

5E5024

Roll No. _____

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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.

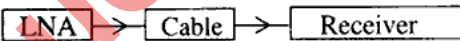
(Mentioned in form No.205)

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) 

(ii) 

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 $A_c \cos(\omega_c t + \phi)$ to the DSB – SC wave, $m(t) \cos \omega_c t$, 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

$[m(t)] \ll A_c/2$.

- (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 5 - [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]
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