Reg. No.																

Question Paper Code	14107

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Fourth Semester

Electronics and Communication Engineering

20ECPC401 - COMMUNICATION THEORY

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	Why AM is used for broadcasting? (a) More immune to noise (b) Less transmitting power is required (c) It has high fidelity (d) Avoids Receivers Complexity	*1*	*K1*	*CO1*
2.	Signal and its Hilbert transform have _____ (a) same energy density spectrum (b) same power (c) a phase difference of 60° (d) a phase difference of 120°	*1*	*K1*	*CO1*
3.	Drawbacks of using direct method for generation of FM signal are (a) Does not give high stability to FM signal frequency (b) Distorted FM signal is generated due to harmonics of modulating signal (c) Cannot be used for high power FM generation (d) Both a and b	*1*	*K1*	*CO2*
4.	NBFM signal's frequency multiplied using frequency multiplier and produces (a) AM (b) NBFM (c) PM (d) WBFM	*1*	*K1*	*CO2*
5.	What are the disadvantages of using balanced slope detector for demodulation of FM signal? (a) The detector operates only for small deviation in frequency (b) Low pass filter of the detector produces distortion in the detection (c) Both a and b (d) None of the above	*1*	*K1*	*CO3*
6.	Function of frequency mixer in super heterodyne receiver is (a) Amplification (b) Filtering (c) Multiplication of incoming signal and the locally generated carrier (d) modulating	*1*	*K1*	*CO3*
7.	Random signals are (a) May be specified in time (b) Occurrence is random (c) Repeat over a period (d) None of the above	*1*	*K1*	*CO4*
8.	The power spectral density function of the stochastic process is (a) Real (b) Odd (c) Real & odd (d) None of the mentioned	*1*	*K1*	*CO4*
9.	Threshold effect is (a) Reduction in output signal to noise ratio (b) Large noise as compared to input signal to envelope detector (c) Detection of message signal is difficult (d) All of the above	*1*	*K1*	*CO5*
10.	The process of combining number of independent signals into a composite signal is called (a) Sampling (b) Quantization (c) Companding (d) Multiplexing	*1*	*K1*	*CO6*

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	A broadcast radio transmitter radiates 5 kW power when the modulation percentage is 60 %. Calculate the carrier power.	*2*	*K2*	*CO1*

12.	State the heterodyning principle.	2	K1	CO1
13.	Summarize the relationship between frequency modulation and phase modulation.	2	K2	CO2
14.	Draw the schematic diagram to generate FM signal using phase modulator.	2	K2	CO2
15.	When Super heterodyne receiver is tuned to 500KHz, its local oscillator input to the mixer is 1015KHz.What is the image frequency?	2	K2	CO3
16.	Define locking range and capture range.	2	K1	CO3
17.	Determine thermal noise voltage across the simple parallel RC circuit shown with R =1kΩ and C=1μF at T = 27°C.	2	K2	CO4
18.	Mention any two properties of power spectral density.	2	K2	CO4
19.	How does the pre-emphasis process improve overall SNR in FM systems?	2	K2	CO5
20.	Express the formula to find the overall noise figure of the cascaded networks.	2	K2	CO5
21.	Draw the schematic diagram to generate PPM signal from PWM signal.	2	K2	CO6
22.	A pulse code modulation system uses a uniform quantizer followed by a 6-bit encoder. The bit rate of the system is 50 Mbps. Determine the message bandwidth of the system.	2	K2	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a) (i)	How amplitude signals can be generated using a non-linear modulator circuit?	4	K2	CO1
	(ii)	Derive an expression for DSB-SC signal.	7	K2	CO1
		OR			
	b)	Derive the expression for canonical form representation of an SSB-SC wave and deduce the block diagram of Phase discrimination method for processing sidebands.	11	K2	CO1
24.	a) (i)	Differentiate between wideband FM and narrowband FM.	4	K2	CO2
	(ii)	With a neat sketch, explain any one method of direct FM generation.	7	K2	CO2
		OR			
	b)	Explain the principle of indirect method of generating a wideband FM signal.	11	K2	CO2
25.	a)	With neat diagrams explain the principle of operation of ratio detector. Compare the merits over the Foster- Seeley discriminator.	11	K2	CO3
		OR			
	b)	Examine the building blocks of phase locked loop and explain how it can be used for FM demodulation.	11	K2	CO3
26.	a) (i)	State the properties of Gaussian random process.	4	K2	CO4
	(ii)	Derive the input and output relationship of a random process applied through a LTI filter.	7	K2	CO4
		OR			
	b)	Let x have the uniform distribution given by $f_x(x) = \{1/2\pi, 0 \le \theta \le 2\pi$ 0, elsewhere$\}$ Solve for mean, mean square value and variance.	11	K2	CO4
27.	a)	Briefly, enumerate on narrow band noise and the properties of quadrature components of narrow band noise.	11	K2	CO5
		OR			
	b)	An amplifier has three stages with gain 5db, 20db and 12 db. The noise figures of the stages are 7db, 13db and 12 db respectively. Determine the overall noise figure and the noise equivalent temperature.	11	K2	CO5
28.	a)	Explain the working of PWM with a neat sketch.	11	K2	CO6
		OR			
	b)	Explain uniform quantization in detail with its types.	11	K2	CO6