C **Reg. No. :**

Question Paper Code: U4207

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Professional Elective

Electronics and Communication Engineering

21ECV207 - 5G TECHNOLOGY

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. What is mMTC? Why it's used in 5G NR?   CO1 U

2. If a person's mobile phone was designed to work with 4G technology, what will   CO2 App
    happen when a 5G network is rolled out in their area?

3. How do control plane protocols contribute to connection management in 5G?   CO1 U

4. In what ways do the user plane and control plane differ in mobile networks?   CO1U

5. What are the key functions performed by a Cognitive Radio within its cognitive   CO1 U
    cycle?

6. How does measurements work in LTE?   CO1 U

7. What are the mmWave-related tasks?   CO2 U

8. How is 5G signal degradation reduced by massive MIMO (mMIMO) and   CO2 U
    beamforming?

9. How does massive MIMO (mMIMO) and beamforming reduce 5G signal   CO1 U
    degradation?

10. What are the available bands at the mmWave and THz spectrum?   CO1 U

PART – B (5 x 16= 80 Marks)

11. (a) Describe the spectrum bands allocated for 5G communication and their   CO1 U   (16)
         respective frequency ranges. Also Discuss the rationale behind selecting
         these specific frequency bands and the advantages they offer for 5G
         network deployments.

                                    Or

    (b) Illustrate the architecture of a UMTS network and explain the role of its   CO1 U   (16)
         main elements.

12. (a) Describe the high-level core network architecture of 5G using a service-based approach.   CO1 U   (16)

Or

(b) The statement 'Virtualization is everything in the 5G world' is often cited in modern network design. Justify whether this statement is true or false by applying your understanding of 5G architecture and network functions.   CO1 U   (16)

13. (a) In the context of SON-enabled 5G systems, classify the research obstacles and terminal attributes necessary to meet the demands of energy efficiency, high data rates and multi-RAT support.   CO2- App   (16)

Or

(b) How will you apply the concept of software-defined networking to reduce the latency in 5G technology?   CO2- App   (16)

14. (a) Compare and contrast radiation pattern–reconfigurable antennas and frequency–reconfigurable antennas based on their reconfiguration techniques, application domains, design complexity and system-level impact.   CO3- App   (16)

Or

(b) Design a polarization-reconfigurable antenna for 5G Wireless Communications.   CO3- App   (16)

15. (a) Evaluate the trade-offs involved in selecting mmWave channel measurement techniques and analyze their operational principles, accuracy and cost and deployment feasibility in both fixed and mobile scenarios.   CO5- Ana   (16)

Or

(b) Analyze the integration of TDD with 5G technologies such as massive MIMO and beamforming and its impact on network performance across different application scenarios.   CO5- Ana   (16)