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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; Sep. / Oct. - 2023

Analog and Digital Communication

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

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

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

CO3: Analyze digital techniques like pulse shaping, coding and other digital communication systems

CO4: Identify and Analyze different coherent receiver for digital modulation, Eye diagram, ISI and other digital communication signaling techniques.

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

***Note**: I) **PART - A** is compulsory. **Two** marks for each question.*

*II) **PART - B**: Answer any **Two** sub questions (from a, b, c) for a Maximum of **18 marks** from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
1 a.	Define Vestigial Side Band (VSB) modulation.	2	L1	CO2	PO3
b.	Mention relationship between the FM and PM modulation.	2	L1	CO2	PO3
c.	List the advantages of digital communication.	2	L1	CO1	PO2
d.	Mention the role of scrambling in digital data transmission.	2	L1	CO4	PO3
e.	List the difference between coherent and non-coherent receiver.	2	L1	CO4	PO3
	II : PART - B	**90**			
	UNIT - I	**18**			
2 a.	Derive the time and frequency domain Amplitude Modulation (AM) equations with neat waveforms.	9	L2	CO2	PO3
b.	Analyze the Bridge Modulator and Ring Modulator for DSBSC with relevant equations and waveforms	9	L3	CO2	PO3
c.	A signal $x(t)$ described by, $x(t) = (3/2)\cos(190\times10^3\pi t) + 5\cos(200\times10^3\pi t) + (3/2)\cos(210\times10^3\pi t)$ i) Show that $x(t)$ is an AM signal ii) Determine the ratio of *Ps* / *Pc* where *Ps* is the power in sidebands and *Pc* is the power in the carrier. iii) What is the power efficiency (η) in the AM signal?	9	L2	CO1	PO2
	UNIT - II	**18**			
3 a.	Show that Wide Band FM (WBFM) has infinite bandwidth.	9	L3	CO1	PO2
b.	Explain the PLL method of FM demodulation.	9	L2	CO2	PO3
c.	Illustrate the working of superheterodyne receiver.	9	L2	CO1	PO2

Contd…2

	UNIT - III	**18**			
4 a.	Define sampling theorem and illustrate ideal sampling method in time and frequency domain.	9	L2	CO2	PO3
b.	With a neat block diagram, explain Pulse Code Modulation.	9	L2	CO2	PO3
c.	Analyse A-law and μ law commanding techniques for Non-uniform Quantization.	9	L4	CO3	PO2
	UNIT - IV	**18**			
5 a.	With a neat block diagram and equations, explain Adaptive Delta Modulation.	9	L2	CO4	PO3
b.	Analyze the binary sequence 101011100 and draw the digital format waveforms corresponding to; i) Unipolar NRZ ii) Polar NRZ iii) Polar RZ iv) Bipolar NRZ v) Manchester vi) Bipolar RZ vii) Unipolar RZ	9	L3	CO3	PO2
c.	With the block diagram, explain DPCM transmitter and receiver.	9	L2	CO2	PO3
	UNIT - V	**18**			
6 a.	With the necessary diagram and equations, explain M-ary PSK and QAM.	9	L2	CO2	PO2
b.	Derive an expression for optimum receiver filter matched filter and explain the same.	9	L3	CO4	PO3
c.	With a block diagram, explain optimum coherent detection of FSK signals.	9	L2	CO2	PO3

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