CBCS SCHEME

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17EC44

Fourth Semester B.E. Degree Examination, June/July 2019
Principles of Communication

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Illustrate the time domain and frequency domain characteristics of standard Amplitude modulation produced by a single tone. **(08 Marks)**

b. A carried wave 4 sin ($2\pi \times 500 \times 10^3$ t) volts is amplitude modulated by an audio wave 0.2 sin 3 [($2\pi \times 500$t) + 0.1 sin 5 ($2\pi \times 500$t)] volts. Determine the upper and lower side band and sketch the complete spectrum of the modulated wave. Estimate the total power in the sideband. **(08 Marks)**

c. Discuss coherent detection of DSBSC modulated waves. **(04 Marks)**

OR

2 a. Discuss the concept of Frequency Translation process with the help of block diagram and spectrum. **(07 Marks)**

b. Explain the system of Quadrature carried multiplexing. **(07 Marks)**

c. Compare the parameters of DSBSC and VSB modulation system. **(06 Marks)**

Module-2

3 a. Explain the generation of FM waves by using VCO method. **(08 Marks)**

b. An angle modulated signal is defined by S(t) = 10 cos [$2\pi \times 106$ t + 0.2sin (2000πt)]. Find the following : i) Power in the modulated signal ii) Frequency deviation iii) Phase deviation iv) Approximate transmission bandwidth. **(06 Marks)**

c. Mention the merits and demerits of F.M. **(06 Marks)**

OR

4 a. Illustrate the detection of FM using non – linear model of PLL. **(10 Marks)**

b. With a block diagram approach, explain the operation of FM stereo system. **(10 Marks)**

Module-3

5 a. Explain conditional probability of 2 events. **(05 Marks)**

b. The pdf of a random variable is given as $f_x(x) = \begin{cases} K & \text{for } a \le x \le b \\ 0 & \text{otherwise} \end{cases}$. **(05 Marks)**

where K = constant i) Sketch the pdf and determine the value of 'K'.

c. Determine the Noise equivalent Bandwidth of low pass filter. **(10 Marks)**

OR

6 a. A mixed stage has a noise figure of 20dB. It is preceded by an amplifier which has a noise figure of 9dB and an available power gain of 35 dB. Calculate the overall noise figure referred to the input. **(06 Marks)**

b. Let 'X' be a continuum random variable having a uniform probability distribution defined in the range $2 \le x \le 4$. Let Y = (3x + 2). Find the mean m_x and m_y. **(06 Marks)**

c. Discuss the properties of auto – correlation function. **(08 Marks)**

Module-4

7 a. Derive the figure of merit of AM Receivers. **(10 Marks)**

b. Explain about pre – emphasis and de – emphasis in FM system. **(10 Marks)**

OR

8 a. Show that the figure of merit of FM is $\frac{3}{2}\beta^2$. **(14 Marks)**

b. An AM receiver operating with a sinusoidal modulating signal has the following specifications. M = 0.8 $\varepsilon[SNR]_0 = 30dB$. What is the corresponding signal to noise ratio. **(06 Marks)**

Module-5

9 a. Explain the concept with block diagram of TDM system. **(06 Marks)**

b. A TV signal with a bandwidth of 4.2 MHz is transmitted using binary PCM. The number of quantization levels is 512. Calculate i) Code word length ii) Transmission B.W iii) Final bit rate. **(06 Marks)**

c. With neat diagram, explain the generation and detection of PCM signals. **(08 Marks)**

OR

10 a. A PCM system uses a uniform quantizer followed by a 'V' bit encoder. Show that rms signal to quantization noise is approximately given by (1.8 + 6V) dB. **(06 Marks)**

b. Mention the merits , demerits and applications of PAM. **(06 Marks)**

c. A signal $m(t) = 10\cos(20\pi t)\cos(200\pi t)$ is sampled at the rate of 250 samplers/sec.
i) Sketch the spectrum of the sampled signal.
ii) Specify the cutoff for the ideal reconstruction filter.
iii) Specify the Nyquist rate for the signal m(t). **(08 Marks)**

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