



Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024 Principles of Communication Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the Generation of AM wave using Switching Modulator along with relevant diagram and analysis. (08 Marks)
- b. Discuss the working of costal receiver for demodulating DSB – SC wave. (06 Marks)
- c. An audio fly signal $10 \sin 2\pi 500f$ is used to amplitude modulate a carrier of $75 \sin 2\pi \times 10^6 t$. Assume modulation index of 0.5. Find i) Side band fly's ii) Bandwidth required iii) Amplitude of each side band iv) Total power delivered to a load of 100Ω . (06 Marks)

OR

- 2 a. Explain the need for modulation. (06 Marks)
- b. Describe the Generation of DSBSC wave using Ring modulator with relevant diagrams and analysis. (08 Marks)
- c. Explain the operation of quadrature carrier multiplexing scheme with transmitter and receiver diagram. (06 Marks)

Module-2

- 3 a. Derive the equation for FM wave and define Carson's Rule of FM. (06 Marks)
- b. Explain the generation of FM using Direct method. (08 Marks)
- c. Explain the working of FM stereo multiplexing. (06 Marks)

OR

- 4 a. Discuss the working of Balanced slope detector. (08 Marks)
- b. Describe Non – linear model and PLL for FM detection. (06 Marks)
- c. The equation for an FM wave is $S(t) = 10 \sin (5.7 \times 10^8 t + 5 \sin 12 \times 10^3 t)$. Calculate i) Carrier frequency ii) Modulating fly iii) Modulation inde iv) Fly deviation. (06 Marks)

Module-3

- 5 a. Explain Mean , Correlation and Covariance functions of a random process $X(t)$. (08 Marks)
- b. Discuss the properties of Autocorrelation function. (06 Marks)
- c. Define Noise. Explain different types of Noise. (06 Marks)

OR

- 6 a. Distinguish between Random variable and Random process. (06 Marks)
- b. Define Probability Density function along with properties of PDF. (08 Marks)
- c. Show that the Noise Equivalent Bandwidth for a RC Low pass filter is $\frac{1}{4RG}$. (06 Marks)

Module-4

- 7 a. Show that the figure of merit of DSBSC system is unity. (10 Marks)
 b. Explain Threshold effect in FM receiving system. (05 Marks)
 c. An FM signal with a deviation of 75KHz is applied to an FM demodulator. When the input SWR is 15dB, the modulating frequency is 10kHz, estimate the SNR at the demodulator output. (05 Marks)

OR

- 8 a. Show that the figure of merit of AM system is $\frac{\mu^2}{2+\mu^2}$. (14 Marks)
 b. Explain the working of pre – emphasis and de – emphasis in FM system. (06 Marks)

Module-5

- 9 a. Define Sampling theorem. Find the Nyquist rate and Nyquist interval for the given signal

$$m(t) = \frac{1}{2\pi} \text{Cos}(4000 \pi t) \text{Cos}(1000 \pi t).$$
 (06 Marks)
 b. Explain the Generation of PAM signals. (06 Marks)
 c. With neat block diagram, describe the TDM system. (08 Marks)

OR

- 10 a. Explain the Generation of PPM waves. (06 Marks)
 b. Define PCM system. Discuss the basic elements of a PCM system. (08 Marks)
 c. Mention the merits , demerits and applications of PAM. (06 Marks)

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