**Printed Page:-** 04 **Subject Code**:- **AEC0603**

**Roll. No:**

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**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA**

**(An Autonomous Institute Affiliated to AKTU, Lucknow)**

**B.Tech**

**SEM: VI - THEORY EXAMINATION (**2022-2023.**)**

**Subject: 5G Technology**

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

**General Instructions:**

**IMP:** *Verify that you have received the question paper with the correct course, code, branch etc.*

**1.** *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

**2.** *Maximum marks for each question are indicated on right -hand side of each question.*

**3.** *Illustrate your answers with neat sketches wherever necessary.*

**4.** *Assume suitable data if necessary.*

**5.** *Preferably, write the answers in sequential order.*

**6.** *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*



**SECTION A** **20**

**1. Attempt all parts:-**

1-a. What is relevant for 5G? (CO1) 1

(a) 5G is the 5th generation mobile network

(b) It is a new global wireless standard after 4G

(c) 5G wirreless technology meant to deliver higher multi-Gbps peak data speed

(d) All of the above

1-b. Which protocol is used for network slicing in 5G? (CO1) 1

(a) HTTP

(b) TCP

(c) SIP

(d) PFCP

1-c. What is channel modelling? (CO2) 1

(a) The process of designing a communication channel

(b) The process of simulating a communication channel

(c) The process of optimizing a communication channel

(d) The process of testing a communication channel

1-d. Which of the following is not a use case for 5G? (CO2) 1

(a) Enhanced mobile broadband

(b) Personal area network

(c) Massive machine-type communications

(d) Ultra-reliable low-latency communications

1-e. How does beamforming help the signal travel further? (CO3) 1

(a) By using the power amplifier alone

(b) By focusing the energy in a specific direction

(c) By using larger bandwidth

(d) By increasing the beamwidth

1-f. Space diversity also known as _____ (CO3) 1

(a) Antenna diversity

(b) Time diversity

(c) Frequency diversity

(d) Polarization diversity

1-g. Which is a common function used to provide QoS in the management plane? (CO4) 1

(a) SLA

(b) Policy

(c) Traffic restoration

(d) All of the above

1-h. Which of the following is a QoS metric that is improved with 5G technology in terms of reliability? (CO4) 1

(a) Availability

(b) Maintainability

(c) Serviceability

(d) All of the above

1-i. Network slicing is ----------. (CO5) 1

(a) A process of dividing a physical network into virtual networks.

(b) A process of joining virtual networks to form a physical network.

(c) A process of creating a single network for all types of traffic.

(d) None of the above.

1-j. The role of management and orchestration in network slicing is ---------- .(CO5) 1

(a) To configure and provision virtual network functions.

(b) To monitor and manage network slices.

(c) To automate network operations.

(d) All of the above.

**2. Attempt all parts:-**

2.a. What frequency bands are used in 5G NR? (CO1) 2

2.b. What are the advantages of using mm wave technology in wireless communication systems? (CO2) 2

2.c. What is the ray tracing model? (CO3) 2

2.d. What is vertical handoff in 5G? (CO4) 2

2.e. What are the benefits of SDN? (CO5) 2

**SECTION B** **30**

**3. Answer any <u>five</u> of the following:-**

3-a. What is the difference between 5G NR and 4G (LTE)? (CO1) 6

3-b. What is uRLLC? Why it's used in 5G NR? (CO1) 6

3-c. How does the propagation model affect the wireless communication techniques? (CO2) 6

3-d. How does 5G enable greater device density compared to 4G? (CO2) 6

3.e. Describe the channel estimation in massive MIMO. (CO3) 6

3.f. How does 5G enable low-latency applications that require high QoS, such as autonomous vehicles? (CO4) 6

3.g. How does NFV help to reduce network deployment and maintenance costs in 5G networks? (CO5) 6

**SECTION C** **50**

**4. Answer any <u>one</u> of the following:-**

4-a. How mapping of channels is achieved with layers in 5G NR? (CO1) 10

4-b. What is the difference between 4G and 5G protocol stack? Explain.(CO1) 10

**5. Answer any <u>one</u> of the following:-**

5-a. How does 5G impact IoT devices? Explain in detail.(CO2) 10

5-b. What is mm wave technology and how does it work? (CO2) 10

**6. Answer any one of the following:-**

| | | |
|---|---|---|
| 6-a. | What are the key challenges in Channel Estimation in Massive MIMO? Explain briefly.(CO3) | 10 |
| 6-b. | What is the relationship between beamforming and MIMO systems? How does beamforming help in reducing interference and increasing system capacity? (CO3) | 10 |

**7. Answer any one of the following:-**

| | | |
|---|---|---|
| 7-a. | Explain the key parameters used for handover management in 5G. (CO4) | 10 |
| 7-b. | What is the purpose of queueing? Also discuss about QoS flow identifier.(CO4) | 10 |

**8. Answer any one of the following:-**

| | | |
|---|---|---|
| 8-a. | What is network slicing, and how does it work in core networks? (CO5) | 10 |
| 8-b. | How can NFV be used to improve network efficiency and reduce operational costs.(CO5) | 10 |