5E5047

Roll No. _____ Total No of Pages: 4

5E5047

B. Tech. V Sem. (Main / Back) Exam., Dec. 2014

Electrical Engineering

5EE6.2A Principles of Communication Systems

Common with EE, EX

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 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.

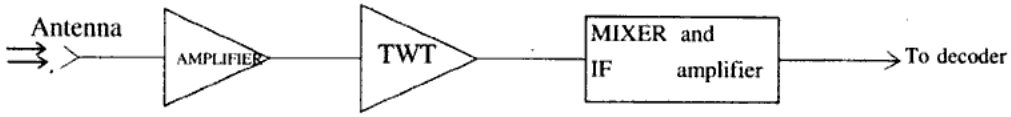
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT – I

Q. 1 (a) Find the expressions for overall noise figure and overall noise temperature of a cascaded amplifier. [10]

(b) Evaluate the overall noise – figure of the receiver and the overall equivalent temperature of the receiver of typical microwave receiver shown in the figure given below. [6]



Gain Ga_1 = 30dB Ga_2 = 20dB Ga_3 = 40dB

Noise Temp = 5°K Noise Figure = 6dB Noise Figure = 12dB

Assume the ambient temperature is 17°C.

OR

(a) Explain the terms: noise bandwidth, noise temperature, available power, signal to noise ratio and noise figure [10]

(b) A receiver with 80 dB gain and an effective noise temperature of 3000 K is connected to an antenna that has a noise temperature of 600 K. Find the receiver noise power output over a 40 MHz band. Given Boltzmann's constant = 1.38×10^{-23} [6]

UNIT – II

Q. 2 (a) Draw the block diagram of super – heterodyne receiver and give its merit over TRF. Why is it called super – heterodyne? Why is local oscillator frequency kept higher? [10]

(b) Calculate the percent power saving of an SSB signal if the AM wave is modulated to a depth of [6]

(a) 100%

(b) 50%

OR

(a) What is modulation index in AM? What is over modulation? How can you detect an over modulated signal? How can you measure modulation index using a CRO? [10]

(b) Show that an AM signal can be recovered irrespective of the value of percentage modulation by using synchronous detection technique. [6]

UNIT – III

Q. 3 (a) Draw and explain the circuit diagram of Ratio detector. What are its merits and demerits? [10]

(b) A carrier $E_c \cos W_c t$ is modulated by a signal - [6]

$f(t) = 2 \cos 2\pi t + 6 \cos 10^3 2\pi t + 7 \cos 10^3 4\pi t$

Find the bandwidth of FM using Carson's rule. Assume deviation sensitivity is 10×10^3 Hz per Volt. Also find the 'deviation ratio'.

OR

(a) Why is direct modulation not preferred for FM generation? How do you generate FM from PM? [10]

(b) Show that the bandwidth of FM signal remains the same even if the modulating signal frequency varies by a factor 1:100. Assume frequency deviation is 75 KHz. [6]

UNIT – IV

Q. 4 Define the figure of merit and explain its significance. Derive an expression for the DSB –SC receiver. [16]

OR

Calculate figure of merit for single tone modulation in FM receiver. Take suitable assumptions if required. [16]

UNIT – V

Q. 5 (a) Why is flat – top sampling preferred over natural sampling? [4]

(b) Write short note on any two of the following - [6x2=12]

(i) PAM

(ii) PPM

(iii) PWM

OR

(a) With the help of neat circuit diagram explain the generation and detection of PPM signal. [12]

(b) Compare PAM, PWM and PPM system. [4]

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