CBCS Scheme

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15EC45

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Principles of Communication System

Time: 3 hrs. Max. Marks: 80

Note: ***Answer FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Explain in detail the working of switching modulator with suitable block diagram and necessary derivations. **(07 Marks)**

b. An audio frequency signal 5cos (2π 1000t) is used to amplitude modulate a carrier of 100 cos (2π 10^6t). If modulation index is 0.4, find i) Sideband frequencies ii) Amplitude of each sideband iii) Bandwidth required iv) Total power delivered to a load of 100Ω. **(04 Marks)**

c. Explain the generation of DSB – SC – modulated waves using ring modulator. **(05 Marks)**

OR

2 a. Give the comparison of various amplitude modulation techniques. **(05 Marks)**

b. With relevant block diagram, explain the working of FDM system. **(06 Marks)**

c. Consider a two stage product modulator with a band pass filter after each product modulator as shown in fig. Q2(c). The filter characteristics is such that its pass band is exactly the same as the upper sideband of the preceding product modulators output. The input signal consists of a voice signal occupying the frequency band of 0.3 to 3.4 KHz. The two oscillator frequencies have values f_1 = 100KHz and f_2 = 10MHz. Specify the following : **(05 Marks)**

i) Output of two product modulator, mentioning the frequency values.

ii) Output of two bandpass filters, mentioning the frequency values.

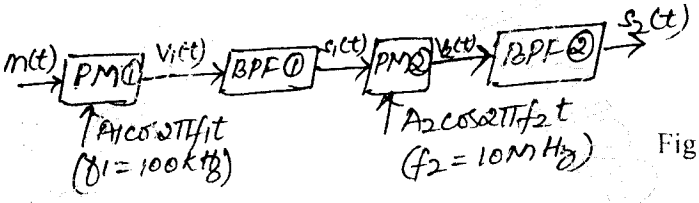

Fig.Q2(c)

Module-2

3 a. Explain the important properties of angle modulated waves. **(05 Marks)**

b. Explain the generation of wideband frequency modulated wave by direct method. **(07 Marks)**

c. A FM wave is represented by the following equation :
s(t) = 10 sin [5 × 10^8t + 4sin 1250t]. find i) Carrier frequency ii) Modulation index and frequency deviation iii) Power dissipated by this FM wave across a 5Ω resistor. **(04 Marks)**

OR

4 a. With the help of block diagram, explain the working of FM stereo multiplexing. **(06 Marks)**

b. Explain the non linear model of PLL, with relevant block diagram and derivations. **(05 Marks)**

c. Explain the working of super heterodyne receiver. **(05 Marks)**

Module-3

5 a. Explain the following terms and find the relation between them : **(06 Marks)**
i) Joint probability of events A & B ii) Conditional probability of events A & B.

b. Define Autocorrelation function. Explain its important properties. **(06 Marks)**

c. Describe Mean and Covariance function with respect to stationary random process. **(04 Marks)**

OR

6 a. Define Shot noise , White noise and Thermal noise. **(06 Marks)**

b. Define Noise equivalent bandwidth and derive the expression for the same. **(06 Marks)**

c. Suppose amplifier 1 has a 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. Discuss the noise in DSBSC receiver with a model receiver using coherent detection. Prove that the figure of merit for such a receiver is unity. **(08 Marks)**

b. An AM receiver operating with a sinusoidal wave and 80% modulation has an output signal to noise ratio of 30dB. Calculate the corresponding carrier to noise ratio. Prove the formula used. **(08 Marks)**

OR

8 a. Explain about the FM threshold effect and its reduction method. **(06 Marks)**

b. Why pre – emphasis and de – emphasis are required? Explain how they are implemented. **(06 Marks)**

c. An FM signal with $\Delta f = 75KHz$ is applied to and FM demodulator. When channel SNR is 15dB, fm is 10KHz. Find output SNR at demodulator. **(04 Marks)**

Module-5

9 a. What are the advantages of digital signals over analog signals? **(04 Marks)**

b. State and prove sampling theorem for band limited signals. **(06 Marks)**

c. Explain the working of TDM system with necessary block diagram. **(06 Marks)**

OR

10 a. Explain the generation and reconstruction of a PCM signal. **(08 Marks)**

b. What is Quantization noise? Derive the output signal to ratio of a uniform quantizer. **(08 Marks)**

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