Q. Code: 128281

Reg. No. | | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023

Fourth Semester

EC18401 – ANALOG COMMUNICATION SYSTEMS

(Regulation 2018 / 2018A)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues.	**4**
CO 2	To introduce the concepts of various modulations and their spectral characteristics.	**4**
CO 3	To introduce random processes, their characteristics and significance	**5**
CO 4	To understand the impact of noise on different modulations and communication systems	**4**
CO 5	To introduce some of the essential baseband signal processing techniques.	**4**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	How many AM broadcast stations can be accommodated in a 100 KHz bandwidth if the highest frequency modulating a carrier is 5 KHz?	**1**	**2**
2.	Draw the spectrum of vestigial sideband modulation.	**1**	**2**
3.	Justify why angle modulation is more immune to noise than amplitude modulation?	**2**	**2**
4.	Mention few applications of PLL.	**2**	**2**
5.	Differentiate between random variables and random process.	**3**	**2**
6.	Illustrate the importance of auto-correlation function in communication systems.	**3**	**2**
7.	What is capture effect?	**4**	**2**
8.	Justify why AGWN noise is preferred in noise analysis?	**4**	**2**
9.	Define aliasing effect and how to overcome it?	**5**	**2**
10.	Define sub-band coding.	**5**	**2**

PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	Show how a square law modulator can be able to recover the AM modulated signal with a neat diagram?	**(14)**	**1**	**3**

(OR)

(b)	**(i)**	Determine the power content of the carrier and each of the sidebands for an AM signal having a percent modulation of 80% and total power of 250 watts.	**(10)**	**1**	**3**
	(ii)	Draw the message, carrier and the DSB-SC AM spectrum and also find its bandwidth.	**(04)**	**1**	**3**
12. (a)		With a necessary phasor diagram, explain in detail about the working principle of Foster-Seeley discriminator method in FM demodulation.	**(14)**	**2**	**3**
		(OR)			
(b)		Explain in detail, how FM wave can be generated using a non-linear device along with its applications?	**(14)**	**2**	**3**
13. (a)	**(i)**	Illustrate the importance of Central limit theorem.	**(04)**	**3**	**3**
	(ii)	Deduce an expression for a random process when it is passed through a LTI filter.	**(10)**	**3**	**3**
		(OR)			
(b)	**(i)**	State and prove the properties of Gaussian process.	**(10)**	**3**	**3**
	(ii)	Define auto-correlation and cross-correlation function. Show that auto-correlation and power spectral density are Fourier transform pairs.	**(04)**	**3**	**3**
14. (a)		Show that the figure of merit of a AM receiver is equal to one.	**(14)**	**4**	**3**
		(OR)			
(b)		Define narrow band noise. Derive an expression for power spectral density of inphase and quadrature phase noise.	**(14)**	**04**	**3**
15. (a)	**(i)**	Compare uniform and non uniform quantization process.	**(04)**	**5**	**3**
	(ii)	Show how adaptive delta modulation is superior to delta modulation.	**(10)**	**5**	**3**
		(OR)			
(b)		Explain in detail about the PCM modulation and demodulation technique. Show why quantization noise is unavoidable in nature?	**(14)**	**5**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

			Marks	**CO**	**RBT LEVEL**
16.		A random process is defined as $x(t) = A\cos(\omega_c t+\Theta)$, where is a Θ is a uniform random variable over$(0,2\pi)$. Verify that the process is ergodic in the mean sense and autocorrelation sense.	**(10)**	**3**	**5**