

Mobile & Wireless Communication (315339)

MSBTE Diploma · K-Scheme · Model Question Paper — Set C

Time: 3 Hours**Max. Marks: 70****Instructions:**

1. All questions are compulsory.
2. Answer each next main question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

Q.1 Attempt any FIVE of the following:**10**

- a) Calculate the cluster size N and the co-channel reuse ratio Q for shift parameters $i = 3$ and $j = 1$.
- b) State the function of the SIM card and the HLR in GSM.
- c) State any four features of 4G LTE.
- d) State the frequency range of the 5G mmWave band and any two of its limitations.
- e) State any four features of NFC.
- f) Define adjacent channel interference.
- g) State any two key performance targets of IMT-2020.

Q.2 Attempt any THREE of the following:**12**

- a) List different wireless communication systems. Explain the paging system with a neat diagram.
- b) Compare N-AMPS and IS-95 on the basis of: i) Generation ii) Multiple access iii) Channel bandwidth iv) Analog/digital.
- c) Draw a basic cellular system and explain the function of mobile station, base station and MSC.
- d) Explain the mobile-terminated call procedure in GSM with a signalling diagram.

Q.3 Attempt any THREE of the following:**12**

- a) Explain co-channel interference. Calculate the S/I ratio in dB for a cluster size $N = 12$ taking six first-tier interferers, for path loss exponents $n = 3$ and $n = 4$.
- b) Compare 3G, 4G and 5G on the basis of: i) Peak data rate ii) Latency iii) Core network iv) Multiple access.

- c) State any four features of Bluetooth. Explain piconet and scatternet with a sketch.
- d) Describe network slicing in 5G. State the role of NSSF.

Q.4 Attempt any THREE of the following:

12

- a) Explain analog, digital and hybrid beamforming. State the significance of beamforming in 5G.
- b) Explain cell splitting and sectoring. For $N = 7$ and $n = 4$, calculate the S/I improvement obtained with 120° sectoring.
- c) List any four applications of vehicular communication and explain V2I communication.
- d) State the limitations of 3G that motivated 4G. List the 3G (IMT-2000) standards with their access technique.
- e) Draw the IEEE 802.11 architecture and state any four features of Wi-Fi.

Q.5 Attempt any TWO of the following:

12

- a) Draw the block diagram of a 3G mobile handset and explain the function of each block.
- b) Compare 5G low, mid and mmWave bands with their advantages and deployment challenges. Calculate the free-space path loss at 1 km for 700 MHz, 3.5 GHz and 26 GHz to support your answer.
- c) Draw the GSM architecture and explain how a call is routed to a mobile user. State the function of VLR, AuC and EIR.

Q.6 Attempt any TWO of the following:

12

- a) Explain the three key usage scenarios of IMT-2020 with applications. State the spectrum requirement of IMT-2020.
- b) Draw the LTE network architecture and explain the function of eNodeB, MME, S-GW, P-GW and HSS.
- c) Explain the applications of wireless communication in: i) Industrial automation ii) Smart cities iii) Media and entertainment.

Note: This is a **model question paper prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in