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Daffodil International University

Department of Electrical and Electronic Engineering
Faculty of Engineering
Final Examination, Summer-2026

Course Code: 0714-311 | Course Title: Communication Engineering
Section: A, B,C, D, E | Level-Term: L3-T1 | Teacher's Initial: FHT, AB
Full Marks: 40 | Exam Date: August 27, 2026 | Time: 2 Hours

Answer all Questions

[The second right most column indicates the course outcomes with respective Bloom's level and right most column indicates the allocated marks]

Q1. (a) Explain in detail the rectifier detection method used for AM demodulation. CO-2 C(2) 4

(b) Sketch FM and PM wave for the modulating signal m(t) shown in following Fig.1. The constant k_f and k_p are $2\pi\times10^5$ and $10\,\pi$ respectively, and the carrier frequency is 100 MHz. CO-2 C(4) 4

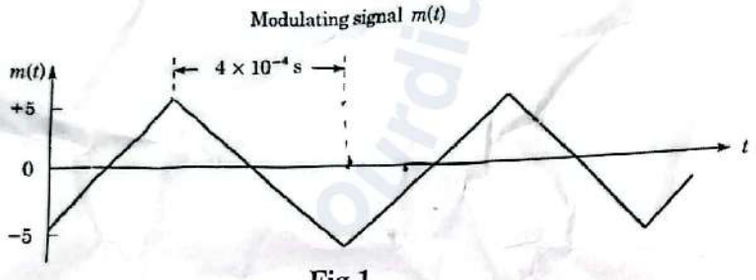


Fig.1

Q2. (a) State sampling theorem. Explain aliasing effect with figures. CO-2 C(2) 3

(b) An analog message signal m(t) is bounded between −12 V and +12 V. A 3-bit PCM system is used to transmit the signal. The sampler produces the following voltage samples at discrete time intervals: 10.2, 8.4, 4.7, 1.2, −1.6, −5.1, −8.4, −10.1 V CO-4 C(4) 5

(i) Calculate the quantization step size (Δ).
(ii) Determine the quantized voltage values mq (nTs) and their corresponding binary codes using a Mid-Rise quantizer, and show the graphical representation.
(iii) Calculate the quantization noise for the first and last sampled data point in the mid-rise scheme.

Q3. (a) For the binary data sequence 1100101, **sketch** the ASK, FSK, and BPSK carrier waveforms corresponding to each bit. Label the amplitude, frequency, and phase changes where applicable. CO-2 C(3) 3

(b) Determine (i) the peak frequency deviation, (ii) minimum bandwidth and (iii) baud for a binary FSK signal with a mark frequency of 50 kHz, a space frequency of 46 kHz and an input bit rate of 2 kbps. CO-2 C(3) 3

(c) List the advantages and limitations of direct generation method of FM signal? CO-2 C(1) 2

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Q4. **(a)** **Illustrates** the FDM multiplexing and demultiplexing processes with diagram. Explain why guard bands are required between adjacent channels. CO-2 C(2) 5

(b) An FDM system combines six channels, each having a bandwidth of 80 kHz. If a guard band of 8 kHz is required between adjacent channels. **Determine** the total bandwidth required for the transmission link and clearly label the bandwidth of each channel, guard bands, and the total transmission bandwidth on the diagram. CO-2 C(3) 3

Q5. **(a)** A digital communication system receives the binary sequence **10101100**. **Sketch** the corresponding waveforms using Unipolar NRZ, Unipolar RZ, Polar NRZ, and Polar RZ line coding techniques. 4

(b) **Differentiate** between 4

(i) serial and parallel data transmission

(ii) synchronous and asynchronous data transmission