B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023
Fourth Semester
Electronics and Communication Engineering
20ECPC401 - COMMUNICATION THEORY
(Regulations 2020)

Duration: 3 Hours   Max. Marks: 100

PART-A (10 × 2 = 20 Marks)
Answer ALL Questions

<div align="right">

Marks,
K-Level, CO
</div>

1. Give the advantages of VSB-AM. — *2,K1,CO1*

2. Determine the Hilbert transform of $\cos\omega t$. — *2,K2,CO1*

3. Determine the modulation index of an FM signal having a carrier swing of 100 kHz when the modulating signal has a frequency of 8 kHz. — *2,K2,CO2*

4. Invent the schematic diagram to generate PM signal from FM signal. — *2,K1,CO2*

5. Give the mathematical definition for random process. — *2,K1,CO4*

6. What is meant by ergodic process? — *2,K1,CO4*

7. Define Pre-Emphasis. — *2,K2,CO4*

8. State the cause of threshold effect in AM systems. — *2,K2,CO5*

9. Interpret on the procedure to avoid aliasing. — *2,K2,CO6*

10. For a PAM transmission of voice signal with W=3 kHz. Calculate B_T if fs=8 kHz and τ=0.1 T_S. — *2,K2,CO6*

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11. a) Derive the expression for SSB-SC waveform and explain the generation of SSB-SC signal using phase shift method. — *13,K2,CO1*

OR

b) Define Amplitude modulation and derive the expression for AM wave and its power relations also give its time and frequency domain representation. — *13,K2,CO1*

12. a) Derive the expression for frequency spectrum of FM modulated signal and comment on the transmission bandwidth. — *13,K2,CO2*

OR

b) Describe how FM generation is achieved using Varactor and reactance modulators. — *13,K2,CO2*

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   ***12448***

13. a) (i) Distinguish between random process and random variable and give examples of each.   *7,K2,CO4*

      (ii) Discuss the properties of auto correlation function.   *6,K2,CO4*

<div align="center">OR</div>

   b) (i) State and explain the properties of Gaussian process.   *6,K2,CO4*

      (ii) Using suitable sketches, expression, explain the transmission of random process through a Linear Time Invariant filter.   *7,K2,CO4*

14. a) Derive an expression for SNR at the input and SNR at the output for an envelope detector.   *13,K2,CO5*

<div align="center">OR</div>

   b) Explain the noise in FM receiver and calculate the figure of merit for a FM system.   *13,K2,CO5*

15. a) Interpret the distribution of quantization errors in uniform quantizers and derive the relationship between the number of bits used in the encoder and signal to quantization noise ratio.   *13,K2,CO6*

<div align="center">OR</div>

   b) (i) Summarize the working of PWM with a neat sketch.   *13,K2,CO6*

      (ii) Briefly describe the concept of FDM.

<div align="center">PART - C (1 × 15 = 15 Marks)</div>

16. a) Explain the operation of PLL as a FM demodulator.   *15,K2,CO3*

<div align="center">OR</div>

   b) Explain the working principle of super heterodyne receiver with neat block diagram.   *15,K2,CO3*