

International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Examination Spring-2019

Course Code: EEE 3601

Time: 2 hours 30 minutes

Program: B.Sc. Engg. (EEE)

Course Title: Communication Theory

Full Marks: 50

Part A

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

- 1(a).** What are the advantages of FM over AM? Write some applications of frequency modulation. CO2 02
- 1(b).** Explain the relationship between FM and PM waves. Sketch the FM and PM waves for the digital modulating signal $m(t)$ shown in Fig. 1.(b). The constants k_f and k_p are $2\pi 10^5$ and $\pi/2$, respectively, and $f_c = 100$ MHz. CO3 04

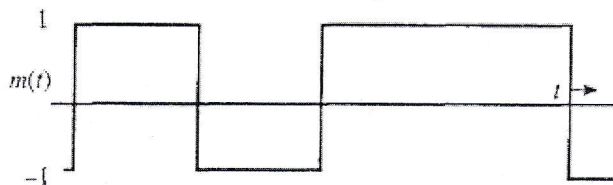


Fig. 1: for question 1(b)

- 1(c).** An angle modulated signal with carrier frequency $\omega_c = 2\pi 10^5$ is described by the equation $V(t) = 10 \cos(\omega_c t + 5 \sin 3000t + 10 \sin 2000\pi t)$ CO3 04
- 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. CO3 C 5
- 2(b).** Design instantaneous sampling and natural sampling; depict the results of these samplings. CO3 E,C 5
- 3(a).** State the sampling theorem. CO1 R,E 2
- 3(b).** Design a sample and hold circuit. CO2 An,E 3
- 3(c).** What are the problems associated with delta modulation? How the problem of slope overload distortion can be solved by adaptive delta modulation? Explain. CO2 05

Part B

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

- 4(a).** Design an Amplitude Shift Keying (ASK) system. CO1 R,U 3
- 4(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 Nyquist bandwidth (f_N) and the baud. CO2 Ap,E 4
- 4(c).** Depict the constellation diagram of a QPSK system. CO2 C 3

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|-------|--|-----|------|----|
| 5(a). | Classify the communication satellite according to its orbit. Contrast the advantages and disadvantages of geosynchronous satellites. | CO1 | | 05 |
| 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. | CO1 | | 05 |
| 6(a). | Discuss about the multilevel multiplexing. Make a comparison between TDM and FDM. | CO4 | | 05 |
| 6(b). | We have four sources, each creating 250 characters per second. If the interleaved unit is a character and 1 synchronization bit is added to each frame, find | CO4 | | 05 |
| | (a) the data rate of each source, | | | |
| | (b) the duration each character in each source, | | | |
| | (c) frame rate | | | |
| | (d) the duration of each frame, | | | |
| | (e) the number of bits in each frame and | | | |
| | (f) the data rate of the link. | | | |
| 7(a). | Show the receiving technique for a QPSK system. | CO3 | Ap,E | 5 |
| 7(b). | What is Minimum shift-keying(MSK)? What are the advantages of MSK . | CO2 | U,R | 3 |
| 7(c). | Write down the difference between Bit rate and baud rate? | CO1 | U,R | 2 |

- CO1 Reflect a basic understanding of analogue and digital communication
- CO2 Understand the application of modulation technique.
- CO3 Solve the problems of difernet modulation.
- CO4 Demonstrate basic proficiency in multiplexing techniques.