BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B.TECH **SEMESTER : IV**
BRANCH: ECE **SESSION : SP/2023**

SUBJECT: EC253N ANALOG COMMUNICATION

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Evaluate the Fourier transform of $Sinc^2\left(\frac{Wt}{2}\right)$, where $Sinc(t) = \frac{Sin\,(t)}{t}$.	[5]	I	V
Q.1(b)	Evaluate the Hilbert transform of $Arect\left(\frac{t}{T}\right)$.	[5]	I	V
Q.2(a)	A signal $v(t) = [1 + m(t)]Cos\omega_c t$ is detected using a square law detector whose input output relationship is $v_0 = {v_{in}}^2$. If the Fourier transform of the signal $m(t)$ is constant at the value M_0 from $-f_m$ to $+f_m$. Evaluate and sketch the Fourier transform of the output of the square law detector in the frequency range $-f_m < f < f_m$.	[5]	II	V
Q.2(b)	Determine and plot in time domain and frequency domain, the upper side band and the lower side band SSB-SC modulated signal, $\varphi_{SSB}(t)$, when the modulating signal, m(t) is $Cos\,(\omega_m t)$.	[5]	II	V
Q.3(a)	Find the expression of frequency modulated signal and its bandwidth when the modulating signal, m(t) is $ACos\,(\omega_m t)$.	[5]	III	I
Q.3(b)	Explain with the help of block diagram, the working principles of detection of FM by frequency discriminator.	[5]	III	II
Q.4(a)	Obtain the Nyquist rate and Nyquist interval for the signal $x(t) = 10\cos(4000\pi t)\,Sin(5000\pi t)$.	[5]	IV	V
Q.4(b)	Explain with the help of block diagram and waveforms, the working principles of generation and detection of pulse width modulation.	[5]	IV	II
Q.5(a)	Determine the noise equivalent bandwidth of RC low-pass filter with time constant of 1.5 Sec.	[5]	V	V
Q.5(b)	Find the figure of merit of DSB-SC modulation for coherent reception.	[5]	V	I

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