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BMS College of Engineering, Bangalore-560019

(Autonomous Institute, Affiliated to VTU, Belgaum)

July / August 2018 Supplementary Examinations

Course: Communication Theory -1
Course Code: 16EC5DCCT1

Duration: **3 hrs**
Max Marks: **100**

Date: 01.08.2018

Instructions:

UNIT 1

1	a	Evaluate mean and variance of a random variable X which is uniformly distributed.	6
	b	Justify the statement "The auto Correlation of a WSS process is an even function of time lag"	4
	c	Show that the random process $x(t)=A\cos(w_c t+\theta)$ where θ is a random variable uniformly distributed in the range $(0,2\pi)$ is a WSS process.	10

OR

2	a	Derive an expression for narrow band noise in terms of its in phase and quadrature components.	5
	b	A parallel tuned circuit having Q of 20 is resonated to 200 MHz with a 10pF capacitor. If this circuit is maintained at 17^0C, what is the equivalent noise voltage? Assume B=10kHz.	5
	c	Identify the type of noise that is generated by the following sources and explain them in brief. i) Sun ii)Fluorescent lights iii)Transistor at low frequencies iv)Resistor v)Vacuum tubes	10

UNIT 2

3	a	Sketch the envelope of modulated wave that you get when carrier wave is multiplied with modulating signal of sinusoidal shape. Compare this signal with standard AM signal both in time and frequency domains.	5
	b	Name the multiplexing technique which uses same carrier but differing in phase by 90^0. Give the block diagram of such a multiplexing technique and explain how the transmission and reception of signals are done.	8
	c	Show that the figure of merit for DSBSC coherent receiver is unity.	7

UNIT 3

4	a	Obtain Hilbert transform of the signal $x(t)=\sin w_c t$ and hence obtain its pre envelope $x_+(t)$	6
	b	Give the time domain description of SSB modulation that considers upper side band. Construct block diagram to generate SSB with above description and explain its working.	8
	c	Calculate the percent power saving for the SSB signal if the AM signal is modulated to a depth of i)100% ii)50%	6

OR

5	a	Validate the usage of VSB for picture transmission in Television. Prove that the envelope detection can be used to get back picture signal from VSB modulate signal	10
	b	Obtain the expression for the figure of merit of SSB receiver using coherent detector.	10

UNIT 4

6	a	List out the advantages of FM over AM. Derive time domain expression for wideband FM, considering single tone modulating signal in terms of Bessel function.	10
	b	What is FM stereo multiplexing? Give the block diagram of FM stereo multiplexing technique and explain how the transmission and reception operation.	10

UNIT 5

7	a	"Bandwidth and power constitute primary communication resources available to a communication engineer" Suggest at least two ways each to save bandwidth and power in communication system and explain.	8
	b	Derive time and frequency domain expressions for natural samples and draw its frequency response.	8
	c	Two signals $g_1(t)$ and $g_2(t)$ are to be transmitted over a common channel by means of TDM. The highest frequency of $g_1(t)$ is 1 kHz and that of $g_2(t)$ is 1.5 kHz. What is the minimum value of the permissible sampling rate? Defend your answer.	4

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