Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN											Course Code	2	1	E	C	4	4

Fourth Semester B.E. Degree Examinations, September / October 2024

COMMUNICATION SYSTEMS-I

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

Note: ***1. Answer any* FIVE *full questions, choosing* ONE *full question from each module.***
2. Missing data, if any, may be suitably assumed.

Q. No		*Question*	*Marks*	*(RBTL:CO:PI)*
		MODULE – 1		
1.	**a.**	Derive an AM expression in time domain and Draw the relevant waveforms.	**08**	(2 :1 : 1.3.1)
	b.	With neat diagram, Explain how the Switching Modulator is used for generation of AM signal with relevant mathematical expressions.	**06**	(2 :1 : 1.3.1)
	c.	An audio frequency signal 5 sin (2π1000) t is used to amplitude modulate a carrier of 100sin (2π x 10^6) t. Assume modulation index 0.4. Calculate (i) Side band frequencies. (ii) Amplitude of each side band (iii) Required Band width, (iv) Total power delivered to the load of 100 Ω.	**06**	(2 :1 : 1.3.1)
		OR		
2.	**a.**	Illustrate coherent detection of DSBSC modulated wave. Also mention the effect of phase error in local oscillator signal on demodulation process.	**08**	(2 :1 : 1.3.1)
	b.	With neat diagram, Explain the demodulation of AM wave using Envelope detector.	**06**	(2 :1 : 1.6.1)
		The output voltage of an AM transmitter is given by 400(1+0.4 cos6280t) cos 3.14×10^7t. This voltage is fed to a load of 600 Ω resistance. Determine (i) Carrier frequency (ii) Modulating frequency (iii) carrier power (iv) total power output.	**06**	(2 :1 : 1.6.1)
		MODULE – 2		
3.	**a.**	Establish the mathematical equation for frequency modulated wave. Also represent its waveform in time domain.	**08**	(2 :2 : 1.6.1)
	b.	With relevant block diagram, explain FM stereo multiplexing.	**07**	(2 :2 : 1.6.1)
	c.	A single tone FM signal is given by S (t) =12cos [($6x10^8$)t + 5sin(1250)t]. Calculate (i) Modulation Index (ii) Modulating Frequency (iii) Frequency Deviation (iv) Carrier Frequency (v) power dissipated in a 10 Ω resistor load.	**05**	(3 :3 : 1.3.1)
		OR		
4.	**a.**	Derive the expression for narrowband FM and compare it with the AM signal using phasor diagram.	**08**	(2 :2 : 1.3.1)
	b.	Explain demodulation of FM using balanced frequency discriminator	**08**	(3 :2 : 1.3.1)
	c.	A sinusoidal modulating waveform of amplitude 5 V and frequency of 2 kHz is applied to FM generator which has a Frequency sensitivity of 40 Hz/volt. Calculate the (i) frequency deviation (ii) Modulation index	**04**	(2 :2 : 1.6.1)
		MODULE – 3		
5.	**a.**	Write Short notes on (i) Short Noise (ii) Thermal Noise (iii) White Noise	**06**	(2 :3 : 1.6.1)
	b.	Explain the noisy receiver model with neat diagram. Explain briefly the figure of merit.	**06**	(2 :3 : 1.6.1)

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

	c.	Derive the expression for figure of merit of an AM receivers using envelope detection.	**08**	(2 :3 : 1.6.1)

OR

6.	**a.**	Explain FM threshold effect with relevant diagram and equations.	**06**	(2 :3 : 1.3.1)
	b.	Show that the figure of Merit for DSB-SC system is unity.	**08**	(3 :3 : 1.3.1)
	c.	Discuss the necessity of Pre-emphasis and De-emphasis in case of FM.	**06**	(2 :3 : 1.6.1)

MODULE – 4

7.	**a.**	Explain the following pulse modulations with waveform. (i) PAM (ii) PPM	**06**	(2 :4 : 1.3.1)
	b.	With neat block diagram and waveforms explain the generation of PPM wave.	**08**	(3 :4 : 1.3.1)
	c.	With neat block diagram explain the concept of TDM.	**06**	(2 :4 : 1.6.1)

OR

8.	**a.**	Define Sampling theorem. Also Explain the Sampling Process.	**08**	(3 :4 : 1.3.1)
	b.	Mention the advantages of digitizing the Analog sources.	**06**	(2 :5 : 1.4.1)
	c.	Explain the following types of Sampling. (i) Ideal Sampling (ii) Natural Sampling (iii) Flat top Sampling	**06**	(3 :4 : 1.3.1)

MODULE – 5

9.	**a.**	With neat block diagram illustrate the generation and reconstruction of PCM signal.	**08**	(3 :5 : 1.3.1)
	b.	A TV signal with a BW of 4.2 MHz is transmitted using Binary PCM. The number of representation level is 256. Calculate (i) Code word length (ii) Final bit rate (iii) Bandwidth of PCM	**06**	(3 :5 : 1.3.1)
	c.	Represent the binary sequence 00100101 in (i) Polar NRZ (ii) Unipolar NRZ (iii) Bipolar RZ (iv) Unipolar RZ (v) Manchester format	**06**	(3 :5 : 1.3.1)

OR

10.	**a.**	What is Quantization Error? Derive an expression of output signal to noise ratio of a uniform quantizer.	**08**	(3 :5 : 1.3.1)
	b.	With neat diagram explain delta modulation system. Also Explain the two types of noise in delta modulation.	**08**	(3 :5 : 1.3.1)
	c.	Explain the concepts of Video +MPEG and Vocoder.	**04**	(2 :5 : 1.3.1)

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