International Islamic University Chittagong (IIUC)
Department of Electronic & Telecommunications Engineering
Final examination

Program: B.Sc. Engineering
Course Code: - ETE-3601/3621
Full Marks-50

Semester- Spring 2019
Course Title:- Digital Communications
Time- 2.30 Hours

[Answer any two questions from section-A & any three questions from section-B]
[The figures in the right margin indicate full marks]

SECTION-A

Q1. (a) Find out an expression for Mean Square Error (MSE) of uniform quantization. Show the quantization noise power and effective voltage of quantization noise using MSE. 5

(b) A Pulse Coded Modulation (PCM) system of maximum analog input frequency of 3800 Hz has decoded voltage at the receiver varying from – 22 V to +22 V. Find the followings: 5

i. Minimum sampling rate
ii. Number of bits required for encoding
iii. Resolution of quantization levels
iv. MSE of quantization error
v. Effective voltage from the MSE
vi. Quantization noise power for R = 3 kΩ

Use a minimum dynamic range of 30 dB if required.

Q2. (a) Explain the companding? Briefly describe the μ-law and A-law companding characteristics. 03

(b) Describe slope overload distortion and granular noise in delta modulation. 03

(c) Express the equation of prediction gain is defined by $G_p = \frac{\sigma_x^2}{\sigma_E^2}$. 04

Q3. (a) Describe the properties of line coding. 02

(b) Construct the following line coding for the given binary sequence 1001011100. 08

i) Unipolar –NRZ
ii) Polar-RZ
iii) Bipolar-NRZ
iv) Manchester

SECTION-B

Q4. (a) Explain why ISI occurs in digital transmission? 02

(b) Create a constellation diagram of PSK, QPSK 8-PSK and DPSK. Also develop the waveform from the above constellation diagram. 08

Q5. (a) Express the equation of BER for ASK, FSK and PSK. 05

(b) Construct the different constellation diagram of 16-QAM. 05

Q6. (a) Classify the M-ary modulation. 02

(b) Explain the handoff and handover process in cellular communication system. 04

(c) Explain the merits and demerits of CDMA. 04

Q7. (a) Explain the following features of CDMA: 6

i) Spreading
ii) Near-far problem
iii) Self Jamming.

(b) Draw the block diagram of a *direct sequence-spread spectrum* (DS-SS) system transmitter and receiver and explain their operation. 4