B.E(FULL TIME) DEGREE ARREAR EXAMINATIONS, MAY 2025

ELECTRONICS AND COMMUNICATION ENGINEERING BRANCH

<u>**EC5008 - WIRELESS COMMUNICATIONNETWORKS**</u>

(REGULATION 2019)

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

Answer ALL Questions

PART-A (10x2=20 Marks)

1. What is ORAN? Mention its benefits over conventional RAN.
2. What is meant by network slicing? Highlights its usage in 5G.
3. Highlight the Gabor transform interpretation of the GFDM.
4. Enumerate the impact of overlapping factor K in FBMC design.
5. Compare the features of OMA and NOMA.
6. Differentiate Half Duplex and Full Duplex relaying techniques.
7. What is Nonlinear Programming? Give mathematical formulation of NLP.
8. Enumerate the distinct characteristics of Geometric and Cone Programming.
9. Define multiplexing gain and diversity gain of MIMO system
10. Why is TDD preferred in massive MIMO?

PART-B (5x13=65 Marks)

11. a. Enumerate the difference between 4G and 5G network architecture and Compare their significant features in terms of various parameters.

(OR)

11. b. Draw the 5G architecture and explain the functions of 5G core.

12. a. With neat block diagram explain the FBMC transmitter and receiver. Highlight its merits and demerits.

(OR)

12. b. With neat block diagram explain the UFMC transmitter and receiver. Compare the significant features of UFMC, GFDM and CP-OFDM.

13. a. Explain the cooperative power domain NOMA and derive the rate equation for Near and Far users. Compare its performance with conventional power domain NOMA.

(OR)

13. b. With suitable example, explain the Sparse code multiple access (SCMA) transmitter and receiver using message passing algorithm.

14. a. Illustrate and explain the various steps involved in problem solving using GA and Ant Colony Optimization.

(OR)

14. b. Explain Particle Swarm Optimization (PSO) and Differential Evolution (DE) algorithm. Explain how PSO is used for optimum power allocation in wireless networks.

15. a. (i) Compare the features of point to point MIMO, Multiuser MIMO and Massive MIMO. **(7)**
    (ii) Explain the Conjugate beamforming for downlink Massive MIMO. **(6)**

(OR)

15. b. Explain the fully and partially connected Hybrid Beamforming Architectures for MU-MIMO.

PART-C (1x15=15 Marks)

16. (i) Identify the suitable numerologies for the 5G systems for the following deployment scenarios: (A) Larger propagation delay spreads, (B) High mobility (C) Low latency applications. Justify your answer. **(8)**
    (ii) Design a matched filter receiver for the user 1 for the Massive MIMO System with K users and M antennas. Derive the SINR for the optimum power scaling. **(7)**