Unit 9 - Week-6 Narrowband FM Generation, Spectrum of FM Signals, Carson's Rule for FM Bandwidth, Narrowband FM Generation, FM Demodulation, Introduction to Sampling, Spectrum of Sampled Signal, Aliasing, Nyquist Criterion

Assignment-6

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-03-11, 23:59 IST.

1) Consider an FM signal with modulation index β and frequency of the sinusoidal message signal denoted by f_m. Using Carsons rule, the bandwidth of the FM signal can be approximated as *1 point*

- $2(\beta+1)f_m$
- $(2\beta+1)f_m$
- $(1+\frac{1}{\beta})f_m$
- $(1+\frac{2}{\beta})f_m$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$2(\beta+1)f_m$

2) Consider a parallel resonant LC circuit with L=2.5 mH and the capacitance of the variable capacitor given as $C(t) = 10\mu F - 5\times10^{-7}m(t)$, where $m(t)$ is the message signal which varies slowly with $max|m(t)| << 1$. What is the approximate carrier frequency of the resulting frequency modulated signal $x_c(t)$ *1 point*

- 0.25 kHz
- 2 MHz
- 2.5 kHz
- 1.0 kHz

No, the answer is incorrect.
Score: 0
Accepted Answers:
1.0 kHz

3) Consider a FM signal with the message signal $A_m\cos(2\pi f_m t)$ and maximum frequency deviation be Δf. The modulation index β equals *1 point*

- $\Delta f f_m$
- $\frac{\Delta f}{f_m}$
- $\frac{f_m}{\Delta f}$
- $1-\left(\frac{\Delta f}{f_m}\right)^2$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{\Delta f}{f_m}$

4) A frequency modulated (FM) signal is described as *1 point*

$x_c(t) = 10\cos\left(6\pi\times10^6 t + \frac{1}{4}\sin(8\times10^2\pi t)\right)$

The approximate bandwidth of $x_c(t)$ calculated using Carsons rule is

- 400 kHz
- 0.75 MHz
- 1 kHz
- 3 MHz

No, the answer is incorrect.
Score: 0
Accepted Answers:
1 kHz

5) Consider the frequency modulated (FM) signal *1 point*

$A_c\cos\left(2\pi f_c t + \frac{K_f A_m}{f_m}\sin(2\pi f_m t)\right)$

The modulation index β for this FM signal is

- K_f
- $\frac{K_f A_m}{f_m}$
- $K_f A_m$
- $\frac{A_m}{f_m}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{K_f A_m}{f_m}$

6) A frequency modulated (FM) signal with carrier frequency $f_c = 5\times10^7$ is described by the equation $\varphi(t) = 5\times\cos\left(2\pi f_c t + 2\times\sin(5000\pi t)\right)$. Find the maximum frequency deviation Δf. *1 point*

- 2.5 kHz
- 2 kHz
- 15 kHz
- 5 kHz

No, the answer is incorrect.
Score: 0
Accepted Answers:
5 kHz

7) Consider an FM signal with carrier frequency f_c, modulation index β and message signal $A_m\cos(2\pi f_m t)$. The instantaneous frequency of the signal is *1 point*

- $f_c + \beta A_m\cos(2\pi f_m t)$
- $f_c + \beta\cos(2\pi f_m t)$
- $f_c + \beta f_m\cos(2\pi f_m t)$
- $f_c + \frac{\beta}{f_m}\sin(2\pi f_m t)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$f_c + \beta f_m\cos(2\pi f_m t)$

8) A frequency modulated (FM) signal is described as *1 point*

$x_c(t) = 200\cos\left(\pi\times10^7 t + 3\sin(5\times10^3\pi t)\right)$

The approximate bandwidth of $x_c(t)$ calculated using carsons rule is

- 200 MHz
- 5 MHz
- 5 kHz
- 20 kHz

No, the answer is incorrect.
Score: 0
Accepted Answers:
20 kHz

9) Consider a FM signal with the message signal $A_m\cos(2\pi f_m t)$ and modulation index β. The maximum frequency deviation of the signal is *1 point*

- $\frac{\beta}{f_m}$
- $\beta f_m f_c$
- βf_m
- $\frac{f_m}{\beta^2}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
βf_m

10) Consider a narrowband frequency modulated (FM) signal with modulation index β given as input to a frequency multiplier by a factor of n. The modulation index of the output wideband FM signal is *1 point*

- $n\beta$
- β
- $\frac{\beta}{n}$
- $n^2\beta^2$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$n\beta$