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15EC45

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022 Principles of Communication Systems

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain in detail the working of switching modulator with suitable diagram and necessary derivations. (07 Marks)
- b. An audio frequency signal $5\sin 2\pi (1000)t$ is used to amplitude modulated carrier of $100 \sin 2\pi (10^6)t$. Assume modulation index as 0.4. Find :
- Amplitude of each side band
 - Bandwidth required
 - Sideband frequencies
- c. Explain the generation of PSB-SC modulated using ring modulator. (05 Marks)

OR

- 2 a. With block diagram, explain the working of quadrature carrier multiplexing. (06 Marks)
- b. Give the comparison of various amplitude modulation techniques. (05 Marks)
- c. With relevant block diagram, explain the working of FDM system. (05 Marks)

Module-2

- 3 a. Explain the generation of frequency modulated wave by direct method. (06 Marks)
- b. Explain how practically the bandwidth of FM is finite. (05 Marks)
- c. Explain the nonlinear effects in FM. (05 Marks)

OR

- 4 a. Explain the nonlinear model of PLL with relevant block diagram and derivations. (06 Marks)
- b. Explain the working of super hetero dyne receiver. (04 Marks)
- c. With the help of block diagram, explain the working of FM stereo multiplexing. (06 Marks)

Module-3

- 5 a. Define autocorrelation function. Explain its important properties. (06 Marks)
- b. Explain the following terms
- conditional probability
 - cumulative distribution function
 - joint probability density function.
- c. Describe mean covariance function with respect to stationary random process. (04 Marks)

OR

- 6 a. Define Noise equivalent bandwidth and derive the expression you the same. (06 Marks)
- b. Define short noise, white noise and thermal noise. (06 Marks)
- c. Suppose amplifier 1 has noise figure of 9dB and power gain of 15dB. It is connected in cascade to the other amplifier 2 with noise figure of 20dB. Calculate the overall noise figure for this cascade connection in decibel units. (04 Marks)

Module-4

- 7 a. Explain the noise in AM receivers and derive the equation for signal to noise ratio of an AM receiver, along its figure of merit. (08 Marks)
b. Explain the noisy model of FM receiver and derive an equation for figure of merit for Frequency Modulation. (08 Marks)

OR

- 8 a. Explain about the FM threshold effect and its reduction method. (08 Marks)
b. Why pre-emphasis and de-emphasis are required? Explain how they are implemented. (08 Marks)

Module-5

- 9 a. State and prove sampling theorem for band limited signals. (08 Marks)
b. Explain the generation and detection of PPM. (08 Marks)

OR

- 10 a. What is Quantization noise? Derive the output signal to noise ratio of a uniform quantizer. (08 Marks)
b. Explain the generation and reconstruction of a PCM signal. (08 Marks)
