Model Question Paper -1 with effect from 2020-21(CBCS Scheme)

USN | | | | | | | | | | |

Fifth Semester B.E. Degree Examination

Principles of Communication Systems

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module – 1			
Q.1	**(a)**	Define standard form of amplitude modulation, derive its equation and explain each term. Derive the Spectral equation of AM wave and hence draw and explain the AM spectrum.	8
	(b)	Explain the generation of DSBSC waves using a Ring Modulator.	8
	(c)	A 1000 KHz carrier is simultaneously modulated to 300 Hz, 800Hz and 2KHz audio Sinewaves. What will be the frequency content of AM signal.	4
OR			
Q.2	**(a)**	Explain the scheme of generation and demodulation of VSB modulated wave with relevant spectrum of signals and mathematical expressions	8
	(b)	Consider a two-stage product modulator with a BPF after each product modulator, where the input signal consists of a voice signal occupying the frequency band 0.3 to 3.4 kHz. The two local oscillator frequencies have the value f_1 = 100 kHz and f_2 = 10 MHz.Calculate the following : i) Sidebands of DSBSC modulated waves appearing at the two product modulator outputs. ii) Sidebands of SSB modulated waves appearing at the BPF outputs. iii) The pass-bands of the two BPF's.	6
	(c)	With a neat block diagram , explain the working of a FDM transmitter and receiver	6
Module – 2			
Q.3	**(a)**	Find the carrier,modulating frequency,modulation index and maximum frequency deviation of a FM wave represented by the voltage equation $V=12\sin(6 \times 10^8 t+5 \sin 1250t)$ volts.Whatpower will this FM wave dissipate in a 10Ω resistor	5
	(b)	Derive the expression for WBFM, Show that the spectrum of WBFM wave contains infinite number of sidebands. Write the expression of theoretical bandwidth for WBFM	10
	(c)	Determine the bandwidth of an FM signal, if the maximum value of the frequency deviation Δf is fixed at 75kHz for commercial FM broadcasting by radio and modulationfrequency is W= 15 kHz. i.Bycarson's rule ii. By universal curve given BT /Δf=3.2 for β=5	5
OR			
Q.4	**(a)**	With relevant equations and diagram explain the direct method generation FM using Hartley Oscillator.	8
	(b)	Write the basic block diagram of PLL? Derive the expression for nonlinear model of PLL.	6
	(c)	With a neat block diagram explain the operation of a Super- heterodyne receiver.	6
Module – 3			
Q.5	**(a)**	Derive the expression for Figure of Merit of a frequency modulated receiver.	10

	(b)	Define noise. What is Noise Equivalent Bandwidth? Explain with relevant equations.	6
	(c)	Using expresion for figure of merit of AM , find the FOM of single tone AM	4
OR			
Q.6	**(a)**	With DSBSC receiver model derive the expression for figure of merit.	8
	(b)	Briefly explain the following as applicable to FM (i) Capture effect (ii) Threshold effect. (iii) Pre-emphasis (iv) De-emphasis	8
	(c)	Write a short notes on a) Thermal noise b) Shot noise	4
Module – 4			
Q.7	**(a)**	State Sampling theorem and explain the same with neat sketches and equations.	7
	(b)	What is the necessity of Digitizing of the analog signals?	6
	(c)	With neat Block diagrams explain the generation and detection of PPM waves.	7
OR			
Q.8	**(a)**	Explain the generation and recovery of PAM (Flat-top) signal with necessary equations and spectrum diagram.	10
	(b)	With a neat block diagram outline the concept of TDM.	5
	(c)	Describe the effect of Noise on a Pulse position modulation System.	5
Module – 5			
Q.9	**(a)**	Derive the expression for the output Signal to Noise Ratio of a Quantizer	8
	(b)	With a neat diagram explain the basic elements of a PCM system.	6
	(c)	A compact disc (CD) records audio signals digitally using PCM. Assume the audio signal bandwidth to be 15 KHz. a. What is the Nyquist rate? b. If the Nyquist samples are quantized to L = 65, 536 levels and then binary coded, determine the number of bits required to encode a sample. c. Assuming that the signal is sinusoidal and that the maximum signal amplitude is 1 volt; determine the quantization step and the signal-to-quantization noise ratio.	4
OR			
Q.10	**(a)**	Write a note on Vocoders.	8
	(b)	What are the desirable properties of digital waveforms? To transmit a bit sequence 10011011, draw the resulting waveforms using:- Unipolar NRZ; polar NRZ; Unipolar RZ ; Bipolar RZ ; Manchester(split phase)	8
	(c)	A TV signal with a bandwidth of 4.2 MHz is transmitted using binary PCM. The number of representation level is 512. Calculate: i) Code word length ii) Final bit rate iii) Transmission bandwidth	4

Table showing the Bloom's Taxonomy Level, Course Outcome and Programme Outcome				
Question		**Bloom's Taxonomy Level attached**	**Course Outcome**	**Programme Outcome**
Q.1	(a)	2	CO1	PO1,2 &3
	(b)	2	CO1	PO1,2 &3
	(c)	3	CO1	PO1,2 &3
Q.2	(a)	2	CO1	PO1,2 &3
	(b)	3	CO1	PO1,2 &3
	(c)	2	CO3	PO1,2 &3
Q.3	(a)	3	CO1	PO1,2 &3
	(b)	2	CO1	PO1,2 &3
	(c)	3	CO1	PO1,2 &3
Q.4	(a)	2	CO1	PO1,2 &3
	(b)	2	CO1	PO1,2 &3
	(c)	2	CO1	PO1,2 &3
Q.5	(a)	3	CO1	PO1,2 &3
	(b)	2	CO1	PO1,2 &3
	(c)	3	CO1	PO1,2 &3
Q.6	(a)	3	CO1	PO1,2 &3
	(b)	2	CO1	PO1,2 &3
	(c)	1	CO1	PO1,2 &3
Q.7	(a)	2	CO2	PO1,2 &3
	(b)	2	CO2	PO1,2 &3
	(c)	1	CO2	PO1,2 &3
Q.8	(a)	2	CO2	PO1,2 &3
	(b)	1	CO2	PO1,2 &3
	(c)	3	CO3	PO2
Q.9	(a)	2	CO2	PO1,2 &3
	(b)	1	CO2	PO1,2 &3
	(c)	3	CO2	PO1,2 &3
Q.10	(a)	2	CO4	PO3
	(b)	3	CO2	PO1,2 &3
	(c)	3	CO2	PO1,2 &3

Bloom's Taxonomy Levels	**Lower order thinking skills**		
	Remembering(knowledge):L_1	Understanding Comprehension): L_2	Applying (Application): L_3
	Higher order thinking skills		
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6