JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- FEB-2023

COURSE CODE (CREDITS): 18B11EC413 (3) MAX. MARKS: 15

COURSE NAME: Modern Analog and Digital Communication

COURSE INSTRUCTORS: Dr. Alok Kumar MAX. TIME: 1 Hour

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

Q.1 Find the Fourier series of the `periodic function $f(x)$ such that **[CO1] [3]**

$$f(x) = \begin{Bmatrix} -\pi & when -\pi \leq x \leq 0 \\ x & when\ 0 < x \leq \pi \end{Bmatrix}$$

Q.2 An amplitude modulated (AM) wave is represented by the expression:

$v(t) = 5[1 + 0.6Cos(6280t)]Sin(211 * 10^4 t)$ volts. Find the following:

a) What are the minimum and maximum amplitudes of the AM wave?
b) What frequency components are contained in the modulated wave?
c) What is the power in the side bands?

[CO2] [3]

Q.3 Derived the expression for amplitude modulated wave while considering message and carrier signal as follows: $m(t) = A_m Cos(\omega_m t)$ and $C(t) = A_c Cos(\omega_c t)$. Where, $m(t)$ is the message signal and $C(t)$ is the carrier signal. ω_m and ω_c are the angular frequency of message and carrier signal respectively. Draw the AM wave in time domain as well as in frequency domain. **[CO2] [3]**

Q.4 What is modulation? How modulation helps in communication? **[CO1, CO2] [2]**

Q.5. Explain impulse function with suitable diagram. Write four properties followed by impulse function? **[CO1] [2]**

Q.6 Define transmission efficiency in AM. What is its maximum value for AM, when considering modulation index=1? **[CO2] [2]**