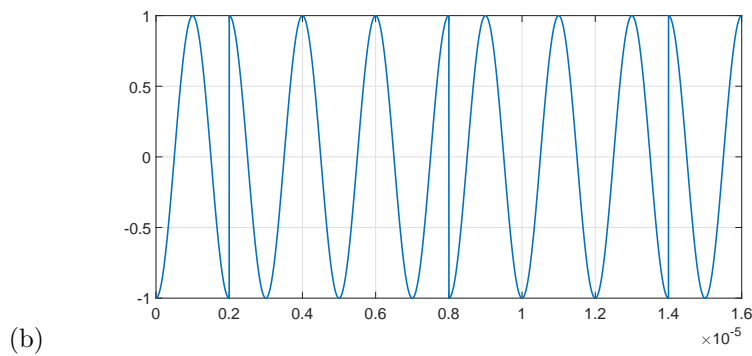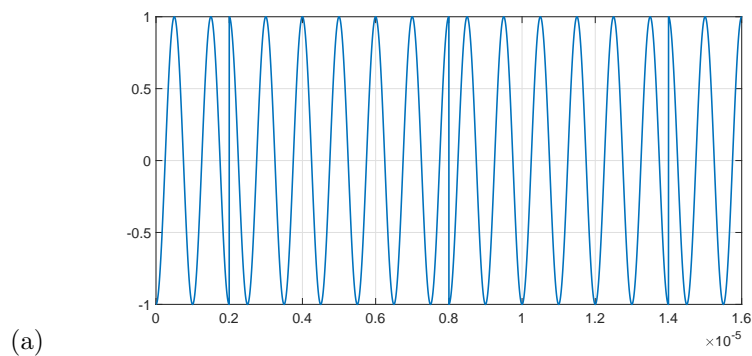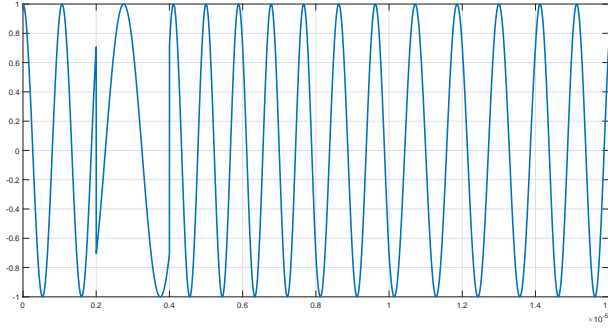# Assignment 4

Digital Communication Systems-I

May 19, 2023
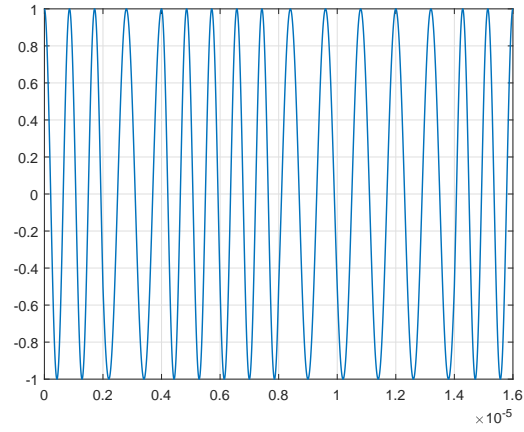
Please answer the following questions. There is only one correct answer.

1. Which of the following is a CPM signal?

(a)

(b)

(c)

(d)

2. What is the value of $q(t)$ at $t = 3$ seconds for the pulse

$$g(t) = \begin{cases} \frac{1}{9} & 0 \le t \le 3 \\ 0 & \text{otherwise} \end{cases}$$

(a) $\frac{1}{6}$

(b) $\frac{1}{4}$

(c) $\frac{1}{3}$

(d) $\frac{1}{2}$

3. What is the modulation index for the given CPM signal

$$s(t) = \sqrt{\frac{2}{T}} \cos \left[4000\pi t + \frac{2\pi}{3} \sum_{k=-\infty}^{n} I_k q(t - kT) \right], \qquad nT \le t \le (n+1)T \tag{1}$$

(a) $\frac{1}{3}$

(b) $\frac{1}{2}$

(c) $\frac{3}{4}$

(d) $\frac{2}{3}$

4. How many total states are there for binary partial response CPM signal with L = 4 symbol interval and h = $\frac{1}{3}$ modulation index?

    (a) 6

    (b) 12

    (c) 24

    (d) 48

5. Consider a binary CPM signal with modulation index h = $\frac{2}{3}$ and a partial response rectangular pulse with L = 2. If the present state $S_n = \left(\frac{\pi}{3}, +1\right)$, what will be the possible next state phase if the input is −1 ?

    (a) $(0, -1)$

    (b) $(\pi, -1)$

    (c) $\left(\frac{\pi}{3}, -1\right)$

    (d) $\left(\frac{2\pi}{3}, -1\right)$

6. For full response CPM signal $(L = 1)$ with modulation index h = $\frac{1}{3}$ what will be the possible terminal phase states?

    (a) $\{0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi\}$

    (b) $\{0, \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \pi, \frac{3\pi}{2}\}$

    (c) $\{0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}\}$

    (d) $\{0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}\}$

7. How many total states are there for a full-response binary CPFSK with h = $\frac{1}{4}$ modulation index?

    (a) 2

    (b) 4

    (c) 6

    (d) 8

8. What is the modulation index of binary CPFSK to be considered as the minimum shift keying (MSK).

    (a) $\frac{3}{4}$

    (b) $\frac{1}{4}$

    (c) $\frac{2}{3}$

    (d) $\frac{1}{2}$

9. Which of the following is the possible states for a binary CPM signal with modulation index h $= \frac{1}{2}$ and a partial response rectangular pulse with L $= 2$?

(a) $\{(0,1); (0,-1); (\frac{\pi}{2},1); (\frac{\pi}{2},-1); (-\frac{\pi}{2},1); (-\frac{\pi}{2},-1); (\pi,1); (\pi,-1)\}$

(b) $\{(\frac{\pi}{4},-1); (\frac{\pi}{4},+1); (\frac{3\pi}{4},-1); (\frac{3\pi}{4},+1); (\frac{5\pi}{4},-1); (\frac{5\pi}{4},+1); (\frac{7\pi}{4},-1); (\frac{7\pi}{4},+1)\}$

(c) $\{(\frac{\pi}{3},1); (\frac{\pi}{3},-1); (\frac{2\pi}{3},1); (\frac{2\pi}{3},-1); (-\frac{5\pi}{6},1); (-\frac{5\pi}{6},-1); (2\pi,1); (2\pi,-1)\}$

(d) $\{(-\frac{\pi}{2},1); (-\frac{\pi}{2},-1); (\frac{2\pi}{5},1); (\frac{2\pi}{5},-1); (\frac{5\pi}{6},1); (\frac{5\pi}{6},-1); (\pi,1); (\pi,-1)\}$

10. GSM (Global System for Mobile communication) uses GMSK signal. What is the value of BT used in GSM?

(a) 0.1

(b) 0.3

(c) 0.5

(d) 0.8