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

Question Paper Code : X10364

B.E./B.Tech. DEGREE EXAMINATIONS NOVEMBER / DECEMBER 2020 AND APRIL / MAY 2021

Third/Fourth Semester

Electronics and Communication Engineering

EC8491 – COMMUNICATION THEORY

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

(Regulations 2017)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART- A (10 x 2 = 20 Marks)

1. A carrier wave of frequency 10MH_Z and peak value 10V is amplitude modulated by a 5 kH_Z sine wave of amplitude 6V. Determine the modulation index the amplitude spectrum.
2. What are the merits of SSB modulation?
3. A 25 MH_Z carrier is modulated by a 400 H_Z sine wave. If the carrier voltage is 4 V and the maximum deviation is 10 KH_Z, write the equation of this modulated wave for (i) FM and (ii) PM.
4. A 500H_Z modulating voltage fed into a PM generator produces a frequency deviation of 2.25 KH_Z. What is the modulation index? If the amplitude of the modulating voltage is kept constant, but its frequency is raised to 6 KH_Z, what is new deviation?
5. Define a random variable. Specify the sample space and the random variable for a coin tossing experiment.
6. When a random process is called deterministic?
7. What is white noise? Give its characteristics.
8. Define noise equivalent bandwidth.
9. For a PCM system with maximum audio input frequency of 4Kh_Z, determine the minimum sample rate and alias frequency produced if a 5 Kh_Z audio were allowed to enter the sampling circuit.
10. State low pass sampling Theorem.

PART- B (5 x 13 = 65 Marks)

11. a) (i) What is the need for modulation? Derive the expression for amplitude modulation and mention its merits and demerits.
(ii) The output voltage of a transmitter is given by $500(1+0.4\sin 3140t)\cos 6.28\times 10^{7}t$. This voltage is fed to a load of 600ohms. Determine 1) Carrier frequency 2) Modulating frequency 3) Carrier power 4) Total transmitted power.

(OR)

b) Describe the working of superhetrodyne receiver with the help of block diagram. Discuss how image signal is formed and mention how it can be reduced.

12. a) With block diagram explain the Armstrong FM Transmitter and discuss its advantages over direct FM transmitters.

(OR)

b) (i) Differentiate between wideband FM AND Narrowband.
(ii) With a neat sketch, explain any one method of direct FM generation.

13. a) (i)State the properties of a Gaussian process.
(ii)For the sine wave process $X(t) = Y\cos\omega t$, $-\infty < t < \infty$ where ω = constant, the amplitude Y is a random variable with uniform distribution in the interval 0 and 1. Check whether the process is stationary or not.

(OR)

b) (i)State any four properties of power spectral density.
(ii) The ACF of the random telegraph signal process is given by $R(t)=e^{-2\lambda t}$. Determine the power density spectrum of the random telegraph signal.

14. a) With a neat sketch, explain the pre emphasis and de emphasis of FM.

(OR)

b) What is narrowband noise? Discuss the properties of the quadrature components of a narrowband noise.

15. a) What is quantization? Explain in detail about the uniform and non-uniform quantization.

(OR)

b) Draw the block diagram of the Transmitter and Receiver of a pulse code modulator and explain the performance.

PART- C (1 x 15 = 15 Marks)

16. a) Derive the expression for canonical form representation of an SSB-SC wave and hence deduce the block diagram of Phase discrimination method for processing sidebands.

(OR)

b) With necessary derivation, circuit diagram and phasor diagram explain the foster seeley FM discriminator.