5E5024

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5E5024

B. Tech. V Sem. (Main/Back) Exam., Nov.-Dec.-2016
Electronics & Communication Engineering
5EC4A Analog Communication

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No.205)

1. NIL 2. NIL

UNIT – I

Q.1 A satellite receiving system consists of a low noise amplifier (LNA) that has a gain of 47 dB and a noise temperature of 120 K, a cable with a loss of 6.5 dB and the main receiver with a noise factor of 7 dB. Calculate the equivalent noise temperature of the overall system referred to the input for the following system connections. [16]

(i) LNA → Cable → Receiver

(ii) Cable → LNA → Receiver

OR

Q.1 (a) Explain the shot noise and white noise in detail. What is partition noise? [8]

(b) A parallel tuned circuit has a capacitor of 1500 pf and is tuned to 2 MHz. It has a Q factor of 90. What is the r. m. s. noise voltage across the tuned circuit at a temperature of 27°C, if the voltage is measured over a bandwidth of 10 KHz? [8]

UNIT – II

Q.2 (a) Consider the wave obtained by adding a non coherent carrier Ac cos (w_c t+ ϕ) to the DSB – SC wave, m(t) cos w_c t, where m(t) is the message waveform. This waveform is applied to an ideal envelope detector. Find the resulting detector output. Evaluate the output for - [12]

(i) $\phi = 0$ (ii) $\phi \neq 0$, and

[m (t)] << Ac/2.

(b) State the applications of SSB – transmission. [4]

OR

Q.2 (a) Sketch the typical spectrum of the VSB signal that is given as input to the video detector of a T. V. Receiver. [5]

(b) Briefly explain the method of generation of SSB – SC signals with phasing method. [7]

(c) An AM signal is given by - [4]

$X_c(t) = [30 + 9 \cos 2000 \pi t + 12 \cos 3000 \pi (t)] \times \cos 2\pi \times 10^5 t$

(i) Determine the effective modulation index.

(ii) Determine the carrier power and total side band power.

UNIT – III

Q.3 (a) With a neat block diagram, briefly explain the principle of working of a super-hetrodyne FM broadcast receiver. Why is a limiter stage used? [10]

(b) A message signal x (t) = 100 sin c 2000 t frequency modulates a carrier signal $c(t) = 200 \cos 2\pi \times 10^8$ t with a modulation index of S - [6]

(i) What is the peak frequency deviation?

(ii) What is the average power of the modulated signal?

(iii) What is the bandwidth of this modulated signal?

OR

Q.3 (a) With the help of a neat block diagram, explain the indirect method of generation of WB FM signal. [8]

(b) Briefly explain, How a PLL is useful in detecting FM signals? [4]

(c) The carrier signal $c(t) = 200 \cos 2\pi \times 10^8$ t is phase modulated by the message signal $x(t) = 2 \cos 2\pi \times 10^3$ t, and the peak phase deviation is $\pi 15$. What is the B. W of P.M. signal? [4]

UNIT – IV

Q.4 (a) Derive an expression for the improvement in the destination SNR obtained by the use of pre emphasis and de emphasis in an FM system. [12]

(b) What is meant by the threshold effect in FM receiver? [4]

OR

Q.4 (a) An AM transmitter is used to send a message signal with $\overline{x^2} = 0.5$ and a bandwidth of 5MHz over a channel which introduces additive white noise with a power spectral density of 10^{-12} W/Hz. The modulation index is 1. If the channel introduces a loss of 100 dB and if the average transmitted power is 200 w, find the destination signal to noise ratio. [8]

(b) Derive an expression for the destination SNR of a DSB – SC system in terms of that of a baseband system. [8]

UNIT – V

Q.5 (a) Explain how a PAM signal may be generated? How it can be demodulated? [8]

(b) Fifteen voice signals, each band limited to 4 KHz, are sampled at a rate that allows us to provide a guard band of 1.5 KHz to facilitate reconstruction. The samples are transmitted using PAM with AM of continuous wave i.e. PAM/AM, the duty cycle being 0.25. Calculate the required transmission B.W. [8]

OR

Q.5 (a) Briefly explain following: [8]

(i) Aliasing

(ii) Aperture effect

(iii) Zero order hold.

(b) Describe with the help of neat sketches and waveforms any two methods of generation of PDM/ PWM. [8]
