

Enrollment No.....



Faculty of Engineering
End Sem Examination May-2024
EC3CO18 Analog Communication

Programme: B.Tech.

Branch/Specialisation: EC

Duration: 3 Hrs.**Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. What is the purpose of modulation in a communication system? **1**
 (a) To reduce the bandwidth of the signal
 (b) To increase the power of the signal
 (c) To improve the efficiency of transmission
 (d) To allow multiple signals to share the same channel
- ii. Which of the following modulation techniques has suppressed carrier? **1**
 (a) DSB-SC (b) SSB-SC
 (c) VSB-SC (d) All of these
- iii. Which method of AM detection is based on synchronization with the carrier signal? **1**
 (a) Envelope detection (b) Asynchronous detection
 (c) Synchronous detection (d) Coherent detection
- iv. What are the types of Angle Modulation? **1**
 (a) AM, FM, PM (b) NBFM, WBFM, PM
 (c) NBFM, WBFM, PPM (d) PAM, PWM, PPM
- v. Which method of FM generation involves varying the frequency of the carrier directly with the modulating signal? **1**
 (a) Direct method (b) Indirect method
 (c) Phase modulation (d) Frequency deviation
- vi. What is the advantage of FM over AM in terms of noise performance? **1**
 (a) FM is less affected by noise
 (b) FM has a wider bandwidth
 (c) FM requires lower power
 (d) FM provides better spectral efficiency

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- vii. Which type of receiver rejects unwanted signals before amplification? **1**
 (a) TRF receiver (b) Superheterodyne receiver
 (c) FM receiver (d) AM receiver
- viii. Which of the following is not a source of noise in communication systems? **1**
 (a) Thermal noise (b) Shot noise
 (c) Signal noise (d) Intermodulation noise
- ix. What is the role of sampling in pulse modulation? **1**
 (a) To reduce the bandwidth of the modulated signal
 (b) To convert the analog signal into a digital format
 (c) To increase the power efficiency of the modulated signal
 (d) To improve the signal-to-noise ratio of the modulated signal
- x. What is the purpose of pre-emphasis and de-emphasis in FM systems? **1**
 (a) To reduce noise in the received signal
 (b) To increase the bandwidth of the transmitted signal
 (c) To improve the signal-to-noise ratio of the received signal
 (d) To increase the modulation index of the transmitted signal

- Q.2 i. Explain why modulation is necessary in communication systems. **2**
 ii. Compare and contrast the bandwidth, power requirement, and efficiency of each modulation technique. **3**
 iii. Define and explain DSB-SC, SSB-SC, and VSB-SC modulation techniques. **5**
- OR iv. Discuss the advantages and disadvantages of each AM generation and detection method. **5**
- Q.3 i. Compare and contrast frequency modulation (FM) and phase modulation (PM) techniques. Also describe the characteristics of NBFM and WBFM. **4**
 ii. Explain the direct and indirect methods of FM generation. **6**
- OR iii. Describe the principle of operation of frequency discriminators and phase discriminators in FM demodulation. **6**
- Q.4 i. Define TRF (Tuned Radio Frequency) receiver and explain its principle of operation. **4**
 ii. Define image frequency and explain why it needs to be rejected in superheterodyne receivers. **6**

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- OR iii. Explain the concept of pre-emphasis and de-emphasis in FM transmission. **6**
- Q.5 i. Define correlation, energy spectral density, and power spectral density in the context of noise. **4**
 ii. Explain how noise figure and noise temperature are related and their significance in amplifier design. **6**
- OR iii. Discuss how noise affects signal-to-noise ratio, sensitivity, and overall receiver performance in both AM and FM systems. **6**
- Q.6 Attempt any two
- i. Explain the role of the sampling frequency in determining the fidelity of the sampled signal. **5**
 ii. Define Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM), and Pulse Position Modulation (PPM). **5**
 iii. Discuss the demodulation methods employed to recover the original message signal from each type of pulse modulation. **5**

Marking Scheme
Analog Communication (T) - EC3CO18 (T)

Q.1	i)	D) To allow multiple signals to share the same channel	1	
	ii)	D) All of the above	1	
	iii)	C) Synchronous detection, D) Coherent detection	1	
	iv)	B) NBFM, WBFM, PM	1	
	v)	A) Direct method	1	
	vi)	A) FM is less affected by noise	1	
	vii)	B) Superheterodyne receiver	1	
	viii)	C) Signal noise	1	
	ix)	B) To convert the analog signal into a digital format	1	
	x)	C) To improve the signal-to-noise ratio of the received signal	1	
Q.2	i.	Modulation is necessarysystems.	2 Marks	2
	ii.	Compare and contrast the bandwidth	1 Mark	1+1+1
		Power requirement,	1 Mark	
		Efficiency of each modulation technique.	1 Mark	
OR	iii.	Define and explain DSB-SC, SSB-SC, VSB-SC modulation techniques.	2.5 Marks 2.5 Marks	2.5+2.5
	iv.	Advantages Disadvantages	2.5 Marks 2.5 Marks	2.5+2.5
Q.3	i.	Compare and contrast frequency techniques.	2 Marks	2+2
	ii.	Characteristics of NBFM and WBFM.	2 Marks	3+3
		Direct methods	3 Marks	
OR	iii.	Indirect methods	3 Marks	3+3
		The principle discriminators	3 Marks	
Q.4	i.	Define TRF (Tuned Radio Frequency) receiver	2 Marks	2+2
	ii.	Explain its principle of operation.	2 Marks	2+4
		Define image frequency	2 Marks	
		It needs to be reject..... receivers.	4 Marks	
OR	iii.	The concept of pre-emphasis De-emphasis in FM transmission.	3 Marks 3 Marks	3+3
Q.5	i.	Define correlation	2 Marks	2+1+1

OR	ii.	energy spectral density	1 Mark	2+4
		Power spectral density of noise.	1 Mark	
		Explain how are related	2 Marks	
		their significance in amplifier design.	4 Marks	
OR	iii.	Discuss sensitivity	3 Marks	3+3
		Overall AM and FM systems.	3 Marks	
Q.6	Attempt any two			
	i.	Explain the signal.	5 Marks	5
	ii.	Define Pulse Amplitude Modulation (PAM)	1 Mark	1+2+2
		Pulse Width Modulation (PWM),	2 Marks	
	iii.	Pulse Position Modulation (PPM).	2 Marks	5
		Discuss the modulation.	5 Marks	
