Unit 8 - Week-5 Generation of SSB , Complex pre-envelope of QCM, VSB , Introduction to AM

Assignment-5

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

Due on 2020-03-04, 23:59 IST.

1) The bandwidth of vestigial side band (VSB) modulation is *1 point*

- Larger than that of both DSB-SC and SSB modulation
- Smaller than that of both DSB-SC and SSB modulation
- Larger than that DSB-SC but smaller than that of SSB modulation
- Smaller than that DSB-SC but larger than that of SSB modulation

No, the answer is incorrect.
Score: 0
Accepted Answers:
Smaller than that DSB-SC but larger than that of SSB modulation

2) Consider the SSB $x(t) = m(t)\cos(2\pi f_c t) - \hat{m}(t)\sin(2\pi f_c t)$. Its Fourier transform can be expressed as *1 point*

- $\frac{1}{2}M(f-f_c)(1+\text{sgn}(f-f_c)) + \frac{1}{2}M(f+f_c)(1-\text{sgn}(f+f_c))$
- $\frac{1}{2}M(f-f_c) + \frac{1}{2}M(f+f_c)$
- $\frac{1}{2}M(f-f_c)(1-\text{sgn}(f-f_c)) + \frac{1}{2}M(f+f_c)(1+\text{sgn}(f+f_c))$
- $\frac{1}{2}M(f-f_c)(1+\text{sgn}(f-f_c)) + \frac{1}{2}M(f+f_c)(1-\text{sgn}(f-f_c))$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{1}{2}M(f-f_c)(1+\text{sgn}(f-f_c)) + \frac{1}{2}M(f+f_c)(1-\text{sgn}(f+f_c))$

3) Consider the message signal $\cos(60\pi t)$. The SSB modulated signal with USB corresponding to carrier frequency $f_c = 1000$ Hz is *1 point*

- $\cos(2060\pi t)$
- $\cos(60\pi t)\sin(2000\pi t)$
- $\cos(60\pi t)\cos(2000\pi t)$
- $\cos(1060\pi t)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\cos(2060\pi t)$

4) The impulse response of the Hilbert transformer is *1 point*

- $\frac{1}{\pi j t}$
- $-j\,\text{sgn}(t)$
- $\text{sgn}(t)$
- $\frac{1}{\pi t}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{1}{\pi t}$

5) For carrier frequency f_c and message frequency f_m, the spectrum of the Lower Sideband (LSB) signal comprises of frequency band(s) *1 point*

- $-f_c - f_m$ to $-f_c$ and $f_c - f_m$ to f_c
- $-f_c$ to $-f_c + f_m$ and $f_c - f_m$ to f_c
- $-f_c$ to $-f_c + f_m$ and f_c to $f_c + f_m$
- $-f_c - f_m$ to $-f_c + f_m$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$-f_c$ to $-f_c + f_m$ and $f_c - f_m$ to f_c

6) Consider message signal $m(t) = \sin(2\pi f_m t)$ modulated using DSB-SC with carrier frequency f_c and carrier amplitude $A_c = 1$. This is demodulated at the receiver with a carrier having a phase offset of ϕ followed by low pass filtering. The resulting output signal is *1 point*

- $\frac{1}{2}\cos(\phi)\sin(2\pi f_m t)$
- $(2\pi f_m t)$
- $\sin(\phi)\sin(2\pi f_m t)$
- $\frac{1}{2}\cos(\phi)\cos(2\pi f_m t)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{1}{2}\cos(\phi)\sin(2\pi f_m t)$

7) Consider the message signal $\sin(100\pi t)$. The Single Sideband (SSB) modulated signal with Lower Sideband (LSB) corresponding to carrier frequency $f_c = 1500$ Hz is *1 point*

- $\sin(100\pi t)\sin(3000\pi t)$
- $-\sin(2900\pi t)$
- $\sin(100\pi t)\cos(1500\pi t)$
- $\sin(3100\pi t)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$-\sin(2900\pi t)$

8) Consider the signal $x(t)$ with Hilbert transform $\hat{x}(t)$. The complex pre-envelope of this signal is *1 point*

- $x(t) - j\hat{x}(t)$
- $x(t) + j\hat{x}(t)$
- $x(t) + \hat{x}(t)$
- $x(t) - \hat{x}(t)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$x(t) + j\hat{x}(t)$

9) Given the message signal $m_I(t), m_Q(t)$ and carrier frequency f_c, the modulation *1 point*

$$x(t) = A_c m_I(t)\cos(2\pi f_c t) - A_c m_Q(t)\sin(2\pi f_c t)$$

is termed as

- Double Sideband suppressed carrier (DSB-SC)
- Single Side Band (SSB)
- Vestigial Side Band (VSB)
- Quadrature Carrier Multiplexing (QCM)

No, the answer is incorrect.
Score: 0
Accepted Answers:
Quadrature Carrier Multiplexing (QCM)

10) In vestigial Sideband Modulation (VSB), the filter $H(f)$ must satisfy the constraint *1 point*

- $H(f-f_c) - H(f+f_c) = 1$
- $H(f-f_c) + H(f+f_c) = 0$
- $H(f-f_c) + H(f+f_c) = 1$
- $H(f-f_c) - H(f+f_c) = 0$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$H(f-f_c) + H(f+f_c) = 1$