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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 100Ω **(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)**

6 a. Explain the operation of the demodulation process of FM waves using balanced slop 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 pas 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 i cascade to the other amplifier 2 with noise figure of 20dB. Calculate the overall noise figur for this cascade connection. **(07 Marks)**

8 a. Using block diagram approach, explain the operation of the Noise in DSBSC Receiver usin 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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