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Eighth Semester B.E. Degree Examination, July/August 2022
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 in brief the basic three propagation mechanisms.   **(06 Marks)**
   b. Define :
      i) Delay spread
      ii) Coherence bandwidth
      iii) Doppler spread
      iv) Coherence time.   **(08 Marks)**
   c. Assume a receiver is located 10km from a 50W transmitter. The carrier frequency is 900MHz, free space propagation is assumed, $G_t = 1$, $G_r = 2$, find :
      i) The power at the receiver
      ii) The magnitude of E-field at the receiver antenna
      iii) The rms voltage applied to the receiver input assuming that the receiver antenna has real impedance of 50Ω and is matched to the receivers.   **(06 Marks)**

OR

2 a. Explain cell splitting and cell sectoring.   **(06 Marks)**
   b. Explain the three statistical channel model of a broadband fading channel. **(09 Marks)**
   c. If a transmitter produces 50Watts of power, express the transmit power in units of
      i) dBm and dBw
      ii) if 50Watts is applied to a unity gain antenna with a 900MHz frequency of carrier, find the received power in dBm at a free space distance of 100m from the antenna.
                                                                                  (05 Marks)

Module-2

3 a. Explain with neat block diagram GSM network architecture.   **(10 Marks)**
   b. Explain GSM Hyper frame with neat sketch.   **(10 Marks)**

OR

4 a. Explain GSM identities.   **(10 Marks)**
   b. Explain the types of GSM location updating.   **(10 Marks)**

Module-3

5 a. Explain the CDMA basic spectrum spreading operation with necessary sketches. **(10 Marks)**
   b. Explain forward logical channels of CDMA.   **(10 Marks)**

OR

6 a. Explain CDMA mobile station initialization and call processing states.   **(12 Marks)**
   b. Explain the types of handoff used in CDMA.   **(08 Marks)**

Module-4

7 a. Explain OFDM advantages and disadvantages. (10 Marks)
   b. Explain with neat block diagram flat LTE SAE architecture. (10 Marks)

OR

8 a. Explain the differences between OFDM and SCFDE with neat block diagrams. (10 Marks)
   b. Write a note on :
      i) Frequency synchronization
      ii) The Peak to Average Ratio (PAR) (10 Marks)

Module-5

9 a. Explain with neat block diagram OFDMA downlink transmitter. (10 Marks)
   b. Mention SC-FDMA advantages and disadvantages. (05 Marks)
   c. Mention OFDMA advantages and disadvantages. (05 Marks)

OR

10 a. Explain LTE end to end network architecture with neat block diagram. (10 Marks)
   b. Explain LTE frame structures. (10 Marks)

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Eighth Semester B.E. Degree Examination, July/August 2022
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. Derive simple form of radar range equation.   (10 Marks)
   b. Define radar and explain basic principle of radar.   (10 Marks)

OR

2 a. Explain block diagram of a radar with a neat diagram and explain each block. (10 Marks)
   b. Explain various applications of radar.   (10 Marks)

Module-2

3 a. Define noise figure and derive modified radar range equation. (10 Marks)
   b. Discuss with equation and graph the probability of false alarm. (10 Marks)

OR

4 a. Explain the radar cross section of sphere and cone sphere targets. (10 Marks)
   b. Discuss briefly the following types of system losses in radar: i) Microwave plumbing losses
       ii) Antenna losses   iii) Duplexer losses   iv) Connector losses. (10 Marks)

Module-3

5 a. With a neat block diagram, explain simple CW Doppler radar. Also mention the advantages
       and disadvantages.   (10 Marks)
   b. Derive equations for clutter attenuation and MTI improvement factor. (10 Marks)

OR

6 a. With a neat block diagram, explain the original Moving Target Detector (MTD) signal
       processor.   (10 Marks)
   b. Explain the working of digital Moving Target Indicator (MTI) Doppler signal processor with
       neat diagram.   (10 Marks)

Module-4

7 a. Explain types of tracking radar systems.   (10 Marks)
   b. Explain the block diagram of conical scan tracking radar.   (10 Marks)

OR

8 a. Define monopulse tracker. Using block diagram explain amplitude comparison monopulse
       tracking radar for a single angular coordinate.   (10 Marks)
   b. Discuss the concept of phase comparison monopulse.   (10 Marks)

Module-5

9 a. List the different functions served by radar antenna.   (10 Marks)
   b. Explain different types of radar display system.   (10 Marks)

OR

10 a. Write a note on reflector antennas.   (10 Marks)
   b. What is the role of duplexer's in radar system? Illustrate the transmit condition and receive
       condition in case of balanced mixer.   (10 Marks)

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Eighth Semester B.E. Degree Examination, July/August 2022
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. Explain flat LTE SAE architecture. **(08 Marks)**
   b. Explain with a neat diagram, adaptive modulation and coding. **(07 Marks)**
   c. Consider a user in downlink of a cellular system where the desired base station is at a distance of 0.5km and the interfacing base stations :
   i) B_1 and B_2 located at a distance of 1 km
   ii) B_3 and B_4 located at a distance of 2 km
   iii) B_6 to B_{11} treated at a distance of 2.66km. Each of the stations transmitted power at the same level. Find the SIR when the path loss exponent $\alpha = 3$ and also when $\alpha = 5$. **(05 Marks)**

OR

2 a. Explain the advantages of OFDM for LTE. **(08 Marks)**
   b. Discuss the delay spread and coherence bandwidth with relevant expressions. **(06 Marks)**
   c. Explain convolution and turbo codes. **(06 Marks)**

Module-2

3 a. Write the block diagram of OFDMA downlink transmitter and explain the principle of operation. **(10 Marks)**
   b. Explain OFDM in LTE with a neat diagram. **(10 Marks)**

OR

4 a. With a neat diagram, explain how the timing and frequency synchronization is performed by the receiver to demodulate an OFDM signal. **(10 Marks)**
   b. Compare V – BLAST and D – Blast uncoding techniques in detail with relevant diagrams. **(10 Marks)**

Module-3

5 a. Discuss in detail the broadcast and multicast channels. **(06 Marks)**
   b. Write the frame structure Type 2 and explain the various fields applicable to TDD mode. **(08 Marks)**
   c. Explain the hierarchical structural of LTE in terms of physical channels. **(06 Marks)**

OR

6 a. Discuss the radio interface protocol stack of LTE. **(10 Marks)**
   b. Explain in detail the principles of design used in LTE. **(10 Marks)**

Module-4

7 a. Explain with a mapping diagram the control unlink information. **(10 Marks)**
   b. Explain briefly the function of H-ARQ feedback in Downlink and uplink transmission. **(10 Marks)**

OR

8 a. Discuss the scheduling and resource allocation in LTE.   (10 Marks)
   b. Explain in brief the types of Random Access procedures in LTE.   (10 Marks)

Module-5

9 a. Explain RRC states and its functions.   (10 Marks)
   b. Discuss the intercell interference co-ordination in downlink and uplink.   (10 Marks)

OR

10 a. Explain the data transfer modes and the main services and functions of RLC sublayer.
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   b. Explain the format of status of PDU and MAC.   (10 Marks)

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