Code No: R2022043 **R20** **SET - 1**

II B. Tech II Semester Regular/Supplementary Examinations, July - 2023

ANALOG COMMUNICATIONS

(Common to ECE & ECT)

Time: 3 hours **Max. Marks: 70**

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~

UNIT-I

1. a) Explain the function of each block of communication system. [7M]
   b) What is meant by modulation and explain the benefits of modulation. [7M]

(OR)

2. a) With a neat block diagram, explain the operation of Frequency division multiplexing technique. [7M]
   b) Explain about diagonal clipping in a diode detector. How it can be eliminated. [7M]

UNIT-II

3. a) Draw the circuit diagram for balanced ring modulator and explain its operation indicating all the waveforms. [7M]
   b) Explain how a DSB-SC signal is detected using a coherent detector. [7M]

(OR)

4. a) Explain the phase discrimination method for generating SSB. [7M]
   b) Explain the detection of VSB signal using envelope detector. [7M]

UNIT-III

5. a) Define angle modulation? Explain different types of angle modulations with mathematical expressions. [7M]
   b) Explain in detail about NBFM and WBFM. Derive the expression for bandwidth of wideband FM. [7M]

(OR)

6. a) What is the difference between direct and indirect methods of FM generation? Explain the working of a balanced frequency discriminator with the help of circuit diagram. [7M]
   b) Derive the expression for single - tone frequency modulation with necessary waveforms. [7M]

UNIT-IV

7. a) Explain the operation of Tuned radio frequency (TRF) receiver with the block diagram. [7M]
   b) List and Explain the characteristics of a radio receiver. [7M]

(OR)

8. a) What is the need for amplitude limiter in FM Receiver? Explain in detail. [7M]
   b) What are the salient features of broadcast radio receivers? Explain in detail. [7M]

UNIT-V

9. a) Why pre-emphasis and de-emphasis are needed in F.M but not in A.M? Explain. [7M]
   b) Explain in detail about the threshold effect in Angle Modulation System. [7M]

(OR)

10. a) What are the differences between PAM, PWM, and PPM. [7M]
    b) Explain how PPM can be generated from PWM signals. [7M]

|''|'||||''|''|||'|
~~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R2022043 **R20** **SET - 2**

II B. Tech II Semester Regular/Supplementary Examinations, July - 2023

ANALOG COMMUNICATIONS

(Common to ECE & ECT)

Time: 3 hours **Max. Marks: 70**

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks

~~~~~~~~~~~~~~~~~~~~~~~~~

UNIT-I

1.	a)	Draw the waveforms and spectrum of Amplitude Modulation (AM) for an arbitrary baseband signal x(t).	[7M]
	b)	With necessary expressions, Explain single-tone AM.	[7M]
		(OR)	
2.	a)	A carrier signal $c(t)=20\cos 2\pi 10^6 t$ is modulated by a message signal having three frequencies 5kHz, 10 kHz and 20 kHz. The corresponding modulation indices are 0.4, 0.5 and 0.6. Sketch the spectrum and calculate bandwidth, power and modulation efficiency.	[7M]
	b)	Explain the benefits of suppressed carrier AM systems.	[7M]

UNIT-II

3.	a)	Explain how a SSB-SC signal is represented in time and frequency domain.	[7M]
	b)	Discuss the generation of a SSB-SC signal using phase shift method.	[7M]
		(OR)	
4.	a)	What are DSBSC generation methods? Explain the generation of DSBSC using Ring modulator.	[7M]
	b)	Why VSB system is widely used for TV broadcasting? Explain it.	[7M]

UNIT-III

5.	a)	Explain the necessity of each block of indirect FM method.	[7M]
	b)	List out the differences between AM and FM.	[7M]
		(OR)	
6.	a)	Explain how a PLL can be used as an FM demodulator.	[7M]
	b)	Describe zero crossing detector.	[7M]

UNIT-IV

7.	a)	Illustrate the effect of feedback on performance of AM transmitter.	[7M]
	b)	Discuss the factors influencing the choice of intermediate frequency (IF) for a radio receiver.	[7M]
		(OR)	
8.	a)	How F.M Receivers are different from A.M receivers? Explain in detail.	[7M]
	b)	Define and explain the terms sensitivity, selectivity and fidelity of a radio receiver.	[7M]

UNIT-V

9.	a)	Discuss about different sources of noise.	[7M]
	b)	Explain about noise effect in AM and obtain expression for figure of merit.	[7M]
		(OR)	
10.	a)	Explain generation of PAM with mathematical analysis.	[7M]
	b)	Explain about demodulation of PPM signal.	[7M]

|''|'||||''|''|||'|
~~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R2022043 **R20** **SET - 3**

II B. Tech II Semester Regular/Supplementary Examinations, July - 2023

ANALOG COMMUNICATIONS

(Common to ECE & ECT)

Time: 3 hours **Max. Marks: 70**

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks

~~~~~~~~~~~~~~~~~~~~~~~~

UNIT-I

1.	a)	With the help of circuit diagram explain the operation of square-law diode modulator & demodulator for AM.	[7M]
	b)	A given AM broadcast station transmits a total power of 5kW when the carrier is modulated by sinusoidal signal with a modulation index of 0.7071. Determine Carrier power and Transmission Efficiency.	[7M]
		(OR)	
2.	a)	What is the principle of Amplitude modulation? Derive expression for the AM wave and draw its spectrum.	[7M]
	b)	Give the Time domain and frequency domain descriptions of single tone Amplitude modulated waves? How much Band width is required?	[7M]

UNIT-II

3.	a)	Explain how a DSBSC signal is represented in the time and frequency domain.	[7M]
	b)	Draw the neat circuits and equivalent circuits (for different modes) of ring modulator using diodes for generating DSB-SC signal.	[7M]
		(OR)	
4.	a)	Explain how a SSB-SC signal is generated using a filter method.	[7M]
	b)	Compare different amplitude modulation techniques.	[7M]

UNIT-III

5.	a)	Define modulation index, carrier swing and percentage modulation of FM.	[7M]
	b)	With the necessary circuit and voltage to frequency characteristics, explain the functionality of balanced slope detector for FM.	[7M]
		(OR)	
6.	a)	Explain the generation of FM using direct method.	[7M]
	b)	Discuss the process of Detection of FM Waves by Phase locked loop.	[7M]

UNIT-IV

7.	a)	Discuss the frequency stability in FM transmitter.	[7M]
	b)	Explain the function of Mixer stage in FM receiver.	[7M]
		(OR)	
8.	a)	Draw the block diagram of a Super Heterodyne receiver, and explain the operation of each stage of the receiver.	[7M]
	b)	A super Hetero dyne receiver is tuned to receive 1000 KHz carrier amplitude modulated by 1KHz sine wave. Assuming the IF of the receiver to be 455 KHz, and the frequency components at the input and output of the IF amplifier. Assume the IF bandwidth to be 10 KHz.	[7M]

UNIT-V

9.	a)	Calculate the noise figure for an SSB-SC system.	[7M]
	b)	Compare the noise performance in frequency modulated system and amplitude modulated system.	[7M]
		(OR)	
10.	a)	Explain about Time Division Multiplexing.	[7M]
	b)	With block diagram explain the generation of PWM signals.	[7M]
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R2022043 **R20** **SET - 4**

II B. Tech II Semester Regular/Supplementary Examinations, July - 2023
ANALOG COMMUNICATIONS
(Common to ECE & ECT)

Time: 3 hours **Max. Marks: 70**

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~

UNIT-I

1. a) Derive an expression for the power content and transmission efficiency of single tone amplitude modulated signal. [7M]
   b) An AM transmitter radiates 50W power when carrier is modulated and μ=0.707. Determine i) Carrier power ii) Modulation efficiency. [7M]

(OR)

2. a) Explain how an amplitude modulated signal can be detected using a square law detector. [7M]
   b) Explain the working of an envelope detector. [7M]

UNIT-II

3. a) Draw the frequency spectrum of DSB-SC modulation with necessary mathematical expressions. [7M]
   b) Explain generation of DSB-SC signal with the help of balanced modulator using diodes. [7M]

(OR)

4. a) Derive an expression for SSB-SC wave using the concept of pre-envelope. [7M]
   b) Explain the process of generation of VSB waves. [7M]

UNIT-III

5. a) Expand the expression for FM signal in terms of Bessel functions. [7M]
   b) Obtain the necessary expression for single tone NBFM. [7M]

(OR)

6. a) Derive the expression for single - tone frequency modulation with necessary waveforms. [7M]
   b) A 20 MHz carrier is frequency modulated by a sinusoidal signal such that the peak frequency deviation is 100 kHz. Determine the modulation index and the approximate bandwidth of the FM signal if the frequency of the modulating signal is: (i) 1 kHz (ii) 15 kHz [7M]

UNIT-IV

7. a) Explain in detail about the phase modulated FM Transmitter. [7M]
   b) Discuss the Effects of feedback on the performance of AM transmitter. [7M]

(OR)

8. a) What is AGC in AM receivers? Draw and explain different AGC characteristics. [7M]
   b) Write about image frequency and derive expression for the Image Frequency Rejection Ratio in radio receivers. [7M]
~~~~~~~~~~~~~~~~~~~~~~~~~

UNIT-V

9. a) What is meant by narrow band noise and explain time domain representation of narrow-band noise. [7M]
   b) Explain effective noise temperature and noise figure. [7M]

(OR)

10. a) Define Pulse Amplitude Modulation (PAM)? Give merits and demerits of PAM. [7M]
    b) Compare TDM and FDM techniques. [7M]