MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

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.
All symbols are of usual significance.

GROUP A
(Multiple Choice Type Questions)

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

(i) IEEE 802.11b has the transfer rate of

(A) 54 mbps (B) 400 mbps (C) 11 mbps (D) none of these

(ii) Bluetooth uses

(A) 4 GHz ISM Band (B) 2.5 GHz ISM Band
(C) 2 GHz ISM Band (D) 3.6 GHz ISM Band

(iii) The access method defined by wireless LAN 802.11 is band on

(A) CSMA (B) CSMA/CD (C) CSMA/CA (D) None of these

(iv) The term 'hand-off' is associated with

(A) analog communication (B) digital communication
(C) satellite communication (D) cellular communication

(v) The normal shape of cell of GSM is

(A) hexagonal (B) circular (C) rectangular (D) triangular

(vi) Which multiplexing technique is used in SONET?

(A) WDM (B) DWDM (C) FDM (D) TDM

(vii) SOA is

(A) Synchronous Optical Amplifier
(B) Semiconductor Optical Amplifier
(C) Serial Optical Amplifier
(D) None of these

(viii) Number of layers in SONET is

(A) 3 (B) 4 (C) 2 (D) 5

(ix) The process of transmitting two or more information signals simultaneously over the same channel is called

(A) multiplexing (B) telemetry (C) detection (D) modulation

(x) If a signal $f(t)$ has energy E, the energy of signal $f(2t)$ is equal to

(A) E (B) E/2 (C) 2E (D) 4E

(xi) Quadrature Multiplexing is

(A) the same as TDM
(B) the same as FDM
(C) a combination of FDM and TDM
(D) different from both TDM and FDM

(xii) Quantizing Noise occurs in

(A) PWM (B) TDM (C) PCM (D) PPM

(xiii) The main advantage of PCM system is

(A) lower BW (B) higher BW (C) lower noise (D) less error

(xiv) The Nyquist Sampling Rate of a Band Limited Signal with BW = 4 kHz is

(A) 4 kHz (B) 8 kHz (C) 2 kHz (D) 16 kHz

(xv) Which encoding technique uses alternating positive and negative values for 1?

(A) NRZ-1 (B) RZ (C) Manchester (D) AMI

(xvi) Comparison of MSK and QPSK schemes show that

(A) MSK requires less power
(B) QPSK requires less power
(C) Filtering is simple in MSK
(D) No comparison

GROUP B
(Short Answer Type Questions)

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

2. What is the function of wavelength switches and wavelength converters? 5

3. Briefly describe the GPRS technology. 5

4. What is Companding? Explain with a graph. 5

5. Prove that BW requirement for a PCM system is given By $BW = nf_m$. 5

6. What do you mean by Nyquist criterion for zero ISI? What is Eye pattern? 2+3

7. Draw the block diagram of a PSK system with neat diagram. 5

GROUP C
(Long Answer Type Questions)

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

8. (a) Explain Optical Transport Network architecture. 7
   (b) Draw and explain GSM architecture. 8

9. (a) What is the problem of channel fading? How it is handled? 3+3
   (b) Briefly explain the structure of Mobile telephone service. 6
   (c) What is bit interleaving? 3

10.(a) Briefly explain early and current technologies used in optical network. 6
   (b) What is handover? Discuss with diagram intra-MSC handover procedure of GSM network? 1+5
   (c) How IPv6 is advantageous that IPv4? 3

11.(a) Draw and explain the block diagram of PCM system. 5
   (b) What is the difference between Uniform and Non-uniform quantization? What is A-law and μ-law? 5
   (c) Write down the disadvantages of DM system. 5

12.(a) 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: 1+2+2
   (i) Code word length
   (ii) Transmission BW
   (iii) Final Bit Rate.
   (b) Explain delta modulation technique. Why delta modulation is called 1-bit DPCM? 5
   (c) Given a sine wave of frequency f_m and amplitude A_m applied to a delta modulator having step size Δ. Show that the slope overload distortion will occur if 5

$$A_m > \frac{\Delta}{2\pi f_m T_s}$$

Here *Ts* is the sampling period.

13. Write short notes on any *three* of the following: 3×5
   (a) CDMA
   (b) Delta Modulation
   (c) WDM
   (d) LEO, MEO, GEO
   (e) VSAT