

International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Examination -Autumn-2018

Program: B.Sc. Engg. (EEE)

Course Code: EEE-3601

Course Title: Communication theory

Time: 2 hours 30 minutes

Full Marks: 50

Part A

[Answer any two questions from the followings; figures in the right margin indicate full marks.]

- 1(a).** Explain the following terms i) Percent modulation ii) 1% bandwidth 2
- 1(b).** How frequency modulated wave can be obtained by using phase modulator. Derive the equation of Narrow Band FM. 4
- 1(c).** An angle modulated signal with carrier frequency $\omega_c = 2\pi 10^5$ is described by the equation $V(t) = 10 \cos (\omega_c t + 5 \sin 3000t + 10 \sin 2000\pi t)$ 4
- a. Find the power of the modulated signal.
- b. Find the frequency deviation.
- c. Find the phase deviation
- d. Estimate the bandwidth of V(t).
- 2(a).** Design the encoding process for a PCM system. 5
- 2(b).** Design simultaneous sampling and natural sampling; depict the results of these sampling. 5
- 3(a).** Derive the expression for the signal to quantization noise ratio for PCM system that employs linear quantization technique. Assume that input to the PCM system is a sinusoidal signal. 5
- 3(b).** Write down the steps of Pulse Code Modulation (PCM) generation? 3
- 3(c).** Design a sample and hold circuit. 2

Part B

[Answer any three questions from the followings; figures in the right margin indicate full marks.]

- 1(a).** Write down the types of Digital modulation technique. 1
- b).** For a Binary Phase Shift Keying (BPSK) modulator with an input data rate (f_b) equal to 10 Mbps and a carrier frequency of 70 MHz, determine the minimum required bandwidth. 5
- 4(c).** Depict the constellation diagram of a QPSK and QAM modulation system.
- 5(a).** Classify the communication satellite according to its orbit. Contrast the advantages and disadvantages of geosynchronous satellites. 5
- 5(b).** What are the factors that limit the number of sub-channels provided within a satellite channel via FDMA? Also, briefly discuss about the satellite link performance factors. 5
- 6(a).** Design a basic TDMA frame for satellite communication. 4
- 6(b).** Make a comparison between Time-Division Multiple-Access (TDMA) and Frequency-Division Multiple Access (FDMA). 1
- 6(c).** Design a WDM, multiplexing and de-multiplexing system with 10 lesser sources. 5
- 7(a).** What are the common multiple access technologies? Write a very short description about CDMA. Also, differentiate between multiplexing and multiple access technologies. 5
- 7(b).** Four data channels (digital), each transmitting at 1Mbps, use a satellite channel of 1 MHz. Design an appropriate configuration using FDM. 3
- 7(c).** Prove that the minimum bandwidth required for BPSK is equal to the input bit rate. 2