Started on	Wednesday, 19 January 2022, 7:30 PM
State	Finished
Completed on	Wednesday, 19 January 2022, 8:15 PM
Time taken	44 mins 51 secs
Marks	19.00/20.00
Grade	**9.50** out of 10.00 (**95%**)

Question 1

Correct

Mark 1.00 out of 1.00

The power of signal $x[n] = (-1)^n u[n]$ is

Select one:

○ a. 1

◉ b. 0.5 ✓

○ c. 0.25

○ d. None of these

Your answer is correct.

The correct answer is: 0.5

Question 2

Correct

Mark 1.00 out of 1.00

The energy of the signal $x[n] = cos(\frac{\pi n}{3}).(u[n] - u[n-6])$ is

Select one:

○ a. 1

○ b. 2

◉ c. 3 ✓

○ d. 6

Your answer is correct.

The correct answer is: 3

Question 3

Correct

Mark 1.00 out of 1.00

The odd component of the signal $x(t) = e^{(-2t)}\cos(t)$ is

Select one:

  ○ a. $\cosh(2t)\cos(t)$

  ○ b. $-\cosh(2t)\cos(t)$

  ○ c. $\sinh(2t)\cos(t)$

  ◉ d. $-\sinh(2t)\cos(t)$

    ✔

Your answer is correct.

The correct answer is: $-\sinh(2t)\cos(t)$

Question 4

Correct

Mark 1.00 out of 1.00

The signal $x(t) = A\cos(\omega t + \phi)$ is

Select one:

  ◉ a. a power signal ✔

  ○ b. an energy signal

  ○ c. neither an energy nor a power signal

  ○ d. an energy as well as a power signal

Your answer is correct.

The correct answer is: a power signal

Even and Odd parts of a unit-step function $u(t)$ are respectively

where

$$sgn(t) = \begin{cases} -1 & t < 0 \\ 1 & t > 0 \end{cases}$$

Select one:

    a. $\frac{1}{2}, \frac{-1}{2} sgn(t)$

    b. $\frac{-1}{2}, \frac{1}{2} sgn(t)$

    c. $\frac{-1}{2}, \frac{-1}{2} sgn(t)$

  ⊙ d. $\frac{1}{2}, \frac{1}{2} sgn(t)$

✔

Your answer is correct.

The correct answer is: $\frac{1}{2}, \frac{1}{2} sgn(t)$

$x[n]$ is defined as

$$x[n] = \begin{cases} 0 & n < -2 \text{ and } n > 4 \\ 1 & \text{otherwise} \end{cases}$$

Determine the value of n for which $x[-n-2]$ is guaranteed to be zero.

Select one:

    a. $n < 1 \; and \; n > 7$

    b. $n < -4 \; and \; n > 2$

  ⊙ c. $n < -6 \; and \; n > 0$

✔

    d. $n < -2 \; and \; n > 4$

Your answer is correct.

The correct answer is: $n < -6 \; and \; n > 0$

Question 7

Correct

Mark 1.00 out of 1.00

The signal $s(t) = \cos(2t) \times \cos(4t)$ is

Select one:

- ○ a. Aperiodic
- ○ b. Periodic with fundamental frequency 6 rad/s
- ○ c. Periodic with fundamental frequency 4 rad/s
- ◉ d. Periodic with fundamental frequency 2 rad/s ✓

Your answer is correct.

The correct answer is: Periodic with fundamental frequency 2 rad/s

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Question 8

Correct

Mark 1.00 out of 1.00

Fundamental frequency of periodic signal $e^{(j\omega_o n)}$ is given as

(where m is integer and N is the period of the signal)

Select one:

- ○ a. $m\left(\frac{N}{2\pi}\right)$

- ○ b. $N\left(\frac{2\pi}{m}\right)$

- ◉ c. $m\left(\frac{2\pi}{N}\right)$

  ✓

- ○ d. None of these

Your answer is correct.

The correct answer is: $m\left(\frac{2\pi}{N}\right)$

The signal $x(t) = 4\sin(3\pi t) + 3\cos\left(3\pi t + \frac{\pi}{3}\right)$ is a power signal. The average power of the signal is

Select one:

○ a. 4.95

○ b. 12.5

◉ c. $12 - 6\sqrt{3}$
    ✗

○ d. 25

Your answer is incorrect.

