

## ONE TIME EXIT SCHEME

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10EC53

Fifth Semester B.E. Degree Examination, April 2018

## Analog Communication

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1
  - a. Explain the Mean , Correlation and Covariance functions with mathematical expressions in random process. (09 Marks)
  - b. Show that the random variables obtained by simultaneously observing the quadrature modulated processes  $X_1(t)$  and  $X_2(t)$  at some fixed value of time  $t$  are orthogonal to each other. (07 Marks)
  - c. What are the different properties of the Gaussian process? (04 Marks)
- 2
  - a. With relevant diagram, explain the operation of the switching modulator. Draw the modulating signal , carrier signal and modulated signal waveforms. (07 Marks)
  - b. Briefly explain the operation of the Ring modulator circuit with relevant circuit diagram and waveforms. (07 Marks)
  - c. Explain the operation of the cost as Loop with block diagram. (06 Marks)
- 3
  - a. What is the significance of Quadrature carrier multiplexing system? Explain the operation of the quadrature carrier multiplexing with transmitter scheme and Receiver scheme. (08 Marks)
  - b. What are the advantages of single sideband modulation? Give reasons. (04 Marks)
  - c. Explain the operation of the phase discrimination method for generating and SSB modulated wave with relevant diagram. (08 Marks)
- 4
  - a. What is the importance of vestigial side band modulation in communication system? (02 Marks)
  - b. Give comparison among Amplitude modulation techniques. (05 Marks)
  - c. What is Frequency translation? Explain the up conversion process and down conversion process in communication system. (05 Marks)
  - d. Explain the operation of the frequency division multiplexing system, with block diagram. (08 Marks)

PART - B

- 5
  - a. With relevant block diagrams, explain the generation of the narrow band FM using DSB – SC modulator and the generation of the narrow band PM using DSB-SC modulator. (08 Marks)
  - b. 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 frequency
    - iii) Modulation index
    - iv) Frequency deviation
    - v) Power dissipated in  $100\Omega$
 (05 Marks)
  - c. Explain the operation of the direct method of FM generation using voltage controlled oscillator circuit with feedback scheme which generated stabilized FM wave. (07 Marks)

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- 6 a. Explain the operation of the demodulation process of FM waves using balanced slope detector circuit and detector characteristics. (06 Marks)
- b. With neat diagram, explain the operation of the 'FM Stereo Multiplexing' briefly. (07 Marks)
- c. Using Linear model of phase locked loop system prove that the output  $v(t)$  of the low pass loop filter is proportional to the original modulating signal  $m(t)$ . (07 Marks)
- 7 a. Explain about Shot noise and Thermal noise. (06 Marks)
- b. Derive an expression for the 'Equivalent Noise Temperature'. (07 Marks)
- c. Suppose amplifier 1 has a noise figure of 9 dB 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. (07 Marks)
- 8 a. Using block diagram approach, explain the operation of the Noise in DSBSC Receiver using coherent detection. (08 Marks)
- b. Find the figure of merit, when the modulation depth is  
i) 100% ii) 50% iii) 30%. (04 Marks)
- c. Explain the importance and significance of pre emphasis and De – emphasis circuits in FM system. (08 Marks)

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