PVP 20

Code: 20EC3402

II B.Tech - II Semester – Regular / Supplementary Examinations
MAY - 2023

COMMUNICATION THEORY
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Explain the generation of DSB-SC using balanced modulator.	L2	CO1	7 M
	b)	Describe the envelope detector for detection of AM with wave forms and explain the principle of operation.	L2	CO1	7 M
OR					
2	a)	The output power of an AM transmitter is 1KW when a sinusoidal signal modulated to a depth of 100%. Calculate the power in each side band when the modulation depth is reduced to 50%.	L3	CO2	7 M
	b)	Explain Super heterodyne receiver with neat block diagram.	L2	CO1	7 M

UNIT-II					
3	a)	Define Modulation index of FM. Sketch the spectrum of Narrow Band FM (NBFM) and Wide Band FM (WBFM) for various modulation Indices.	L3	CO2	7 M
	b)	Demonstrate the detection of FM using Phase Locked Loop (PLL).	L3	CO2	7 M
OR					
4	a)	A 10 MHz carrier is frequency modulated by a sinusoidal signal such that the peak frequency deviation is 50 kHz. Calculate the modulation index and the approximate bandwidth of the FM signal if the frequency of the modulating signal is: (i) 2 kHz (ii) 10 kHz.	L3	CO2	7 M
	b)	Explain the functionality of each block of Balanced Frequency discriminator.	L2	CO1	7 M
UNIT-III					
5	a)	A random noise X(t) having power spectrum $S_{XX}(\omega) = 3/(49+\omega^2)$ is applied to a network for which $h(t) = t^2 \exp(-7t)\, u(t)$. The network response is denoted by Y(t) (i) Calculate the average power of X(t) (ii) Solve for power spectrum of Y(t) (iii) Calculate average power of Y(t).	L3	CO3	7 M
	b)	When a random process is said to be mean ergodic? If a random process X(t) is given by $X(t)=100\cos(100t+\theta)$, whose θ is	L3	CO3	7 M

		uniformly distributed over $(-\pi, +\pi)$, show that X(t) is correlation ergodic.			
		OR			
6	a)	State and prove any three properties of power spectral density of a random process.	L3	CO3	7 M
	b)	A random process is defined as $X(t) = A \sin \omega t$, where ω is a constant and A is a uniform random variable over (0,1). Solve for the auto covariance of X(t).	L3	CO3	7 M
		UNIT-IV			
7	a)	Analyze noise in AM receivers using Envelope Detection.	L4	CO4	7 M
	b)	Explain the Capture effect and Threshold effect in FM.	L2	CO4	7 M
		OR			
8	a)	Explain FM receiver model and find SNR of FM system.	L4	CO4	7 M
	b)	Explain Noise in SSB receivers.	L4	CO4	7 M
		UNIT-V			
9	a)	State and prove sampling theorem for low pass signals. A signal $m(t) = 4 \cos(200\pi t) \cos(600\pi t)$ is ideally sampled at 700 Hz, and is sent through an ideal LPF with cut off at 650 Hz. Determine the frequency components in the filter output. What changes will be there if the sampling is done at Nyquist rate?	L4	CO4	7 M

	b)	Explain the Time Division Multiplexing with a neat block diagram.	L2	CO1	7 M
OR					
10	a)	With a neat sketch, explain Pulse Width Modulation.	L2	CO1	7 M
	b)	What is Companding? Explain Companding with A-law and μ-law.	L2	CO1	7 M