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ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024

Electronics and Communication Engineering
Semester 4
EC5402 Communication Theory
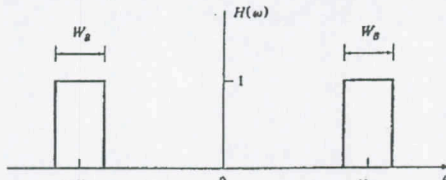(Regulation2019)

Time:3hrs   Max.Marks: 100

PART- A(10x2=20Marks)
(Answer all Questions)

Q.No.	Questions	Marks
1	Why is VSB modulation preferred for commercial TV broadcast?	2
2	Determine the bandwidth of AM and DSBSC signals if the message signal is band limited to 4 kHz.	2
3	Distinguish FM signal from AM signal based on power requirement and noise performance.	2
4	Write down the time domain expression for the phase modulated signal?	2
5	Determine the mean and variance of the random variable Y=3X+5, if X has zero mean, unit variance.	2
6	What is meant by wide sense stationary random process?	2
7	Define noise equivalent temperature.	2
8	State central limit theorem.	2
9	What are the typical noises associated with DM?	2
10	How is DPCM made adaptive?	2

PART- B(5x 13=65Marks)

Q.No.	Questions	Marks
11 (a)	i) Consider that the carrier signal $c(t) = cos2\pi10^6t$ is modulated by a message signal $m(t) = 2cos4\pi10^4t$. Plot the spectrum, and determine the bandwidth and power requirement if the modulation is DSBSC.	7
	ii) Explain the generation of AM signal using square law modulation	6
	OR	
11 (b)	i) Illustrate the demodulation of AM signal using envelope detector and analyse the impact of component selection.	6
	ii) Consider the signal $s(t) = 2cos4\pi10^6t[1 + 0.6cos3\pi10^3t]$. If the sensitivity of the modulator is 0.6 determine the a.Message signal b.Spectrum of modulated signal c.Power and bandwidth of the modulated signal	7
12 (a)	Explain the demodulation of frequency modulated signal using balanced frequency discriminator in detail.	13
	OR	
12 (b)	i) Explain the generation of FM signal using indirect method.	7
	ii) How does FM stereo multiplexing work to improve the quality of the audio system?	6

13 (a)	i) ii)	State the properties of Autocorrelation function Consider that X(t) a white noise process is applied as input to an ideal bandpass filter with frequency response shown in figure below. Determine the noise power at the output of the filter. 	6 7
		OR	
13 (b)	i) ii)	Consider that a random process is applied as an input to a LTI system. Derive the relationship between the statistical parameters of input and output process. Consider a random process $X(t) = 2\cos(2\pi fct + \emptyset)$, where $\emptyset$ is a uniformly distributed random variable over $(-\pi,\pi)$. Determine its mean and autocorrelation process.	7 6
14 (a)		Derive the figure of merit of AM receiver and compare it with that of AM and DSBSC .	13
		OR	
14 (b)		Draw the model of FM receiver and obtain the output SNR of the FM receiver.	13
15 (a)		Draw and explain the PCM communication system and determine the data rate for the transmission of speech signal of bandwidth 3.2 kHz, sampled at Nyquist rate and under goes 256 level quantization.	13
		OR	
15 (b)		Draw the block diagram of DM system.Consider the voice signal of bandwidth 4 kHz under goes Delta Modulation which uses sampling rate 10 times Nyquist sampling rate. Determine the data rate of the modulated signal.	13

PART- C(1x 15=15Marks)
(Q.No.16 is compulsory)

Q.No.	Questions	Marks
16.	i) Compute the SNR of the DCPM system that uses a quantizer with 256 levels and prediction filter of gain 6 dB	5
	ii) A receiver system has three amplifiers A, B and C to be connected in cascade. Consider the amplifiers have their {gain, Noise figure} as {20,8}dB , {15,10}dB and {15,5}dB respectively. Determine the possible combinations of the amplifiers which results in lowest over all Noise figure. Also determine the overall noise temperature	10