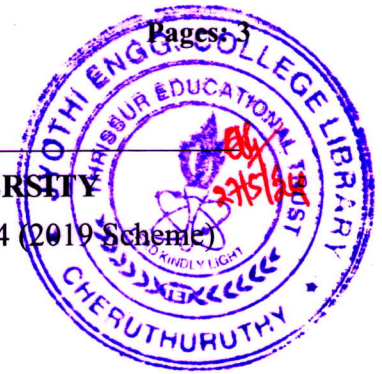


Reg No.: \_\_\_\_\_

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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