VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF ELECTRONICS ENGINEERING

CONTINUOUS ASSESSMENT TEST - I

WINTER SEMESTER 2025-2026

SLOT: B2+TB2

Programme Name & Branch : B.Tech & Electronics and Communication Engineering
Course Code and Course Name : BECE304L - Analog Communication Systems
Faculty Name(s) : Dr.A. Sangeetha, Dr.G.Aarthi, Dr.Christina Josephine Malathi A, Dr. Dilip Kumar Choudhary, Dr.D.Vijendra Babu,
Class Number(s) : VL2025260500761, 0764,0771,0782,0784
Date of Examination : 28-01-2026 (2:00 PM to 3.30 PM)
Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- Assume any missing data, appropriately. Provide illustration, wherever necessary.
- Course Outcomes (CO):
  - CO 1 - Explain the key elements of communication systems.
  - CO 2 - Examine the amplitude modulation schemes and their performance metrics.

Q. No	Question	M	CO	BL
1.	a) i) Give the electromagnetic spectrum range used in Communication system for two different ranges with minimum two applications. ii) Differentiate between Simplex, Half duplex and full duplex methods with suitable example? [5] b) Consider a situation where three-station A= 2kHz, B= 4kHz , and C= 4kHz are transmitting simultaneously in a common channel. If the audio signals are unmodulated, what are the difficulties at the receiver? Justify how modulation overcomes this situation. Draw the spectrum with and without modulation. [5]	10	1	2
2.	The equation of Amplitude Modulated wave is given by $s(t)=30[1+0.6\cos(2\pi\times10^3t)]\cos(4\pi\times10^5t)$ and $R_L=20\Omega$. Determine the, a) Carrier power, sideband power, total power & sketch the power spectrum b) Amplitudes of the side bands and sketch the single-sided frequency spectrum c) Draw the two-sided spectrum with the amplitudes d) Bandwidth of AM wave	10	2	3
3.	The signal $x(t) = \frac{1}{2}cos(2\pi70t) + \frac{1}{3}cos(2\pi120t)$ is given as input to the square law amplitude modulator and the carrier signal frequency is 10 kHz. Write the time domain expression of the modulated signal output from the square law device with the output $y(t)=a_1 x(t)+a_2 x^2(t)$. Also, determine the values of coefficients a_1 and a_2 such that carrier amplitude A_c =10 V and modulation index is 0.5. Draw the output spectrum.	10	2	3
4.	a) Obtain an expression for the signal $V_3(t)$ in the following Figure 1 for $V_1(t) = 5\cos(400\pi t) + 2\sin(1000\pi t)$. Assume that $V_2(t) = [2 + V_1(t)]^2$ and that the BPF is an ideal unity gain filter with pass band from 400 Hz to 600 Hz. Also sketch the spectral amplitude characteristics of the output waveform $V_3(t)$ in the frequency range 400 Hz $\leq f \leq$ 600 Hz. [5]	10	2	3

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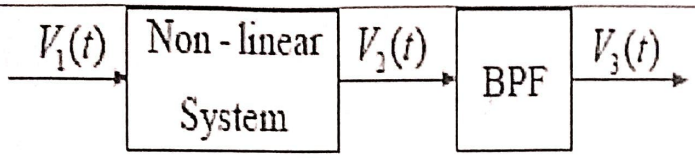

Figure 1

b) The Figure 2 shows the block schematic of a balance modulator. The input applied to the top AM modulator is m(t), whereas that applied to lower AM modulator is –m(t); the two modulators have the same amplitude sensitivity. Show that the output s(t) of the balance modulator consists of DSB-SC signal. [5]

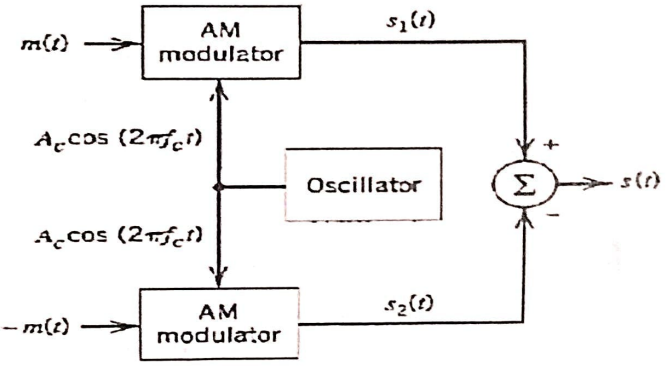

Figure 2

5.	The modulator shown in the figure uses a sideband filter with a pass band of 100 to 104 kHz and modulates two signals f_1=1kHz and f_2= 3kHz.	10	2	3

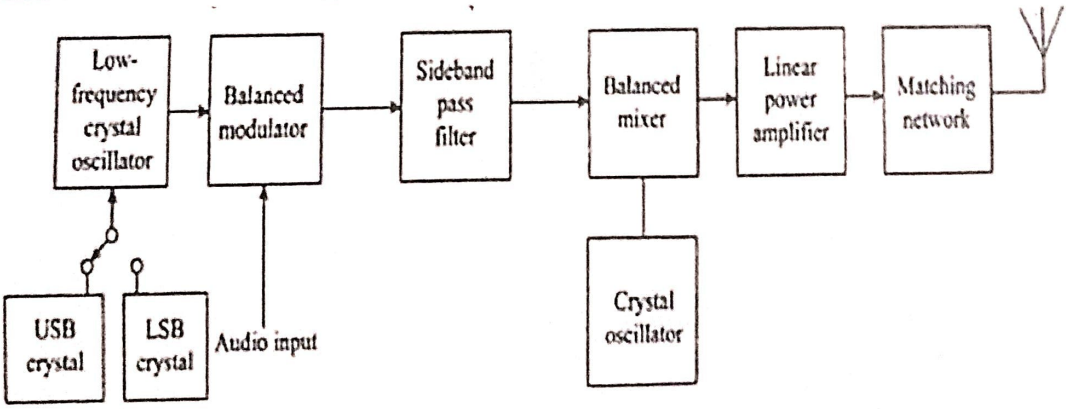

Figure 3

a) For a carrier at 100kHz, sketch the spectrum of the signal presented to the mixer input. Note the positions of the two modulating signals and the suppressed carrier. Is it a USB or LSB signal?

b) Using the same filter how could the modulator be changed to obtain the other sideband?

c) Sketch the spectrum of the mixer input signal for part b), noting the positions of the modulating signal and the suppressed carrier. Is it a USB or LSB signal?

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