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Eighth Semester B.E. Degree Examination, June/July 2023
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. Derive the Friis free space equation for power received by an antenna situated at a distance 'd' for free space propagation model. **(10 Marks)**

   b. Find the received power level at a distance of 10km. Given a transmitter produces 50W of power.
   i) Express the transmit power in dBm
   ii) Express the transmit power in dBw
   If d_0 is 100m and the received power at that distance is 0.0035mw, then assume that the transmit and receive antennas have unity gains. **(08 Marks)**

   c. Define the following terms :
   i) Path loss
   ii) Antenna gain. **(02 Marks)**

OR

2 a. Derive the Total Electric Field $[E_{Total}]$ Equation For Ground Reflection [Two – Ray] model. **(10 Marks)**

   b. Give the following geometry, determine :
   i) The loss due to knife – edge diffraction
   ii) The height of the obstacle required to induce 6 dB diffraction loss. Assume f = 900MHz.

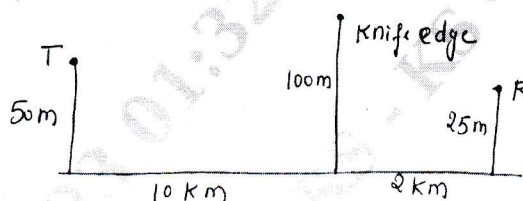
Fig.Q2(b)   **(10 Marks)**

Module-2

3 a. Discuss GSM signaling model with a neat diagram. Explain signaling between the MSC, BSS and MS in a GSM system. Also explain signaling over the GSM after interface. **(12 Marks)**

   b. Explain GSM hyper frame with a neat diagram. **(08 Marks)**

OR

4 a. List out the ten operations in call setup in GSM system, explain in detail Ciphering mode setting and IMEI check. **(10 Marks)**

   b. Explain with detailed flow diagram, the call handover in GSM inter BSC system. **(10 Marks)**

Module-3

5 a. Explain the elements of the cdma2000 packet core network. **(06 Marks)**

   b. Explain CDMA access channel probing. **(08 Marks)**

   c. Explain various types of CDMA handoff. **(06 Marks)**

OR

6 a. Explain the major components of a cdma2000 wireless system with details of network nodes. **(08 Marks)**
  b. Explain the generation of the CDMA paging channel signal with a relevant diagram. **(06 Marks)**
  c. Explain generation of the CDMA reverse traffic channel with a relevant diagram. **(06 Marks)**

Module-4

7 a. Highlight the advantages and disadvantages of OFDM? **(06 Marks)**
  b. Explain IP based flat network architecture used in 3GPP evolution. **(06 Marks)**
  c. Explain how the data blocks preparation using cyclic prefix are represented in OFDM. **(08 Marks)**

OR

8 a. What are the multi antenna techniques incorporated to combat multipath fading. **(06 Marks)**
  b. Explain the concept of OFDM with relevant block diagram. **(07 Marks)**
  c. Describe the feature of SC – FDE system. Also compare its performance with OFDM. **(07 Marks)**

Module-5

9 a. Explain with relevant diagram OFDM uplink transmitter/downlink receiver for K users. **(08 Marks)**
  b. Compare different OFDMA Rate – Adaptive Resource Allocation scheme. Explain the maximum sum rate algorithm. **(08 Marks)**
  c. Explain in brief the design principles of LTE. **(04 Marks)**

OR

10 a. Explain with relevant diagram SC – FDMA uplink receiver. Highlight the advantages and disadvantages associated with the SC-FDMA. **(10 Marks)**
  b. Explain the proportional rate constraint algorithm and proportional fairness scheduling. **(10 Marks)**

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Eighth Semester B.E. Degree Examination, June/July 2023
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. Enumerate key enabling features of LTE4G.   (06 Marks)
    b. Explain IP based flat network architecture.   (06 Marks)
    c. Explain statistical modeling used for broadband fading channels.   (08 Marks)

