

5E3104

B. Tech. (Sem. V) (Main/Back) Examination, December - 2013
 Applied Electronics & Instrumentation
 5AI4 Analog Communication (Common with 5EX4 & 5EC4)

Time : 3 Hours]

[Total Marks : 80

[Min. Passing Marks : 24

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.

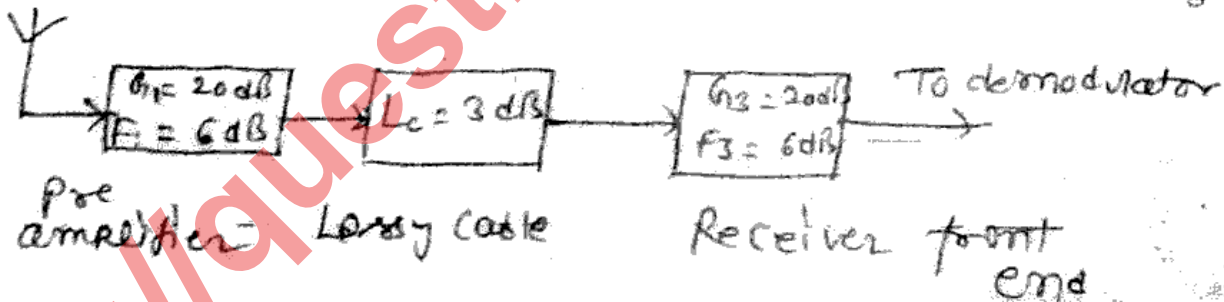
Use of following supporting material is permitted during examination.
 (Mentioned in form No. 205)

1. NIL

2. NIL

UNIT - I

- I (a) In TV receivers, the antenna is often mounted on a tall mast and a long lossy cable is used to connect the antenna to the receiver. To overcome the effect of the lossy cable, a pre amplifier is mounted on the antenna as shown in the figure.



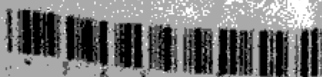
- (i) Find the overall noise figure of the system.
 (ii) Find the overall noise figure of the system if the pre amplifier is omitted and the gain of the front end is increased by 20 dB.

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- (b) How does 'Shot-noise' originate? Comment the power spectrum of shot noise current.

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OR



1 (a) Define and explain the term 'noise figure' and 'noise temperature' of a two port network. How are they related? 8

(b) A source with an internal resistance of $50\ \Omega$ and internal emf of $6\ \mu\text{V}$ is supplying the signal voltage to an amplifier that has an input resistance of $75\ \Omega$. The amplifier has an equivalent noise resistance of $1470\ \Omega$. For a noise bandwidth of $5\ \text{kHz}$, calculate the output (S/N) ratio in dB at room temperature of 290°K . Also determine the noise figure 'F' of the amplifier. 8

UNIT - II

2 (a) Explain the Weaver's method of SSB-SC signal generation and draw the block diagram of pilot carrier SSB transmitter. 10

(b) A collector modulated class-C power amplifier is giving an amplitude modulated signal of average power $100\ \text{W}$ at the output, while operating with a collector circuit efficiency of 80% . Assuming the modulation index to be 0.8 , find (a) the power to be supplied by the modulating amplifier (b) the dissipation in the transistor. 6

OR

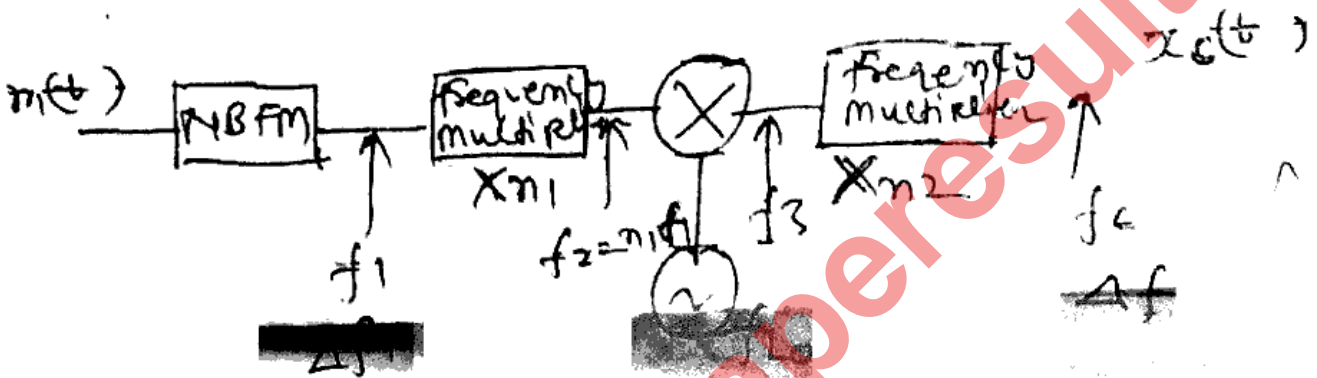
2 (a) Discuss the principles of demodulation methods of AM signals. 6

(b) Draw and explain the working of super heterodyne receiver. How the local oscillator frequency is decided? 10

- 3 (a) Discuss the indirect method of generation of wideband Angle modulated signal and compare with direct methods.

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- (b) A block diagram of an FM transmitter is shown in figure. Compute the maximum frequency deviation of the output of the FM transmitter and the carrier frequency f_c if $f_1 = 200$ kHz, $f_{LO} = 10.8$ MHz, $\Delta f_1 = 25$ Hz, $n_1 = 64$, $n_2 = 48$.



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OR

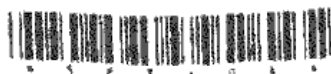
- 3 (a) A carrier is frequency modulated with a sinusoidal signal of 2 kHz, resulting in a maximum frequency deviation of 5 kHz.

- (i) Find the bandwidth of the modulated signal.
- (ii) The amplitude of the modulated signal is increased by a factor of 3, and its frequency is lowered to 1 kHz. Find the maximum frequency deviation and the bandwidth of the new modulated signal.

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- (b) With the neat block diagram, explain the working of phase locked loop (PLL) detector of FM signal, also write its advantages and disadvantages.

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UNIT - IV

- 4 (a) Discuss the noise performance of the FM system and derive an expression for figure of merit.
- (b) Explain the need of pre emphasis and de emphasis in the case of FM systems.
- (c) Explain the threshold effect in FM and causes for threshold effect.

16

OR

- 4 (a) Derive an expression of figure of merit of an AM system with envelope detector and discuss the threshold effect.
- (b) An AM receiver operating with a sinusoidal modulating wave and 80% modulation has an output signal to noise ratio of 30 dB, what is corresponding carrier to noise ratio ?

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UNIT - V

- 5 (a) Sketch the waveforms of pulse time modulation system with sinusoidal input and explain the methods of generation of PTM signals.
- (b) How cross talk limits the performance of PTM systems ? Discuss. Explain the synchronization in TDM-PTM.

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OR

5 Write short notes on any two :

- (a) Cross talk in PAM
- (b) Anti aliasing and reconstruction filters
- (c) Detection of PTM signals.

8×2=16

