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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 2π 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 fly is 10kHz, estimate the SNR at the demodulator output. **(05 Marks)**

OR

8 a. Show that the figure of merit of AM system is $\dfrac{\mu^2}{2+\mu^2}$. **(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 $m(t) = \dfrac{1}{2\pi} \text{Cos}(4000\,\pi t)\,\text{Cos}(1000\,\pi t)$. **(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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