



Daffodil International University
Department of Electrical and Electronic Engineering
Faculty of Engineering
Midterm Examination, Summer-2026

Course Code: 0714-311
 Section: A,B,C,D,E
 Full Marks: 25

Course Title: Communication Engineering
 Level-Term: L3-T1
 Exam Date: July 4, 2026

Teacher's Initial: FHT, AB
 Time: 1.5 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) Describe a general communication system with a neat block diagram. Explain the function of each block in detail. CO-1 3
C(2)
- (b) Discuss the major challenges faced in communication systems. CO-1 2
C(2)
- Q2. (a) State Shannon's channel theorem in a noisy channel. CO-1 1
C(1)
- (b) A receiver front-end consists of two cascaded amplifiers, amplifier 1 (A1) and Amplifier 2 (A2). The input signal power fed into the first stage is $5\mu\text{W}$ and the accompanying input noise power from the source antenna is 40nW . CO-1 2.5+
C(3) 2.5
- Amplifier 1 is an ideal amplifier which is placed first with a power gain of 13dB and Amplifier 2 is a non-ideal amplifier with a power gain of 20dB and an internal noise power of 360 nW (referred to its own input). Determine the following
- (i) Input and Output SNR of each amplifier
- (ii) Noise factor and noise figure of each amplifier.
- Q3. A baseband message signal is given by $m(t) = \cos 500\pi t$ and the radio-frequency carrier signal is given by $c(t) = \cos 1000\pi t$, where $\omega_c > \omega_m$. CO-2 3+3
C(3)
- (a) Using a multiplier modulator, derive the mathematical expression for the generated DSB-SC signal, $s(t)$. Sketch the frequency spectrum of
- (i) original message signal, $m(t)$.
- (ii) The generated DSB-SC signal, highlighting USB and LSB.
- (b) Further, using a coherent demodulator, derive the expression for the recovered signal and explain the demodulation process. Also sketch the frequency spectrum of the
- (i) combined signal before it passes through the appropriate filter
- (ii) the final spectrum after filtering.
- Q4. Explain the working of a non-linear DSB-SC modulator operating as a single balanced modulator. Derive the output expression and illustrate the frequency spectrum of the generated DSB-SC wave with suitable diagrams. Also state why the modulator is referred to as a single balanced modulator. CO-2 5
C(3)

Q5. Sketch the AM signal $[A+m(t)]\cos(\omega_c t)$ for the periodic triangular modulating signal $m(t)$ shown in the Fig.1, corresponding to the following modulation indices: CO-2 3
C(3)

(ii) $\mu=0.5$

(ii) $\mu=1$

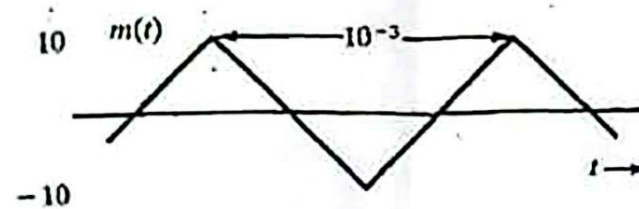


Fig.1