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5E5024

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B. Tech V Sem. (Main/Back) Exam. Nov-Dec. 2015
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.

1. NIL _____   2. NIL _____

UNIT-I

Q.1 (a) In a radio receiver an RF amplifier and a mixer are connected in cascade as shown in fig.-1. The amplifier has a noise figure of 10dB and power gain of 15dB. The noise figure of the mixer is 20db. Calculate the overall noise figure reffered to the input. [8]
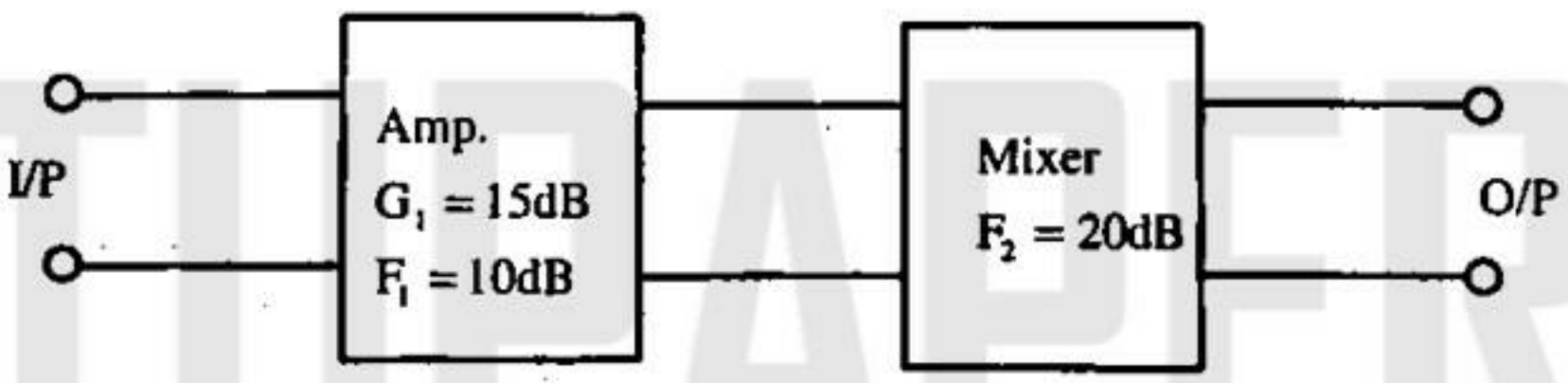

Figure - 1

(b) How reactive circuits affect the noise in communication circuits? A parallel tuned circuit has resonant frequency 10 MHz and quality factor Q=20. If the value of capacitance is 10PF then calculate the noise voltage across it. Assume the ambient temperature 17°C. [4+4=8]

OR

Q.1 (a) What are the external sources of noise? Compare these sources with internal noise sources in respect of their voltage level, bandwidth and coupling in communication system. [8]

(b) A radio receiver with equivalent noise bandwidth of 10kHz has a noise figure of 20dB. It input SNR to receiver is 40 dB then (i) determine the output SNR (ii) what is equivalent noise temperature if ambient temperature is 27°C. [8]

UNIT-II

Q.2 (a) The input to an envelope detector is a single tone AM signal $X_{AM}(t)=A(1+maCosW_mt) CosW_ct$.

(i) Show that if the detector output is to follow the envelope then it must fulfill the following condition at any instant to $\frac{1}{RC} \geq W_m\left(\frac{M_a sinw_m t_o}{1+M_a Cosw_m t_o}\right)$. How this coalition will modify for all time? [8]

(b) What is vestigial sideband modulation? Explain its circuit for demodulation. Also write the specific use of it. [3+3=6]

(c) Draw frequency spectrum of DSB-SC. [2]

OR

Q.2 (a) A carrier signal $X_C(f)=1.0 sinW_ct$ is fed in series to a modulating signal of amplitude 0.5 volt across a square law modulator having characteristic -

$i=10+KV_i+K^1V_i^2$ mA

with $K = 2mA/V$ $K^1 = 0.2mA/V^2$

Then calculate the depth of modulation. [8]

(b) Draw the frequency spectrum of AM-DSB, SSB and vestigial side band modulation. Compare their modulation efficiency. [8]

UNIT-III

Q.3 (a) What is the difference between direct and indirect method of FM Generation? Explain each method and compare them in respect of circuit complexity and performance. [8]

(b) A signal is given by -

$s(f) = CosW_c t + 0.2\ WSW_m t\ SinW_c t$

(i) Prove that it is combination of AM-FM signal.

(ii) Draw the phasor diagram at any two instant. [3+3=6]

(c) Explain the different between narrow band and wide band FM. Also write their specific application. [2]

OR

Q.3 (a) Define the sensitivity factor in FM and PM. Calculate the resulting bandwidth if -

(i) FM Sensitivity $K_f = 10^4 Hz/volt$

(i) FM Sensitivity $K_p = 100\pi$ radian/volt

Assume the carrier frequency = 100MHz. [2+3+3=8]

(b) What is thumb rule for bandwidth calculation in FM? When it can be used? Find the fraction of signal power that is included in the bandwidth given by thumb rule when moderation index is $M_f = 1$ and $M_f = 10$ [2+2+2+2=8]

UNIT-IV

Q.4 Find the expression of SNR in FM. How it is modified with pre-emphasis and de-emphasis? [16]

Q.4 (a) Find the SNR in coherent detection used in SSB receiver. Also find its figure of merit. [8+2=10]

(b) Explain the threshold effect used in AM and FM. [6]

UNIT-V

Q.5 (a) Compare the performance of a coded and uncoded communication system. [8]

(b) Explain the noise performance of PPM and PWM. [8]

OR

Q.5 Write short note on **any two**: [8+8=16]

(a) Natural Sampling

(b) Noise in PAM

(c) Demodulation of PPM.