Enrollment No......................................

Faculty of Engineering

End Sem (Even) Examination May-2022

EC3CO04 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.

Q.1 i.   Modulation is the process of changing one of the characteristics of   **1**
           (a) Baseband signal   (b) Carrier signal
           (c) Modulating Signal   (d) Modulated Signal

     ii.   The most suitable method for detecting a modulated signal **1**
           $(2.5 + 5 \cos \omega_m t) \cos \omega_c t$ is
           (a) Envelope detector   (b) Synchronous detector
           (c) Ration detector   (d) Both (a) & (b)

     iii. Multi tone FM system is   **1**
           (a) Linear System   (b) Non-Linear System
           (c) Causal System   (d) Non-Causal System

     iv.   Theoretically how much BW will be required to transmit the WBFM **1**
           signal
           (a) $2\omega_m$ (b) 0   (c) $2\omega_m + 2\Delta\omega$ (d) Infinity

     v.   The IF frequency of commercial AM super heterodyne receiver is   **1**
           (a) 450 KHz   (b) 455 KHz   (c) 490 KHz   (d) 452 KHz

     vi.   FM broadcast standards specify a maximum deviation of frequency to **1**
           be equal to 75 KHz and a maximum modulating frequency of 15 KHz.
           What is the modulation index for an FM wave?
           (a) 1/5   (b) 5   (c) 60   (d) 1125

     vii. Phase density spectrum gives the information about   **1**
           (a) Magnitude spectrum   (b) Phase spectrum
           (c) Both (a) & (b)   (d) None of these

     viii. Figure of merit is always unity in   **1**
           (a) SSB-SC   (b) AM   (c) FM   (d) All of these

                                                                    P.T.O.

ix. The maximum permissible distance between two samples of a 2 KHz **1** signal is
(a) $1000\mu s$ (b) $500\ \mu s$ (c) $250\ \mu s$ (d) $200\ \mu s$

x. In PPM system, the transmitted pulses have **1**
(a) Constant amplitude but varying width
(b) Constant amplitude and constant width
(c) Constant width but varying amplitude
(d) None of these

Q.2 i. Write down the mathematical expression of DSB-SC and draw the spectrum. **2**

ii. How VSB modulation is different from SSB? **3**

iii. How modulation will help in FDM? explain with suitable example and diagram. **5**

OR iv. What do you understand by synchronous detection? how it will reconstruct the original signal? what will happen if there is change in carrier frequency and phase in the receiver side? **5**

Q.3 i. Derive the expression of NBFM? Draw the spectrum. **4**

ii. Write down the expression of multi tone WBFM when the signal is $f(t) = E_1 \cos \omega_1 t + E_2 \cos \omega_2 t$ and prove that it is a non linear modulation system. **6**

OR iii. What is the basic principal used for demodulation of FM signal? Discuss the different demodulation techniques of FM system. **6**

Q.4 i. Why super heterodyne receiver is named as super heterodyne? **3**

ii. Why Armstrong FM transmitter is known as indirect method? Discuss its working with appropriate block diagram. **7**

OR iii. How super heterodyne receiver is different from TRF receiver, explain with proper diagram and also write down their applications? **7**

Q.5 i. What is narrow-band noise and what are its applications in communication system? **3**

ii. Define figure of merit for evaluating noise performance of a communication system. Derive an expression for γ for envelope detectors. **7**

OR iii. Comparison of noise performance and various aspects between AM & FM. **7**

Q.6 Attempt any two:

i. Why flat top sampling preferred over natural sampling? draw suitable diagram. **5**

ii. Compare PWM & PPM. **5**

iii. What is the carrier signal in pulse modulation techniques? Justify your answer with appropriate diagram. **5**

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Marking Scheme
EC3CO04 Analog Communication

Q.	Part	Description	Marks
Q.1	i.	Modulation is the process of changing one of the characteristics of (b) Carrier signal	1
	ii.	The most suitable method for detecting a modulated signal ¿ is (a) Envelope detector	1
	iii.	Multi tone FM system is (b) Non-Linear System	1
	iv.	Theoretically how much BW will be required to transmit the WBFM signal (d) Infinity	1
	v.	The IF frequency of commercial AM super heterodyne receiver is (b) 455 KHz	1
	vi.	FM broadcast standards specify a maximum deviation of frequency to be equal to 75 KHz and a maximum modulating frequency of 15 KHz. What is the modulation index for an FM wave? (b) 5	1
	vii.	Phase density spectrum gives the information about (a) Magnitude spectrum	1
	viii.	Figure of merit is always unity in (a) SSB-SC	1
	ix.	The maximum permissible distance between two samples of a 2 KHz signal is (c) 250 μs	1
	x.	In PPM system, the transmitted pulses have (b) Constant amplitude and constant width	1
Q.2	i.	Mathematical Expression — 1 Mark; Spectrum Plotting — 1 Mark	2
	ii.	Each Difference — 1 Mark * 3	3
	iii.	Diagram — 1.5 Marks; Plotting Waveform — 1.5 Marks	5
		Explanation — 2 Marks	5
OR	iv.	What is Synchronous detection — 1 Mark; Reconstruction of the signal from the method — 1.5 Marks; Distortion with frequency & phase explanation — 2.5 Marks	5
Q.3	i.	Writing the expression of FM — 1 Mark; Deriving from FM to NBFM — 2 Marks; Draw the spectrum — 1 Mark	4
	ii.	The expression of WBFM — 2 Marks; Prove its non linearity — 4 Marks	6
OR	iii.	The basic principal used for demodulation of FM signal — 1 Mark; Name the five techniques, Discuss any one — 5 Marks.	6
Q.4	i.	Why Heterodyne — 1.5 Marks; Why it is super — 1.5 Marks	3
	ii.	Why it is called as indirect method — 1.5 Marks; Block diagram — 1 Mark; Explanation of each block — 4.5 Marks	7
OR	iii.	Diagram of TRF receiver — 2 Marks; Diagram of Super heterodyne — 2 Marks; Write down the differences — 2 Marks; Application — 1 Mark	7
Q.5	i.	Define Narrow band noise — 1.5 Marks; Their applications — 1.5 Marks	3
	ii.	Define of merit — 2 Marks; Expression for γ fir envelop detectors — 4 Marks; Diagram — 1 Marks	7
OR	iii.	Write 7 Comparisons — (1 mark*7)	7
Q.6		Attempt any two:	
	i.	Diagram — 1.5 Marks; Difference — 3.5 Marks	5
	ii.	Write 5 differecne including waveforms — (1 mark *5)	5
	iii.	What is the carrier signal in pulse modulation techniques — 2 Marks	5

		Justify the answer	2 Marks	
		Diagram	1 Marks	

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