Department of Electronics & Communication Engineering

(Faculty of Technology, Dharmsinh Desai University, Nadiad)

Academic Year: 2022 - 2023

TUTORIAL – 9

Subject : *PHYSICS (Module-8)*
Class : *B. Tech. Sem. II (EC/IT)*

Q.1 Select the most appropriate option.

(1) In Amplitude Modulation(AM), the modulating frequency should always be:
(I) Greater than f_c (II) Lesser than f_c (III) Equal to f_c (IV) None of these

(2) For an AM wave represented by $10[1 + 0.6 \cos(2\pi * 1000t)] \cos(2\pi * 10^6 t)$ the sideband frequencies are
(I) 998 kHz and 1002 kHz (II) 999 kHz and 1001 kHz (III) 0.998 MHz and 1.002 MHz (IV) None of these

(3) The frequency deviation in Phase Modulation (PM) is proportional to
(I) Modulating voltage (II) Modulating frequency (III) Modulating frequency and voltage (IV) None of these

(4) Which of the following is called ON-OFF keying?
(I) Amplitude Shift Keying (II) Frequency Shift Keying (III) Phase Shift Keying (IV) None of these

(5) In Binary Frequency Shift Keying (BFSK), mark and space respectively represent
(I) 1 and 0 (II) 0 and 1 (III) 11 and 00 (IV) 00 and 11

Q.2 Do as Directed (Descriptive Answers, Examples etc)

(1) A carrier wave is represented by the expression $v_c(t)= 10 \sin(\omega t)$. Draw the waveform of an AM wave for modulation index = 0.5 if information signal frequency is 1 KHz.

(2) A carrier wave of amplitude 10V and frequency of 100 MHz is frequency modulated by a sinusoidal voltage. The modulating voltage has an amplitude of 5V and frequency f_m = 20 kHz. The frequency deviation constant is 2 kHz/volt. Draw the frequency spectrum of FM wave. (Challenging Problem)

(3) Give the performance comparison between Frequency Modulation (FM) and Phase Modulation (PM) systems.

(4) In an FM system, the audio frequency is 1 kHz and audio voltage is 2 volts. The deviation is 4 kHz. If the audio voltage is now increased to 8 volts and its frequency dropped to 500 Hz, find the modulation index in each case and corresponding bandwidth using Carson's rule.