

BESEM VIII (choice based) Summer 2026

06/06/2026

EXTC.

Duration: 3hrs

[Max Marks: 80]

N.B. : (1) Question No 1 is Compulsory.

(2) Attempt **any three** questions out of the remaining five.

(3) All questions carry equal marks.

(4) Assume suitable data, if required, and state it clearly.

- 1 Attempt **any FOUR** [20]
 - a List the functions of MSC, BS, and Control channel. [5]
 - b Differentiate between CDMA 2000 and WCDMA [5]
 - c State radio specifications of GPRS and LTE [5]
 - d Explain the transmitter and receiver of millimeter wave technology with suitable diagram. [5]
 - e Explain spectrum sensing in detail. [5]
- 2 a A city has a population of 2 million people and three competing cellular networks (A, B, and C). System A has 394 cells with 19 channels each. If the shared user traffic is 0.03 Erlangs and the system is designed for a Grade of Service (GoS) of 2% blocking, find the total number of users System A can support. (Assume Erlang B table gives 12 Erlang of traffic for 19 channels at 0.02 GoS). [10]
- b Draw and explain UMTS network architecture. Give its air interface specifications. [10]
- 3 a What is beamforming? State its types, and explain in detail with suitable diagram. [10]
- b What is fading? Differentiate between large scale fading and small scale fading. Explain the types of small scale fading. [10]
- 4 a A mobile communication system uses a $h_t = 50$ m transmitter antenna and a $h_r = 1.5$ m receiver antenna. If the transmit power is 40W and the distance is 5 km, find the received power. Assume $G_t = G_r = 1$. [10]
- b Illustrate how power control and hand over is achieved 3GPP LTE [10]
- 5 a Draw and explain GPRS network architecture [10]
- b What is CDMA? State its types. Explain the rake receiver [10]
- 6 a Explain frames, slots and symbols used in physical layer of 3GPP LTE. [10]
- b Write a note on (**any TWO**) [10]
 - i) Cognitive Radio
 - ii) Rayleigh Distribution
 - iii) Massive MIMO
