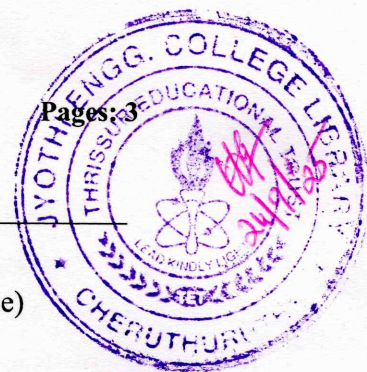


Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S8 (S) Examination September 2025 (2019 Scheme)



Course Code: ECT402

Course Name: WIRELESS COMMUNICATION

Max. Marks: 100

Duration: 3 Hours

PART A

No.	<i>Answer all questions, each carries 3 marks.</i>	Marks
1	List the different types of Wireless LAN topologies.	(3)
2	Describe the different types of handoff schemes used in cellular networks?	(3)
3	Differentiate between flat fading and frequency selective fading?	(3)
4	Explain how Doppler spread affects wireless communication performance parameters.	(3)
5	Analyse the different factors that affect the performance of OFDM systems?	(3)
6	Discuss the advantages and disadvantages of multicarrier modulation?	(3)
7	List the different types of equalization techniques and explain?	(3)
8	Describe the role of power control in CDMA systems.	(3)
9	Differentiate between ionospheric and space wave propagation	(3)
10	Explain the propagation methods of radio waves around the Earth's surface?	(3)

PART B

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

No.	Module I	Marks
11	a) Explain the concept of soft handoff and hard handoff in cellular networks. How do they differ and what are their advantages and disadvantages? b) If a cellular system supports 150 simultaneous calls per cell and each call requires 24 kbps, determine the bandwidth needed for a 4-cell cluster.	(7) (7)
OR		
12	a) Compare and contrast the important performance features of 4G and 5G wireless communication systems.	(7)

- b) Explain the techniques that can be used to improve the capacity of a cellular system? (7)

Module II

- 13 a) Describe the different types of fading in a wireless system. How do they impact signal reception? (7)
- b) A wireless signal has a Doppler shift of 150 Hz when moving at 60 km/h. Determine the original frequency of the signal. (7)

OR

- 14 a) Discuss the impact of shadowing on wireless channel performance. (7)
- b) Define the Shannon capacity theorem in the context of wireless communication. How does it set the upper limit for data transmission in a given channel? (7)

Module III

- 15 a) How does the cyclic prefix mitigate inter-symbol interference (ISI) in frequency-selective fading channels? (7)
- b) Derive an equation to calculate the average error probability of a BPSK based signalling in a flat fading channel. (7)

OR

- 16 a) Explain the different interferences in OFDM systems. How does it affect data transmission and what techniques are used to mitigate it? (7)
- b) For an OFDM system with a cyclic prefix length of 2 μ s and a maximum channel delay spread of 15 μ s, determine the maximum subcarrier spacing to avoid ISI. (7)

Module IV

- 17 a) Discuss the significance of code division in CDMA systems. How does it allow multiple users to share the same frequency spectrum? (7)
- b) In an FDMA system, the frequency band is divided into 10 sub bands, each supporting a data rate of 2 Mbps. Design a system for 20 users. What access technique is suitable? Determine the data rate for each user. (7)

OR

- 18 a) How can MIMO used to improve the performance of wireless communication systems? (7)

- b) In a multicarrier system with 128 subcarriers, each having a bandwidth of 20 kHz and spaced 20 kHz apart determine the overall bandwidth used by the system. (7)

Module V

- 19 a) Differentiate between tropospheric waves and ionospheric waves? (7)
- b) If a radio signal of 5 MHz frequency is transmitted towards the ionosphere at an angle of 60° with the ground. It takes approximately 2 milliseconds for a round trip after reflecting from the D layer of the ionosphere; calculate the distance from the source at which the signal is first incident on the ground. (7)

OR

- 20 a) What are the different modes by which radio waves propagate around the earth? (7)
- b) Given the critical frequency for the D layer of the ionosphere is 6 MHz, calculate the maximum usable frequency for a radio signal transmitted at an angle of incidence of 30 degrees. (7)
