

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- APRIL-2023

COURSE CODE(CREDITS): 18B11EC413 (3)

MAX. MARKS: 25

COURSE NAME: Modern Analog and Digital Communication

COURSE INSTRUCTORS: Dr. Alok Kumar

MAX. TIME: 1 Hour 30 Minutes

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

- Q.1 Explain the working of switching modulator to generate the AM wave. A 2 MHz sinusoidal carrier is amplitude modulated by a symmetrical square wave of period 200 μ sec. Find out which frequencies will be present in the modulated signal?
[CO2] [2+2=4]
- Q.2 Differentiate between narrowband FM and wide band FM communication system with help of mathematical and graphical analysis. What is the similarity between Narrow band FM system and Amplitude modulated system.
[CO2] [3+1=4]
- Q.3 What is sampling theorem? Find the Nyquist rate and Nyquist interval for the given signal $x(t)$.
 $x(t) = \frac{1}{2\pi} \cos(4000\pi t) \cos(1000\pi t)$
[CO3] [2+1+1=4]
- Q.4. In a FM system, a carrier of 100 MHz is modulated by a sinusoidal signal of 5 KHz. The bandwidth by Carson's approximation is 1MHz. If $Y(t) = (\text{modulated waveform})^2$, then by using Carson's approximation, find the bandwidth of $Y(t)$.
[CO2] [3]
- Q.5 A modulating signal given by $x(t) = 5\sin(4\pi \cdot 10^3 t - 10\pi \cos(2\pi \cdot 10^3 t))$ is fed to a phase modulator with phase deviation constant $K_p = 5$ rad/V. If the carrier frequency is 20 KHz, find the instantaneous frequency at $t = 0.5$ ms.
[CO2] [3]
- Q.6. Explain the working principle of envelope detector to demodulate the signal with suitable diagram.
[CO1, CO2] [3]
- Q.7 Answer the following questions.
a) What is aliasing and how do you avoid it?
b) What is quantization? How can we reduce the quantization error?
[CO3] [4]