAPR) in OFDM system? How can it be reduced? (6)

Module IV

17 a) With neat figure explain the operation of a ZF equaliser. (7)

b) Compare the features of TDMA,FDMA and CDMA (7)

OR

18 a) Describe the features of the Selection Combining diversity technique. (9)

b) List the advantages of Adaptive Equalization (5)

Module V

19 a) Define MUF. Derive an expression for MUF in terms of critical frequency, height of the ionospheric region at the point of reflection and skip distance. (8)

b) The critical frequencies for F1 and F2 layers are observed as 5 MHz and 9 MHz respectively. Find the maximum electronic concentration of these two layers. (6)

OR

20 a) Deduce the expression for critical frequency of an ionized region in terms of its maximum ionization density. (8)

b) Calculate the skip distance for flat earth with MUF of 10 MHz. The wave is reflected from a height of 300km where the maximum value of refractive index is 0.9 and critical frequency is 5 MHz. (6)

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