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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (R,S)(FT/PT/WP) Examinations April 2026 (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 cell splitting? How does it improve system performance?	(3)
2	Describe the features of Bluetooth Technology.	(3)
3	How does multipath propagation cause small scale fading?	(3)
4	How is the outage probability computed for a wireless channel?	(3)
5	What is the significance of using cyclic prefix in an OFDM system	(3)
6	Write the expression for bit error probability in BPSK. Name the terms involved.	(3)
7	Describe the selection combining technique used in diversity receivers.	(3)
8	Draw the schematic of uplink and downlink channels used in multiuser systems	(3)
9	How does the spherical nature of the earth affect ground wave propagation?	(3)
10	A receiving antenna is located at 75km from the transmitting antenna. The height of the transmitting antenna is 120m. What is the required height of the receiving antenna?	(3)

PART B

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

Module I

11	a)	Explain the different channel assignment strategies used in cellular system.	(6)
	b)	A total of 33MHz of bandwidth is allocated to an FDD cellular system which uses two 25kHz simplex channels to provide full-duplex voice & control channels. Compute the number of channels available per cell if the system uses 7-cell reuse.	(8)

OR

12 a) Describe any three techniques to improve the capacity and coverage of the cellular system. (8)

b) Explain Trunking and Grade of service with the necessary formulae involved (6)

Module II

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

b) Explain the relation between Doppler spread and Coherence time (6)

OR

14 a) Explain the different categories of fading (7)

b) A transmitter radiates a sinusoidal carrier frequency of 3GHz. For a vehicle moving at a speed of 72Kmph, compute the received frequency if the mobile is moving i) Directly towards the transmitter ii) Directly away from the transmitter (7)

Module III

15 a) Derive the expression for outage probability of a BPSK in flat fading channels. How is this related to Fade margin? (7)

b) Consider a multicarrier system with a total passband bandwidth of 1 MHz and channel delay spread T_m= 20 μs How many subchannels are needed to obtain approximately flat fading in each subchannel? If each subcarrier has a bandwidth of 40 KHz and there is a guard band of 10 KHz between any two subcarriers, how many subcarriers would be required for the same total passband bandwidth of 1 MHz. (7)

OR

16 a) Draw the general block diagrams of a multicarrier transmitter and receiver and explain the steps involved (8)

b) List out the advantages and disadvantages of OFDM (6)

Module IV

17 a) Explain the steps involved in the Least Mean Squares (LMS) algorithm in adaptive equalization? (8)

b) Explain the uplink and downlink features of CDMA (6)

OR

18 a) Describe the features of maximal ratio combining diversity technique (9)

b) Find the outage probability of BPSK modulation at $P_b = 10^{-3}$ for a Rayleigh fading channel with SC diversity for M= 1 (no diversity), M= 2 and M= 3 Assume equal branch SNRs of $\bar{\gamma}$=15 dB (5)

Module V

19 a) Derive the expression for the LOS distance between transmitter and receiver for a) flat earth case and b) considering the equivalent radius of earth to account for refraction. (9)

b) Find the MUF between two antennas separated by a distance of 2500km.The height of ionospheric layer is 300 km and critical frequency is 5 MHz (5)

OR

20 a) Derive the expression for the refractive index of ionosphere (8)

b) Describe the effect of earth's magnetic field on radio wave propagation (6)

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