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Course Code 

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**Fourth Semester B.E. Degree Examinations, September 2024**  
**COMMUNICATION SYSTEM – 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>
<b><u>MODULE – 1</u></b>			
1.	a. Signify the need of modulation.	07	(1 :1: 1.3.1)
	b. Write an AM expression in time domain and frequency domain. Draw the AM wave.	07	(2 :1: 1.1.1)
	c. A single tone FM is represented by the voltage equation $v(t) = 12\cos(6 \times 10^8 t + 5\sin 1250t)$ . calculate the following:	06	(3 :1: 1.1.1)
	i) Carrier frequency                      ii) Modulating frequency		
	iii) Modulation index and Maximum frequency deviation		
	iv) What power this FM wave will dissipate in $10\Omega$ resistor.		
<b>OR</b>			
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 diagram.	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)
<b><u>MODULE – 2</u></b>			
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 5 KHz sine wave the resultant FM signal has frequency deviation of 40 KHz. Find	06	(3 :2: 2.1.3)
	i) Carrier swing                      ii) highest and lowest frequencies of FM signal		
	iii) modulation index of FM                      iv) BW of FM		
<b>OR</b>			
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  $5\Omega$  resistor load. **06** (3 :2: 2.1.3)

**MODULE – 3**

5. a. Write Short notes on i) Short 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. What is aperture effect. Briefly explain how to overcome it. **06** (2 :4: 1.3.1)

**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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