MID TERM EXAMINATION

B.TECH PROGRAMMES (UNDER THE AEGIS OF USICT)

3rd Semester, November 2023

Paper Code: ECC – 209

Subject: Analog Communication

Time: 1½ Hrs.

Max. Marks: 30

Note: Attempt Q. No. 1 which is compulsory and any two more questions from remaining.

Q. No.	Question	Max. Marks	CO(s)
1 (a)	What is Hilbert Transform and its use in Analog communication?	02	1,2
(b)	What is the need of Modulation? Explain	02	1,2
(c)	The antenna current of an AM transmitter is 8A if only career is sent, but it increases to 8.93A if the carrier is modulated by a single sinusoidal wave. Determine the percentage modulation	02	1,2
(d)	A Superheterodyne radio receiver with an intermediate frequency of 455 kHz is tuned to a station operating at 1200 kHz. What is the associated image frequency?	02	3
(e)	Explain any method of generation of SSB	02	1,2
2 (a)	Explain Envelop detector with the importance of RC time constant	04	1,2
(b)	An Angle Modulated signal with carrier frequency $w_c = 2\pi \times 10^5$ is described by the equation. $$s(t) = 10\cos(w_c(t) + 5\sin(3000t) + 10\sin(2000\pi t))$$ (a) Find the power of the modulated signal. (b) Find the frequency deviation Δf (c) Find the deviation ratio β (d) Find the Bandwidth	06	1,2
3 (a)	Derive the expression for single tone frequency modulated wave	04	1,2
(b)	Design an Armstrong indirect FM Modulator to generate an FM signal with career frequency 91.2 MHz and $\Delta f = 75kHz$. A NBFM generator of $f_{c1} = 200kHz$ and $\Delta f = 25$ Hz is available. Only frequency doublers and triplers can be used as multipliers.	06	1,2
4 (a)	The spectrum of a message signal m(t) is shown in figure below, which is applied to a system. Analyse the system and sketch the spectrum of the output x(t)	05	1,2

(b)	Explain the PLL method of FM detection	05	2