B.Tech II Year II Semester (R15) Supplementary Examinations December 2018

ANALOG COMMUNICATION SYSTEMS

(Electronics & Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) A 400 Watt carrier is modulated to a depth of 80%. Calculate the total power in the modulated wave.

(b) What are the advantages of SSB modulation?

(c) What is frequency modulation and write the expression for instantaneous frequency?

(d) With block diagram, show how FM can be obtained using PM.

(e) Define white noise and write expression for power spectral density of white noise.

(f) Define signal to noise ratio and figure of merit.

(g) Describe in brief the sampling theorem in frequency domain.

(h) Write the advantages of PAM.

(i) Consider a binary source with source alphabet probabilities $P = \left\{\frac{1}{256}, \frac{255}{256}\right\}$. Find the entrophy.

(j) State Shannon Hartley theorem.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Illustrate the working of ring modulator for sinusoidal modulating wave n(t) and also obtain the o/p equation for ring modulator.

(b) An audio frequency signal 10 sin2π X 500 t is used to amplitude modulate a carrier of 50 sin2π X 10^5 t. Assume modulation index = 0.2. Find the following: (i) Sideband frequencies. (ii) Amplitude of each sideband frequencies. (iii) Bandwidth required. (iv) Total power delivered to the load of 600 Ω.

OR

3 (a) Describe the principle of QAM with functional block diagram.

(b) The output voltage of a transmitter is given by 400(1+0.4 cos6280 t) cos 3.14 x 10^7 t. This voltage is fed to a load of 80 Ω resistance. (i) Determine carrier frequency. (ii) Modulating frequency. (iii) Carrier power. (iv) Total power o/p.

UNIT – II

4 (a) Explain the generation of narrow band frequency modulation (NBFM) using Armstrong technique.

(b) An angle modulated signal s(t) is given by the equation: $s(t) = 12\cos(12\pi 10^8 t + 200\cos 2\pi 10^3 t)$. Find its bandwidth.

OR

5 (a) Analyze the FM demodulation using PLL.

(b) A sinusoidal modulating waveform of amplitude 10 V and a frequency of 1 kHz is applied to an FM generator that has a frequency sensitivity content of 40 Hz/volt. Determine the: (i) Frequency deviation. (ii) Modulation index.

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UNIT – III

6 (a) Derive the equation for (SNR)o of DSB-SC receiver.

(b) A carrier reaching an envelope detector in an AM receiver has an RMS value equal to 1 volt in the absence of modulation. The noise at the input of the envelop detector has a PSD equal to 10^{-3} watts/Hz. If the carrier is modulated to a depth of 100% and message bandwidth w = 3.2 kHz. Find output signal-to-noise ratio (SNR)o.

OR

7 (a) Obtain (SNR)o equation for FM receiver.

(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 10 kHz, estimate the SNR at the demodulator output.

UNIT – IV

8 (a) State and prove sampling theorem for band limited signals.

(b) Specify the Nyquist rate and Nyquist interval for each of the following signals:

(i) x(t) = sin c (200t).

(ii) x(t) = sin c^2 (200t).

OR

9 (a) Describe the generation and demodulation of PAM.

(b) Twelve different message signals, each of bandwidth 10 kHz are to be multiplexed and transmitted. Determine the minimum bandwidth required for PAM/TOM.

UNIT – V

10 (a) State and prove the properties of entrophy.

(b) A black and white TV-picture consists of 525 lines of picture information. Assume that each line consists of 525 picture elements and that each element can have 256 brightness levels. Pictures are repeated at the rate of 30 frames/sec. Calculate the average rate of information conveyed by a TV set to a viewer.

OR

11 Prove the identity H(x, y) = H(x/y) + H(y).

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