IT-705E

ADVANCED DATA COMMUNICATION AND CODING

Time Allotted: 3 Hours   Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP A
(Multiple Choice Type Questions)

1.   Answer any *ten* questions. $10\times1 = 10$

(i) IEEE 802.11 supports

(A) Infrared   (B) DSSS
(C) FSS   (D) All of these

(ii) In intra-MSC handover, the hand-off decision is taken by

(A) BTS new   (B) BTS old
(C) BSC new   (D) BSC old

(iii) Which of the following is a signal parameter?

(A) amplitude   (B) frequency
(C) phase   (D) all of these

(iv) A single frame in GSM frame structure consists of

(A) 8 time slots   (B) 10 time slots
(C) 12 time slots   (D) 16 time slots

(v) Hard hand-off was observed till

(A) 1st generation   (B) 2nd generation
(C) 3rd generation   (D) none of these

(vi) Modulation scheme used in GSM is

(A) AM   (B) GMSK
(C) QPSK   (D) FSK

(vii) Maximum unit of BER allowed in optical communication system for faithful digital transmission is

(A) 10^{-19} (B) 10^{-9}
(C) 10^{9} (D) 10^{19}

(viii) Optical bandwidth is always

(A) greter than the electrical bandwidth
(B) less than the electrical bandwidth
(C) equal than the electrical bandwidth
(D) square than the electrical bandwidth

(ix) The interface between MSC and BSC is

(A) radio interface   (B) abis interface
(C) A-interface   (D) SS7

(x) Which multiplexing technique transmit digital signal.

(A) FDM   (B) TDM
(C) WDM   (D) both (A) and (B)

(xi) The baud rate in bunary transmission is

(A) always equal to the bit rate
(B) equal to twice the band width of an ideal channel.
(C) not equal to signalling rate.
(D) equal to one half of the band width of ideal channel.

(xii) If the step size of quantization in PCM is 36 mV the quantization noise is

(A) 36 μW   (B) 72 μW
(C) 108 μW   (D) 18 μW

(xiii) The uplink Frequency of C-band.

(A) 4 GHz   (B) 6 GHz
(C) 8 GHz   (D) none of these

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.   3×5 = 15

2.   Draw and explain the schematic diagram of an optical Communication   5
      system.

3. (a) Write the operating frequency of GSM for uplink and downlink   2
       channels.

   (b) Define the following terms with their functionality: IMSI, IMEI, T-IMSI.   3

4. (a) What is the difference between soft handoff and hard handoff?   2

   (b) What are the advantages and disadvantages of I-TCP?   3

5.   A PCM system uses a uniform quantizer followed by an n-bit encoder.   5
      Shoe that the r.m.s signal to quantization ratio is approximately given as
      $(1.76 + 6n)$ dB.

6. (a) What do you mean by ISI.   2+3

   (b) State and explain Nyquist Criterion for Zero ISI.

GROUP C
(Long Answer Type Questions)

Answer any *three* questions.   3×15 = 45

7. (a) What do you mean by CDMA? Write down the difference between   2+4
       GSM and CDMA.

   (b) Draw and explain the GPRS network structure .   6

   (c) How is the location update taken place in GSM system?   3

8. (a) What is the problem of hidden terminal? How does IEEE 802.11 deal   3+3
       with it?

   (b) Briefly explain the structure of Mobile telephone service.   9

---

9. (a) What are step-index and graded-index optical fibres?   3

   (b) Explain why the performance of multimode graded-index fibre is   3
       improved over multimode step-index fibre?

   (c) Beiefly explains the architecture of Optical Transport Network.   7

   (d) What is bit interleaving?   2

10.(a) Draw and Explain the Block diagram of PCM system.   5+3+3+4

   (b) What is difference between Uniform and Non-uniform quantization?
       What is A-law and μ-law?

   (c) Write down the disadvantages of DM system.

   (d) A television signal having BW of 10.2 MHz is transmitted using binary
       PCM system. Given that the number of quantization level is 512.
       Determine:
              (i) Code word length
             (ii) Transmission BW
            (iii) Final bit Rate
            (iv) Output Signal to Quantization Noise Ratio.

11.(a) With neat block diagram explain the generation and detection of the   5+3+2+5
       BPSK signal.

   (b) What are the limitations of DM. How it can be overcome?

   (c) A binary data is transmitted at a rate of 10^6 bits/sec over a channel
       having a BW of 3 MHz . Assume that the noise power spectral density
       at the receiver is $N_o/2 = 10^{-10}$ W/Hz. Determine the average carrier
       amplitude required at the receiver input for coherent PSK and DPSK
       signaling schemes to maintain $P_e < 10^{-4}$

12.   Write short notes on any *three* of the following   3×5

   (a) SONET
   (b) PDH and SDH
   (c) 3G over 2G
   (d) WDM
   (e) Geosynchronous Satellite