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

Question Paper Code : 80528

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Third/Fourth Semester

Electronics and Communication Engineering

EC 8491 – COMMUNICATION THEORY

(Common to : Computer and Communication Engineering/Geoinformatics Engineering)

(Regulations 2017)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is demodulation?

2. What is image frequency?

3. What is the main difference between NBFM and WBFM?

4. Mention the names of any two FM demodulation methods.

5. Define random variable.

6. What is the probability density function?

7. Define noise figure.

8. What is narrow-band noise?

9. What is aliasing?

10. What is quantization?

PART B — (5 × 13 = 65 marks)

11. (a) Explain in detail the Envelope detector method for demodulation of AM.

Or

(b) Explain the square law modulator for the generation of amplitude–modulated signal.

12. (a) Derive the wideband, FM equation with explanation.

Or

(b) Explain in detail PLL as FM demodulator.

13. (a) Explain the auto-correlation function and its properties in detail. (5+8)

Or

(b) Given $x(t) = A\cos(\omega_0 t)$. Determine (i) Auto-correlation function and (ii) Power spectral Density. (7+6)

14. (a) Explain in detail the different sources of noise in the communication system.

Or

(b) Derive the expression for the Figure of merit for the AM receiver.

15. (a) State and Prove the Sampling Theorem. Explain its significance. (11+2)

Or

(b) A message signal of $2\cos\left[(2\pi * 10^4)t\right]$ is transmitted through a 3-bit PCM system with a sampling frequency equal to twice the Nyquist rate. Calculate and plot the quantizer characteristics for the given sample values of –3.4V, –2.6V, +0.4V, +1.2V, +3.4V along with quantizer and encoder output.

PART C — (1 × 15 = 15 marks)

16. (a) Ten sinusoidal message signals, each bandlimited to 10kHz, are multiplexed Using TDM. The sampling rate is chosen 50% more than the Nyquist rate. The maximum quantization error should be at most 1% of the peak amplitude of the message signal. The number of synchronization bits is considered to be 4. Determine the transmission bit rate for the given system.

Or

(b) Calculate the Nyquist sampling rate for the signal given below:

$$x(t) = \frac{Sin^3(300\pi t).Sinc^2(700t)}{\pi t^3}$$