Name _____ CM_____

ECE-300, Quiz #4

1) Assume we are going to synthesize a periodic signal $x(t)$ using $x(t) = \sum c_k e^{jk\omega_0 t}$ where $c_k = \frac{j}{1+k^2}$. Will $x(t)$ be a real function? a) Yes b) No

2) Assume we are going to synthesize a periodic signal $x(t)$ using $x(t) = \sum c_k e^{jk\omega_0 t}$ where $c_k = \frac{jk}{1+jk}$. Will $x(t)$ be a real function? a) Yes b) No

3) Assume $x(t) = 3\cos(2t-5)$ is the input to a system with transfer function

$$H(\omega) = \begin{cases} 3e^{-j2\omega} & |\omega| < 3 \\ 2 & else \end{cases}$$

the output $y(t)$ in steady state will be

a) $y(t) = 6\cos(2t-5)$ b) $y(t) = 9\cos(2t-5)$
c) $y(t) = 9\cos(2t-5)e^{-j4}$ d) $y(t) = 9\cos(2t-9)$

4) Assume $x(t) = 2\cos(3t)$ is the input to system with transfer function $H(j\omega) = 2e^{-j\omega}$. In steady state the output of the system will be

a) $y(t) = 4\cos(3t)e^{-j\omega}$ b) $y(t) = 4\cos(3t)e^{-j3}$ c) $y(t) = 4\cos(3t-3)$
d) $y(t) = 4\cos(3t+3)$ e) none of these

5) Assume $x(t)$ is a periodic function with period $T = 2$ seconds. $x(t)$ is defined over one period as $x(t) = t, \quad -1 < t < 1$. The average power in $x(t)$ (the power averaged over one period) is

a) 0 b) $\frac{1}{2}$ c) $\frac{1}{3}$ d) $\frac{2}{3}$

Problems 6 and 7 refer to the following Fourier series representation of a periodic signal

$$x(t) = 2 + \sum_{k=-\infty}^{k=\infty} \frac{2}{2+jk} e^{\frac{jkt}{2}}$$

6) The average value of $x(t)$ is a) 0 b) 1 c) 2 d) 3

7) The fundamental frequency (in Hz) is a) $\frac{1}{2\pi}$ b) 0.5 c) $\frac{1}{4\pi}$ d) 2

8) Assume $x(t) = 2\cos(t) + 5\sin(2t) + 6\sin(3t)$ is the input to a system with transfer function $H(j\omega) = 3\Pi\left(\frac{\omega}{5}\right)$. In steady state the output of the system will be

a) $y(t) = \left[2\cos(t) + 5\sin(2t) + 6\sin(3t)\right]\left[3\text{rect}\left(\frac{\omega}{5}\right)\right]$

b) $y(t) = 6\cos(t) + 15\sin(2t) + 18\sin(3t)$

c) $y(t) = 6\cos(t) + 15\sin(2t)$

d) none of these

9) Assume $x(t) = 2\cos(3t) + 4\cos(5t)$ is the input to a system with transfer function given by

$$H(j\omega) = \begin{cases} 2 & 4 < |\omega| < 6 \\ 0 & else \end{cases}$$

The output of the system in steady state will be

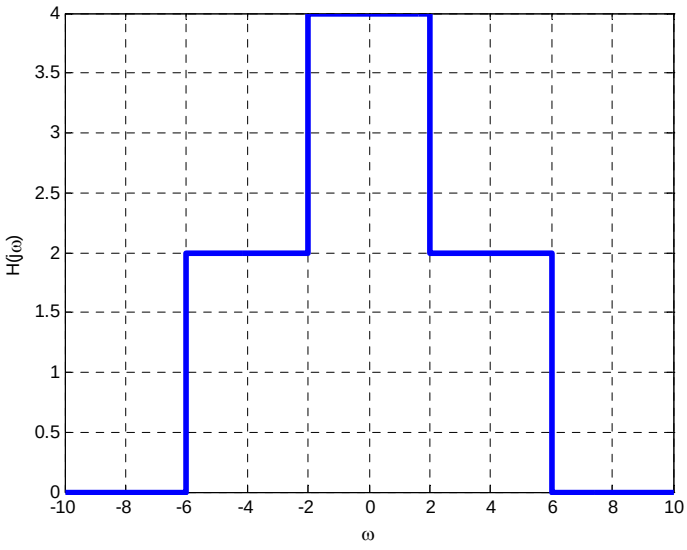
a) $y(t) = 4\cos(3t) + 8\cos(5t)$

b) $y(t) = 8\cos(5t)$

c) $y(t) = 4\cos(3t)$

d) none of these

10) Assume $x(t) = \cos(t) + \cos(5t) + \cos(9t)$ is the input to a system with transfer function given below:



The output of this system in steady state will be

a) $y(t) = 4\cos(t) + 4\cos(5t)$ b) $y(t) = 4\cos(t) + 2\cos(5t) + \cos(9t)$

c) $y(t) = 4\cos(t) + 2\cos(5t)$ d) none of these