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Total Number of Pages:02

B.TECH
PET51103

5th Semester Regular Examination 2017-18

ANALOG COMMUNICATION

BRANCH: ECE, ETC

Time: 3 Hours

Max Marks: 100

Q.CODE: B457

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

Part – A (Answer all the questions)

Q1 Answer the following questions: *multiple type or dash fill up type* (2 x 10)

- The Ultra High Frequency (UHF) range extends from .
- The process of transmitting two or more information signals simultaneously over the same channel is called .
- The inverse Fourier transform of $\delta(\omega - \omega_0)$ is .
- The Dirichlet's condition for Fourier series is .
- An AM signal and narrow band FM signal with identical carriers, modulating signals and modulation indices of 0.1 are added together. The resultant signal can be closely approximated by
 - Broadband FM
 - SSB with carrier
 - DSB-SC
 - SSB without carrier
- The envelop of AM signal $S(t) = [A + X(t)] \cos \omega_c t$ is .
- The band width of AM wave is .
- The angle modulated signal is $x(t) = 10 \cos(2\pi \cdot 10^8 t + 200 \cos 2\pi \cdot 10^3 t)$. The β is .
- The probability Density Function (PDF) of an uniform distribution is expressed as .
- The expression for Thermal noise generated in a resistor is .

Q2 Answer the following questions: *Short answer type* (2 x 10)

- What is direct delta function?
- State the time delay Theorem of Fourier transform.
- Write the Dirichlet's condition for Fourier series.
- Define transmission efficiency in AM wave?
- What is Hilbert transform? What are its properties?
- What are the disadvantages of FM order?
- Write the drawbacks of Tuned Radio Frequency (TRF) receiver.
- What is conditional probability density function?
- An amplifier operating on a frequency range from 18 to 20 MHz has a 10 K Ω input resistance. Find the r.m.s noise voltage at the input to this amplifier if the ambient temperature is 27^o C.
- Determine the modulation index m_f of an FM signal which is being broadcast in the 88-108 MHz band. This FM wave has a carrier swing of 125 KHz.

Part – B (Answer any four questions)

- Q3** a) Find out the output response of the low pass RC network due to an input $x(t) = te^{-t/RC}$ by convolution. **(10)**
b) For a system the impulse response $h(t)$ is given as $h(t) = e^{-t}u(t) + e^{2t}u(-t)$. The system is excited by $x(t) = e^{-2t}u(t)$. Find the output $y(t)$ for this system **(5)**
- Q4** a) The waveform $v(t) = e^{-t/\beta}u(t)$ is passed through a high pass RC circuit having a time constant β . Find the energy spectral density at the output of the circuit. Show that the total output energy is one-half the input energy. **(10)**
b) Find the cross correlation of two periodic functions as a saw tooth wave and a square wave both having time period T and amplitude 1. **(5)**
- Q5** a) A random variable $V = b + X$, where X is a Gaussian distributed random variable with mean 0 and variance σ^2 , and b is a constant. Show that V is a Gaussian distributed random variable with mean b and variance σ^2 . **(10)**
b) Explain the disadvantages of detection of DSBSC in detail. **(5)**
- Q6** a) Discusses the VSB communication with generation and detection. Explain the effectiveness of VSB in TV transmission. Also discusses the bandwidth of TV channel with Guard Band. **(10)**
b) Differentiate the amplitude modulation from angle modulation. **(5)**
- Q7** a) The modulated signal is given as $S(t) = 10 \cos(\omega_c t + 5 \sin 3000t + 10 \sin 2000\pi t)$. The carrier frequency is $\omega_c = 2\pi \times 10^5$ radian. Find power of the modulated signal, frequency deviation, modulation index, phase deviation, and the band width of $S(t)$. **(10)**
b) Discusses the generation of WBFM by parameter variation method with the expression. **(5)**
- Q8** a) Explain the frequency domain representation of Noise with mathematical expressions and also prove that the spectral components of noise are uncorrelated. **(10)**
b) Discusses the superheterodyne receiver with the block diagram. **(5)**
- Q9** a) Give the noise analysis for DSBFC signal to find SNR. Also find the figure of merit. **(10)**
b) Write a note on Frequency Division Multiplexing. **(5)**