

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

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Fourth Semester B.E. Degree Examinations, Sept/ Oct 2023

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

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO: PI)</u>
MODULE – 1			
1.	a. Illustrate General communication system with neat block diagram.	07	(2 :1: 1.3.1)
	b. Write an AM expression in time domain and frequency domain. Draw the time domain representation of AM wave.	07	(2 :1: 1.1.1)
	c. An audio frequency signal $10\sin(2\pi 500)t$ is used to amplitude modulate a carrier of $50\sin(2\pi \times 10^5)t$. Assume modulation index 0.2. Calculate (i) Side band frequencies. (ii) Amplitude of each side bands, (iii) Required Band width, (iv) Total power delivered to the load of 600Ω .	06	(3 :1: 1.1.1)
OR			
2.	a. With neat diagram, explain how the Switching Modulator is used for generation of AM signal with relevant mathematical expressions.	08	(2 :1: 2.1.3)
	b. Explain Quadrature carrier multiplexing with the help of transmitter and receiver block diagrams.	06	(2 :1: 1.3.1)
	c. A carrier wave of frequency 10MHz and peak value 10V is amplitude modulated by a 5KHz sine wave of amplitude 6V. Determine modulation index, Amplitude and frequency of the sidebands, Bandwidth required.	06	(3:1: 2.2.3)
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.	06	(2 :2: 1.7.1)
	c. A 93.2MHz carrier is frequency modulated by 5KHz sine wave the resultant FM signal has frequency deviation of 40KHz. Find i) Carrier swing ii) highest and lowest frequencies of FM signal iii) modulation index of FM iv) BW of FM	06	(3 :2: 2.1.3)
OR			
4.	a. Derive the expression for narrowband FM and compare it with the AM signal using phasor diagram.	08	(2 :2: 1.1.1)
	b. Describe Generation of FM wave using Direct method.	06	(2 :2: 1.2.1)
	c. A single tone FM signal is given by $S(t)=20\cos[(8\pi \times 10^6)t + 9\sin(2\pi \times 10^3)t]$. Calculate i) Modulation Index ii) Modulating Frequency iii) Frequency Deviation iv) Carrier Frequency v) power dissipated in a 5Ω resistor load.	06	(3 :2: 2.1.3)

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

MODULE – 3

5. a. Write Short notes on i) Shot Noise ii) Thermal Noise **06** (1 :3: 1.2.1)
b. Discuss the necessity of Pre-emphasis and De-emphasis in case of FM and Explain the same. **06** (2 :3: 1.3.1)
c. Derive the expression for figure of merit of an AM receiver using envelope detection. **08** (2 :3: 2.1.3)

OR

6. a. Show that the figure of Merit for DSB-SC system is unity. **08** (2 :3: 1.3.1)
b. Explain FM threshold effect with relevant diagram and equations. **08** (2 :3: 1.3.1)
c. Explain the noisy receiver model with neat diagram. Explain briefly the figure of merit. **06** (1 :3: 1.3.1)

MODULE – 4

7. a. Define sampling theorem. Also Explain the conditions of sampling i) under Sampling ii) Over sampling iii) Nyquist sampling with necessary diagram. **08** (2 :4: 1.3.1)
b. With neat block diagram explain the concept of TDM. **06** (1 :4: 1.3.1)
c. Write a note on Pulse Amplitude modulation. **06** (1 :4: 1.3.1)

OR

8. a. With neat block diagram and waveforms explain the generation of PPM wave. **08** (1 :4: 1.3.1)
b. Mention the advantages of digitizing the Analog sources. **06** (2 :4: 1.3.1)
c. Explain the following types of sampling: **06** (2 :4: 1.3.1)
i) Ideal sampling ii) Practical sampling

MODULE – 5

9. a. What is Quantization Error? Derive an expression for $(SNR)_o$ with quantization process. **06** (2 :4: 2.2.3)
b. With neat diagram explain delta modulation system. **08** (2 :4: 1.3.1)
c. A TV signal with a bandwidth of 5.2MHz is transmitted using binary PCM. The number of representation level is 512. Calculate i) Code word length ii) Final bit rate iii) Transmission bandwidth. **06** (3 :4: 2.3.1)

OR

10. a. With neat block diagram illustrate the generation and reconstruction of PCM signal. **08** (2 :4: 1.3.1)
b. Write a short note on MPEG +Video. **06** (2 :4: 1.3.1)
c. Represent the binary sequence 011001010 in i) Polar NRZ ii) Unipolar NRZ iii) Bipolar RZ iv) Unipolar RZ v) Manchester format **06** (3 :4: 2.3.1)

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