5E5024

Roll No. : _____ 4

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B. Tech. (Sem. V) (Mercy Back) Examination, November 2018 Electronics & Communication Engg. 5EC4A Analog Communication

Time : 3 Hours

Maximum Marks: 80

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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. NII.

2. NII.

UNIT - I

1 (a) Define and explain the terms : noise figure and noise temperature of a 2-port network. How are they related?

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(b) A 10 kΩ and a 20 kΩ resistor are both at a room temperature of 27°C. For a 100 kHz bandwidth, determine the r.m.s. value of the thermal noise voltage across (i) each one of them, (ii) their series combination, and (iii) their parallel combination.

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1 Jay Define and explain the term: "noise equivalent bandwidth of a filter".

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(b) A source with an internal resistance of 50 Ω and an internal e.m.f. of 6 μV is supplying the signal voltage to an amplifier that has an input resistance of 75 Ω. The amplifier has an equivalent noise resistance of 1470 Ω. For a noise bandwidth of 5 kHz, calculate the output (S/N) ratio in dB at room temperature of 290 K.

UNIT - II

- 2 (a) A carrier signal $\Lambda_c \cos \omega_c t$ is amplitude modulated by a message signal $\Lambda_m \cos \omega_m t$, where, $\Lambda_m < \Lambda_c$.
 - Write down the expression for the modulated signal.
 - (ii) Write down the expression for the carrier component and the side-frequency components.
 - (iii) Draw the phasor diagram of the modulated signal.

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(b) A carrier signal is sinusoidally modulated to a depth of m = 0.8. What percentage of the total power of the modulated signal is in the two sidebands?

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2 (a) State how a DSB-SC signal may be generated?

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(b) Write down an expression for the time-domain representation of a VSB signal.

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UNIT - III

3 Derive an expression for the time domain representation of a frequency (a) modulated signal. 8 A message signal, x(t) = 100 sinc 2000 t frequency modulates a carrier signal $c(t) = 200\cos 2\pi \times 10^8 t$, with a modulation index of 5. Write down an expression for x_c(t), the modulated signal. (ii) What is the bandwidth of this modulated signal? 8 OR Define the term 'modulation index' for FM in the case of single-tone 3 modulation and for a general modulating signal. (b) With the help of a neat block schematic diagram, explain the indirect method of generation of WBFM signals. 8 UNIT - IV Draw the block diagram of the model used for the channel and the receiver to study the noise performance of various modulation systems. What is meant by 'threshold effect' in FM receivers ? (b) 8 8 OR (a) What is the model used for an envelope detector ? Expain the need for 'pre-emphasis and de-emphasis' in the case (b) FM systems. How is it implemented? 8 5E5024 |

UNIT . V

- 5 (a) What is 'aliasing'? How it can be reduced or avoided?
 - (b) State the low pass sampling theorem and briefly explain its significance.

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- 5 (a) Explain how a PAM signal may be generated. How can it be demodulated?
 - Describe with the help of neat sketches of waveforms, any two methods of generation of PDM/PWM and PPM.

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