U.S.N | | | | | | | | | | |

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; August - 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 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. **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.	Mention the bandwidth for DSB-SC and SSB-SSC wave.	2	L1	CO1	PO1
b.	List any two properties of cross-correlation function.	2	L1	CO1	PO1
c.	Sketch the encoded waveform for the bit stream 011011 for the polar and bipolar line coding scheme.	2	L2	CO2	PO1
d.	Mentions the drawbacks of delta modulations.	2	L1	CO1	PO1
e.	Mention any two advantages of digital modulation over analog modulation.	2	L1	CO2	PO2
	II : PART - B	**90**			
	UNIT - I	**18**			
2 a.	With neat diagram, explain the generation of AM wave using switching modulator.	9	L2	CO2	PO2
b.	An audio frequency signal $5\sin 2\pi(1000)t$ is used to amplitude modulate a carrier of $100\sin 2\pi(10^6)t$. Assume modulation index as 0.4. Compute; i) Side band frequencies ii) Amplitude of each side band iii) B.W. required iv) Total power delivered to a load of 100 Ω	9	L2	CO3	PO2
c.	Mathematically illustrate time domain expression for WBFM wave which has infinite sidebands.	9	L3	CO4	PO2

Contd.... 2

	UNIT - II	**18**			
3 a.	List and explain the properties of auto-correlation function.	9	L2	CO1	PO1
b.	Classify and explain the different types of digital communication channels.	9	L2	CO2	PO2
c.	Illustrate the concept of Gram-Schmidt orthogonalization procedure.	9	L3	CO4	PO2
	UNIT - III	**18**			
4 a.	Describe the quadrature sampling of band pass signal with related block diagram, spectrum and equations.	9	L3	CO2	PO2
b.	Define eye pattern and explain how it is useful in understanding the ISI problem?	9	L2	CO1	PO1
c.	A signal $g(t) = 10\cos(20\pi t)\cos(200\pi t)$ is sampled at the rate of 250 samples/s; i) Sketch the spectrum of the sampled signal ii) Specify the cut-off ideal reconstruction filter so as to recover $g(t)$ from $g_s(t)$ iii) Specify the Nyquist rate for the signal $g(t)$	9	L3	CO3	PO2
	UNIT - IV	**18**			
5 a.	Derive an expression for Signal to quantization noise ratio in PCM.	9	L3	CO4	PO2
b.	With block diagrams, explain DPCM transmitter and receiver.	9	L2	CO3	PO2
c.	Explain adaptive delta modulation with neat block diagram and equations.	9	L2	CO1	PO1
	UNIT - V	**18**			
6 a.	Derive probability of error for a coherent PSK system.	9	L3	CO2	PO1
b.	With block diagrams, explain the working of DPSK transmitter and receiver.	9	L2	CO1	PO2
c.	Describe the QPSK signal with its signal space characterization with a neat block diagram and explain the generation and detection of QPSK signals.	9	L3	CO3	PO2

* * * *