OR

2 a. What are the advantages and disadvantages of OFDM?   (06 Marks)
    b. Explain shadowing in BWC.   (06 Marks)
    c. Explain the following in brief:
       (i)   Delay spread.
       (ii)   Coherence Band width.
       (iii) Doppler spread.
       (iv)   Coherence time.   (08 Marks)

Module-2

3 a. Explain how the data blocks preparation using cyclic prefix are represented in OFDM.
                                                                                  (08 Marks)
    b. Enumerate how timing and frequency synchronization is achieved in OFDM.   (06 Marks)
    c. Explain the working of OFDM downlink transmitter.   (06 Marks)

OR

4 a. Explain with neat block diagram the concept of OFDM.   (06 Marks)
    b. Describe the features of SC-FDE with a neat block diagram. Also compare its performance
       with OFDM.   (06 Marks)
    c. Explain receive diversity in multiple antenna technique.   (08 Marks)

Module-3

5 a. With a neat diagram, explain end to end network architecture of LTE.   (10 Marks)
    b. With a neat block diagram, explain downlink transport channel processing. (10 Marks)

OR

6 a. Elaborate on protocol stack of LTE radio interface.   (10 Marks)
    b. Explain frame structure type 2 used in LTE.   (10 Marks)

Module-4

7 a. Describe Random access procedures in detail.   (06 Marks)
    b. Discuss two different classes of CQI feedback modes.   (06 Marks)
    c. Explain the importance of H-ARQ f/b for both uplink and downlink.   (08 Marks)

OR

8 a. Explain in detail the process of cell search. **(06 Marks)**
   b. Elaborate on the methods of scheduling and resource allocation to UE's. **(08 Marks)**
   c. Briefly explain uplink reference signals. **(06 Marks)**

Module-5

9 a. Explain main service and function of PDCP. **(06 Marks)**
   b. Discuss different data transfer modes available in MAC/RLC. **(06 Marks)**
   c. Illustrate mobility management over S1 interface. **(08 Marks)**

OR

10 a. Explain the main services and functions of RLC and MAC layers. **(06 Marks)**
    b. Explain RRC states and function with neat sketch. **(06 Marks)**
    c. Explain mobility management over X2 mobility with neat sketch. **(08 Marks)**

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18EC823

Eight Semester B.E. Degree Examination, June/July 2023
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 basic principle of radar. **(10 Marks)**
   b. Show that simple form of radar range equation.

$$R_{max} = \left[\frac{P_t A_e^2 \sigma}{4\pi\lambda^2 S_{min}} \right]$$

   (10 Marks)

OR

2 a. Explain block diagram of a conventional pulse radar with a superheterodyne receiver.
   (10 Marks)
   b. Explain the application of radar. **(10 Marks)**

Module-2

3 a. Define noise figure of receiver and prove that

$$R_{max}^4 = \frac{P_t G A_e \sigma}{(4\pi)^2 KT_o B F_n (S/N)_{min}}$$

   (10 Marks)
   b. Explain probabilities of detection and false alarm in radar receiver. **(10 Marks)**

OR

4 a. Explain Radar cross section of targets. **(10 Marks)**
   b. Briefly explain various radar system losses. **(10 Marks)**

Module-3

5 a. With a neat block diagram explain single delay line canceler. **(10 Marks)**
   b. With a neat block diagram explain MTI radar with power amplifier transmitter. **(10 Marks)**

OR

6 a. Explain digital MTI doppler signal processor with a neat block diagram. **(10 Marks)**
   b. Explain Moving Target Detector (MTD) signal processor with a neat block diagram.
   (10 Marks)

Module-4

7 a. Explain the types of tracking radar systems. **(10 Marks)**
   b. Explain Amplitude-Comparision Monopulse in one angle coordinate with a neat block diagram. **(10 Marks)**

OR

8 a. Explain conical scan and sequential lobing with a diagram.   (10 Marks)
   b. Explain conical scan tracking radar system with a neat block diagram.   (10 Marks)

Module-5

9 a. Explain functions of the radar antenna.   (10 Marks)
   b. Explain different antenna parameters.   (10 Marks)

OR

10 a. Explain receiver noise figure.   (10 Marks)
    b. Explain types of radar displays.   (10 Marks)

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