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17EC44

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
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 square – law modulator with relevant equations and wave form. (08 Marks)
- b. With a neat block diagram, explain the balanced modulate method of generating DSB – SC wave. (07 Marks)
- c. With the functional block diagram, describe the salient features of QAM receiver. (05 Marks)

OR

- 2 a. An audio frequency signal $10 \sin 2\pi \times 500t$ is used to amplitude modulate a carrier of $50 \sin 2\pi \times 10^5$. Assume modulation index = 0.2. Determine side band frequency, amplitude of each sideband frequency, Bandwidth required, total power delivered to the load of 600Ω . (07 Marks)
- b. Discuss the concept of Costas loop with block diagram. (07 Marks)
- c. Explain the scheme of frequency division multiplexing system in detail. (06 Marks)

Module-2

- 3 a. Define Modulation index, deviation ratio and transmission bandwidth of a FM signal. (06 Marks)
- b. Explain narrow band FM generation using Indirect method. (06 Marks)
- c. An angle Modulated signal is defined by $s(t) = 10 \cos[2\pi 10^6 t + 0.2 \sin[2000\pi t]]$ volts. Find the following :
 - i) Power in the modulated signal
 - ii) Frequency deviation Δf
 - iii) Phase deviation
 - iv) Transmission bandwidth. (08 Marks)

OR

- 4 a. With schematic and frequency response explain the operation of balanced slope detector. (07 Marks)
- b. Explain linear module PLL. (06 Marks)
- c. With the help of block diagram, explain the working of FM ‘stereo’ multiplex. (07 Marks)

Module-3

- 5 a. A computer becomes inoperative, if 2 components A and B both fail. The probability that A fails is 0.01 and probability that B fails is 0.005. However the probability that B fails increases by a factor of 4, if A has failed. Calculate the probability that the compute become inoperable. Also find the probability that ‘A’ will fail if B has failed. (06 Marks)
- b. Define mean, covariance and auto correlation function. (06 Marks)
- c. Determine Noise equivalent bandwidth for RC LPF. (08 Marks)

OR

- 6 a. Explain the properties of auto correlation function. (06 Marks)
 b. Distinguish between random variable and random process. (06 Marks)
 c. Define noise along with sources of noise. Explain the types of noise which occur in an electronic devices. (08 Marks)

Module-4

- 7 a. Show that the figure of merit of DSBSC receivers is unity. (10 Marks)
 b. Find the figure of merit of AM when the depth of modulation is : (06 Marks)
 i) 100% ii) 50% iii) 30% (04 Marks)
 c. Write a note on capture effect in FM.

OR

- 8 a. Show that the figure of merit of FM receiver, using single tone modulation is $1.5\beta^2$. (08 Marks)
 b. An FM signal with a deviation of 75 KHz is applied to an FM demodulator when the input SNR is 15dB , the modulating frequency is 10KHz, estimate the SNR at the demodulator output. (06 Marks)
 c. Explain function of De-emphasis and de-emphasis in FM systems. (06 Marks)

Module-5

- 9 a. Find the Nyquist rate and Nyquist interval for the following signals.
 i) $m(t) = \frac{1}{2\pi} \cos(4000\pi t) \cos(1000\pi t)$
 ii) $m(t) = \frac{\sin(5000\pi t)}{\pi t}$. (08 Marks)
 b. Explain the generation of PAM signal. (06 Marks)
 c. With block diagram, explain the concept of VOCODERS. (06 Marks)

OR

- 10 a. With the help of neat sketches, describe the generation, reconstruction and regenerative repeaters of PCM system. (10 Marks)
 b. Distinguish between PAM and PPM techniques. (10 Marks)
