

# CBCS SCHEME

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18EC81

**Eighth Semester B.E. Degree Examination, Dec.2023/Jan.2024**

## **Wireless and Cellular Communication**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. Explain three basic propagation mechanisms. (10 Marks)  
b. Discuss about the parameters coherence bandwidth and delay spread. In what way does it effect the wireless channel? (10 Marks)

OR

- 2 a. Explain free space propagation model with necessary equations. (10 Marks)  
b. Exhibit the difference between fast fading and slow fading channel. (10 Marks)

### Module-2

- 3 a. With block diagram, explain the GSM architecture. (10 Marks)  
b. Explain the GSM hyper frame with TDMA. (10 Marks)

OR

- 4 a. Explain the functions of three layers in a network management subsystem. (10 Marks)  
b. Explain the dedicated control channels. (10 Marks)

### Module-3

- 5 a. With a neat block diagram, explain about CDMA network system architecture. (10 Marks)  
b. Explain about 3G CDMA. (10 Marks)

OR

- 6 a. Explain about the concept of CDMA channels. (10 Marks)  
b. Explain about Layer 3 operations. (10 Marks)

### Module-4

- 7 a. Explain about channel dependent, multi-resource scheduling and signaling for scheduling in downlink and uplink. (10 Marks)  
b. With the help of neat diagram, explain how the timing and frequency synchronization is performed by the receiver to demodulate OFDM signal. (10 Marks)

OR

- 8 a. Discuss about flat IP architecture. (10 Marks)  
b. With a neat diagram, explain SC-FDE. List out the advantages and disadvantages of SC-FDE. (10 Marks)

### Module-5

- 9 a. List the advantages of OFDM leading to its selection for LTE and explain. (10 Marks)  
b. With a neat block diagram of OFDMA down link transmitter and explain the principle of operation. (10 Marks)

OR

- 10 a. With a neat diagram, explain SC-FDMA uplink transmitter. (10 Marks)  
b. Explain about download link OFDMA radio receivers. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

# CBGS SCHEME

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18TE81

## Eighth Semester B.E. Degree Examination, Dec.2023/Jan.2024 Advanced Cellular Communication

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Discuss the reasons for choosing OFDM in LTE. (10 Marks)
- b. Explain the principle of operation of adaptive modulation and coding with a neat block diagram. (06 Marks)
- c. Discuss the two classes of equalizers. (04 Marks)

OR

- 2 a. Write a neat block diagram of EPC architecture along with legacy radio access networks and discuss in brief. (10 Marks)
- b. Explain the steps in developing statistical channel models and discuss fading models in brief. (10 Marks)

### Module-2

- 3 a. With a neat block diagram of OFDM communication system, explain the principle of operation. (10 Marks)
- b. Explaining the spatial multiplexing MIMO system and the key points of single user MIMO model. (10 Marks)

OR

- 4 a. Explain the working of OFDMA downlink transmitter with a neat block diagram. (10 Marks)
- b. Write the block diagram of Receive Diversity and explain the principle of operation. (10 Marks)

### Module-3

- 5 a. Draw the frame structure Type 2 format and explain the various fields. (10 Marks)
- b. Write the structure of downlink resource grid and discuss the three parameters that characterize the resource grid structure. (10 Marks)

OR

- 6 a. Discuss the Radio Interface Protocol stack of LTE. (10 Marks)
- b. Explain the transport channels in LTE. (10 Marks)

### Module-4

- 7 a. Write the block diagram of SC-FDMA baseband signal generation and explain. (10 Marks)
- b. Explain the types of Random Access Procedures in LTE in detail. (10 Marks)

OR

- 8 a. Discuss the function of HARQ feedback in Downlink and Up-link transmission. (10 Marks)
- b. Explain how uplink control information assists physical layer procedures. (06 Marks)
- c. Discuss the uplink reference signals in brief. (04 Marks)

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**Module-5**

- 9 a. Discuss the main services and functions of PDCP sublayer for user plane and control plane. (10 Marks)  
b. With a neat flow diagram, explain mobility management over X<sub>2</sub> interface. (10 Marks)

**OR**

- 10 a. Discuss the main services and functions of RLC and MAC layers. (10 Marks)  
b. With a neat flow diagram, explain the mobility management over S1 interface. (10 Marks)

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18EC823

**Eighth Semester B.E. Degree Examination, Dec.2023/Jan.2024**

## **Radar Engineering**

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Explain conventional pulse radar with a neat block diagram. (10 Marks)  
b. A S band radar has maximum unambiguous range of 60 nmi, with pulse width of 1.5  $\mu$ sec, transmitting a peak power of 800 kW. Find  
i) Pulse repetition frequency  
ii) What is the extent of pulse energy in space?  
iii) How far apart in range must 2 equal size targets be separated?  
iv) Average Power  
v) Duty Cycle (10 Marks)

OR

- 2 a. Discuss the applications of radar in detail. (10 Marks)  
b. Derive simple form of radar range equation and deduce the equation to other forms also. (10 Marks)

### Module-2

- 3 a. Discuss the prediction of range performance and minimum detectable signal in detail. (10 Marks)  
b. Derive the modified radar equation in terms of signal to noise ratio. (10 Marks)

OR

- 4 a. Explain  
i) Microwave Plumbing loss  
ii) Antenna losses  
iii) Signal Processing losses. (10 Marks)  
b. Discuss PRF and range ambiguities with necessary figures and equations. (10 Marks)

### Module-3

- 5 a. With a neat block diagram explain MTI radar. (08 Marks)  
b. Explain sweep to sweep subtraction and SDLC with relevant diagrams. (07 Marks)  
c. An MTI radar operating at  $\lambda = 10$  cm has a PRF of 1 kHz. Calculate the first three blind speeds (05 Marks)

OR

- 6 a. Explain original moving target detector with neat diagram. (10 Marks)  
b. Discuss the compensation for blind phases with neat waveforms and also explain digital MTI processing with block diagram. (10 Marks)

### Module-4

- 7 a. Explain different types of tracking radar systems. (08 Marks)  
b. Discuss amplitude comparison monopulse tracking radar for a single angular coordinate with neat block diagram. (08 Marks)  
c. Describe angle tracking in detail. (04 Marks)

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OR

- 8 a. With a block diagram explain the working principle of conical scan tracking radar. (10 Marks)  
b. Explain phase comparison monopulse in detail. (10 Marks)

**Module-5**

- 9 a. List the functions of the Radar antenna. (06 Marks)  
b. Explain directive gain, power gain, antenna radiation pattern, effective aperture and polarization of radar antenna with necessary equations and figures. (06 Marks)  
c. Discuss Electronically steered phased array antennas. (08 Marks)

OR

- 10 a. Explain different types of radar displays. (10 Marks)  
b. What is the role of duplexers in radar system? Illustrate the transmit condition and receive condition in case of balanced mixer. (10 Marks)

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