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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fourth Semester, B. E. - Electronics and Communication Engineering

Semester End Examination; July / August - 2022

Analog and Digital Communication

Time: 3 hrs *Max. Marks: 100*

Course Outcome's

The Students will be able to:

*CO1: **Apply** the basic knowledge of mathematics for Formulation and analysis of Random signals, Analog and Digital communication system.*

*CO2: Ability to **Analyze** various aspects of sampling, quantizing, encoding, Analog and Digital signal modulation/transmission and demodulation/reception techniques*

*CO3: **Articulate** the methods used for sampling, quantizing and **analyze** noise introduced in data transmission for designing a digital communication systems.*

*CO4: **Analyze** the error probabilities and SNR of various modulation schemes with the knowledge of random process.*

*CO5: **Apply** appropriate techniques, resources, and modern tools to **examine** and **design** elementary communication system for various modulation schemes and noise specification.*

***Note**: i) **PART-A** is compulsory. One question from each unit for maximum of 2 marks.*
*ii) **PART-B**: Answer any **TWO** sub questions (from a, b, c) from each unit for a Maximum of 18 marks.*

Q. No.	Questions	Marks	BLs	COs	POs
	I: PART - A	**10**			
I a.	Write any two difference between AM and FM modern techniques.	2	L1	CO1	
b.	List the properties of Gaussian process.	2	L1	CO1	
c.	Sketch the model waveform for the bit stream 1101101 for the NRZ unipolar scheme.	2	L2	CO2	
d.	Define slope overload distortion and Granular noise.	2	L1	CO2	
e.	Write any two differences between coherent and non coherent detection techniques.	2	L1	CO2	
	II: PART - B	**90**			
	UNIT-I	**18**			
1 a.	Explain the generation of AM using square law modulator.	9	L2	CO1	
b.	Explain time domain description of SSB modulates technique.	9	L2	CO1	
c.	With a neat black diagram, explain narrow band frequency modulation (generation).	9	L2	CO1	
	UNIT - II	**18**			
2 a.	Explain the Gram-Shmitt orthoganalization procedure with relevant block diagrams.	9	L2	CO2	
b.	Explain the properties of auto correlates and cross correlates functions.	9	L2	CO1	
c.	With a neat block diagram, explain correlation receiver.	9	L2	CO1	

Contd….2

	UNIT – III	**18**		
3 a.	A signal g(t) = 10cos(20πt)cos(200πt) is sampled at the rate of 250 samples / sec. i) Sketch the spectrum of the sampled signal. ii) Specify the cutoff ideal reconstructions filter so as to recover g(t) from gs(t) iii) Specify the Nyquest rate.	9	L3	CO3
b.	Derive the Power Spectral Density (PSD) of polar NRZ signals and plot the spectrum.	9	L4	CO3
c.	With a neat block diagram, explain the digital PAM transmission through band limited base band channels and obtain the expression for ISI.	9	L2	CO3
	UNIT - IV	**18**		
4 a.	Explain Delta Modulation (DM) with block diagram and equations.	9	L2	CO2
b.	Explain quantization error and derive an expression for maximum Signal to Noise Ratio (SNR) in PCM system that uses linear quantization.	9	L2	CO2
c.	With a neat block diagram, explain adoptive delta modulation.	9	L2	CO2
	UNIT - V	**18**		
5 a.	Derive probability of error for a coherent FSK system.	9	L3	CO4
b.	Explain the working of disk transmitter and receiver with neat block diagrams.	9	L2	CO4
c.	A binary data is transmitted over an AWGN channel using binary PSK at a rate of 1MBPS. It is desired to have average probability of error Pc ≤ 10^{-4}. Noise power spectral density is $\frac{No}{2} = 10^{-12} w/Hz$. Determine the average carrier power required at the receiver input, if the detector is of coherent type, Take erfc(3.5) = 0.00025	9	L3	CO4

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