The correct answer is: 12.5

Value of the integral

$\int_{\frac{3\pi}{2}}^{2\pi} \left[2\cos\left(\frac{t}{2}\right) + t^2\right] \delta(t - \pi) dt$ is

Select one:

○ a. $\dfrac{\pi^2}{2}$

◉ b. 0 ✓

○ c. π^2

○ d. $\sqrt{2}\pi$

Your answer is correct.

The correct answer is: 0

Which of the following represents an invertible system?

Select one:

○ a. $y(t) = x(t-3)$

✓

○ b. $y(t) = \sin(x(t))$

○ c. $y[n] = x[n]x[n-1]$

○ d. $y(t) = x^2(t)$

Your answer is correct.

The correct answer is: $y(t) = x(t-3)$

Which of the following signals have same average power

$x_1(t) = 20\sin(3\pi t)$
$x_2(t) = 20\sin(6\pi(t-2/3))$
$x_3(t) = 2\cos(6\pi t + \pi/2)$
$x_4(t) = 10\cos(3\pi(t-2/3)) + 10\cos(4\pi t)$

Select one:

○ a. $x_1(t)$ and $x_2(t)$

✓

○ b. $x_1(t)$ and $x_4(t)$

○ c. $x_2(t)$ and $x_4(t)$

○ d. $x_1(t), x_2(t),$ and $x_4(t)$

Your answer is correct.

The correct answer is: $x_1(t)$ and $x_2(t)$

If the energy of a continuous-time signal $x(t)$ is 12, then the energy of the signal $2x(3t - 5)$ is given by

Select one:

- ⦿ a. 16 ✓
- ○ b. 8
- ○ c. 18
- ○ d. 12

Your answer is correct.

The correct answer is: 16

Which of the following systems is/are invertible?

Select one:

- ○ a. $y(t) = \sin(x(t))$

- ○ b. $y[n] = \displaystyle\sum_{k=-\infty}^{\infty} x[k]$

- ⦿ c. $y(t) = x\left(\frac{t}{2}\right)$

  ✓

- ○ d. $y(t) = \dfrac{dx(t)}{dt}$

Your answer is correct.

The correct answer is: $y(t) = x\left(\frac{t}{2}\right)$

Question 15

Correct

Mark 1.00 out of 1.00

Consider the time domain signal given as

$$f(t) = 5 + 3\cos(\pi t) + 2\sin\left(\frac{2\pi t}{3}\right) + 2\cos\left(\frac{\pi t}{2} + \frac{\pi}{4}\right).$$

where time t is in seconds. The fundamental period of $f(t)$ in seconds is

Select one:

○ a. 6

○ b. 4

○ c. 2

⦿ d. 12 ✓

Your answer is correct.

The correct answer is: 12

Question 16

Correct

Mark 1.00 out of 1.00

The value of the integral $\int_{-2}^{4} \sin(2t)\delta(2t - \frac{\pi}{2})dt$ is

Select one:

○ a. $\sqrt{3}$

⦿ b. $\dfrac{1}{2}$

✓

○ c. $\sqrt{2}$

○ d. 0

Your answer is correct.

The correct answer is: $\dfrac{1}{2}$

Correct

Mark 1.00 out of 1.00

Let $x(t)$ be a real continuous time signal. The even part of the signal $x(t)$ is $x_e(t)$ and the odd part is $x_o(t)$. Which of the following statements are true?

$S_1 : \int_{-\infty}^{\infty} |x(t)|^2 dt = \int_{-\infty}^{\infty} |x_e(t)|^2 dt + \int_{-\infty}^{\infty} |x_o(t)|^2 dt$

$S_2 : \int_{-\infty}^{\infty} x_o(t) dt = 0$

$S_3 : \int_{-\infty}^{\infty} x_e(t) x_o(t) dt = 0$

Select one:

○ a. S_2 and S_3 only

○ b. S_1 and S_3 only

⊙ c. S_1, S_2, and S_3

✔

○ d. S_1 and S_2 only

Your answer is correct.

The correct answer is: S_1, S_2, and S_3

Correct

Mark 1.00 out of 1.00

Let **x(t)** and **y(t)** denote the input and output of a continuous time system. