Total number of printed pages: 2 **UG/6th /UIE612**

2023

COMMUNICATION ENGINEERING

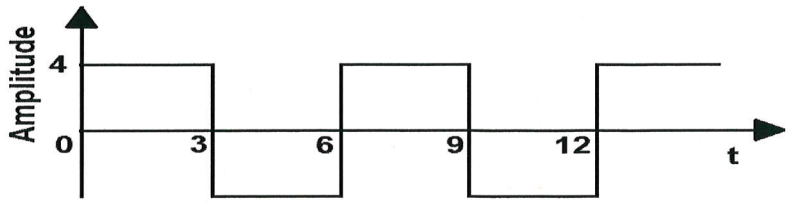
Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	What is modulation? Give the convenience of modulation.	1+3=4
	b)	What is overmodulation?	2
	c)	Explain AM wave in frequency domain representation.	7
	d)	Explain collector modulation method with suitable circuit diagram.	7
2.	a)	Explain generation of DSB-SC signal using Balanced modulator.	7
	b)	Explain coherent detection system to detect DSB-SC signal.	5
	c)	Explain how Envelope detector helps in detecting AM signals and draw the characteristics of the linear diode detector and detected output.	6
	d)	What is the limitation of Filter Method in SSB-SC.	2
3	a)	What is the difference between FM and PM signals?	3
	b)	Derive the equation for NBFM and draw its spectrum.	8
	c)	The signal m(t) as shown in figure is applied both to a phase modulator (with K_P as the phase constant) and frequency modulator (with K_F as the frequency constant) having the same carrier frequency and phase. Find K_P/ K_F.	4



	d)	Explain slope detector characteristics with the help of suitable circuit diagram and characteristics curve.	5
4	a)	With the help of a neat block diagram explain the Superheterodyne receiver.	7
	b)	Draw and explain transmitter and receiver of PCM system.	6
	c)	Explain the operation of delta modulation.	7
5	a)	What is Sampling Theorem? Write different sampling techniques.	1+3=4
	b)	Explain generation and detection process of PWM signal.	4+6=10
	c)	Derive the equation for signal to quantization noise ratio for linear Quantization.	6
6.	a)	An FM wave is given by $s(t)=20\sin(6\times10^8t+7\sin1250t)$. Determine (i)The carrier and modulating frequencies, the modulation index, and the maximum deviation. (ii)Power dissipated by this FM wave in a 100 ohm resistor.	5
	b)	A 7 bit PCM system employing uniform quantization has an overall signalling rate of 56 k bits per second. Calculate the signal to quantization noise that would result when its input is a sine wave with peak amplitude equal to 5 V. Find the dynamic range for the sine wave inputs in order that the signal to quantization noise ratio may be less than 30 dBs. What is the theoretical maximum frequency that system can handle?	7
	c)	With suitable block diagram describe PLL system. Also explain mathematically detection of message signal.	8
7.	a)	What is TDM system? Explain Synchronous and Asynchronous TDM system.	2+3+3=8
	b)	Draw the waveform of ASK, FSK and PSK for the bit stream 101101010.	3
	c)	Explain DPSK with a suitable example.	6
	d)	Illustrate an eye diagram in communication.	3

****