Exam.Code:0928
Sub. Code: 7010

1089

B.E. (Electronics and Communication Engineering)
Forth Semester
EC-403/EC-421: Communication Theory

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, selecting atleast two questions from each Unit.*

x-x-x

UNIT – I

I. a) Define signal. Explain in detail the classification of signals.

b) State sampling theorem. Explain with the aid of diagram what is aliasing and suggest different methods to remove aliasing. (2x5)

II. a) An amplifier operating over the frequency range from 18 to 20 MHz has a 10 Kilo ohm input resistor. What is the rms noise voltage at the input to this amplifier if the ambient temperature is 27°C? Explain what would be the effect of the noise voltage on the performance of the amplifier.

b) Discuss the different types of noise and the sources of noise in detail. (2x5)

III. a) Consider a random process X(t) defined by $X(t) = \sin(27\pi f_c t)$, in which the frequency f_c is a random variable uniformly distributed over the interval [0,W]. Show that X(t) is nonstationary.

b) A stationary, Gaussian process X(t) has zero mean and power spectral density $S_X(f)$. Determine the probability density function of a random variable obtained by observing the process X(t) at some time t_K. (2x5)

IV. a) Compute the four terms in the Fourier series for a 1 KHz rectangular waveform with a pulse width of 500 μs and an amplitude of 10 V.

b) State and prove Parseval's Power theorem. (2x5)

UNIT – II

V. a) Derive the impulse response of matched filter and state its properties.

b) State and explain channel capacity theorem. (2x5)

VI. a) Let p denote the probability of some event. Plot the amount of information gained by the occurrence of this event for $0 \leq p \leq 1$.

b) A voice grade channel of the telephone network has a bandwidth of 3.4 KHz. Calculate the information capacity of the telephone channel for signal to noise ratio of 30 dB.

P.T.O.

VII. Explain in short:-

a) Huffman coding

b) Shannon Fano coding

c) Coding efficiency (3,4,3)

VIII. Define probability of error of a communication system. Derive the complete mathematical expression for probability of error of a communication system, explaining the detail of each individual step. (10)

x-x-x