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**Question Paper Code: U9407**

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2024

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. If a person's mobile phone was designed to work with 4G technologies, what will happen when a 5G network is rolled out in their area? CO2-App
2. How will 5G network use cases change the world? CO2 -App
3. Compare 5G NR and 4G (LTE). CO1-U
4. Is IMT-2000, IMT-Advanced or IMT-2020 3G, 4G or 5G? CO1-U
5. Identify and narrate the technology used to overcome the challenges of degradation in QoE associated with mobility, handover operations and spectrum aggregation. CO2 -App
6. What are the Key challenges and potential solutions of Small Cell Deployment for various conditions? CO2 -App
7. "Think of a city with many Wi-Fi hotspots to ensure constant connectivity, in this instance, how will the continuous connection be ensured? CO4 -App
8. "Remote surgery performed by a doctor on the other side of the world with near-instant feedback". Identify the role of 5G technology in this particular case. CO4 -App
9. How does massive MIMO (mMIMO) and beam forming reduce 5G signal degradation? CO1 -U
10. What are the available bands at the mmWave and THz spectrum? CO1 -U

PART – B (5 x 16= 80 Marks)

11. (a) Summarize the Road map of the evolution of cellular technology, highlighting the representative applications, from 1G to 5G. CO1 -U (16)
- Or
- (b) Describe IMT-2020 use cases and mapping to usage scenarios. CO1 -U (16)
12. (a) Develop a context model using Resources, Actors, Ambient and Policies. Justify How the model adds value to the next stage of IoT evolution by using context ambient to bring about predictive and proactive modelling in understanding context and context awareness. CO3- Ana (16)
- Or
- (b) Identify and analyze various control-plane protocols are, among other things, responsible for connection setup, mobility, and security. CO3-Ana (16)
13. (a) “5G devices will be expected to possess a variety of attributes in order to be able to provide energy-efficient and high-speed connectivity to the end user, whilst being multi-mode in nature”. Classify research obstacles and important attributes of a 5G terminal that will achieve the above-mentioned scenario. CO2-App (16)
- Or
- (b) Applying the long-term evolution concept, analyze the need for SON in 5G and 6G to meet requirements for high-speed mobile networks. CO4-App (16)
14. (a) Obtain the Constellation diagram of a single-carrier 16-qam signal without (left) and with (right) LO phase noise. CO3-App (16)
- Or
- (b) Compare the performance of power spectral density and dynamic range carrier frequency with mm-wave technology aspects. CO4 Ana (16)

15. (a) “Millimeter-wave (mmWave) and terahertz (THz) frequencies have gained significant attention in recent years due to their potential for high data rates and low latency in wireless communication systems. However, the use of these frequencies for wireless communication presents unique challenges in terms of antenna design and propagation characteristics”. Analyze the technical aspects and challenges of mm Wave and THz antennas and propagation for the above mentioned context. CO5 -Ana (16)

Or

- (b) Analyze the mmWave channel measurements efforts for various environments. CO4-Ana (16)

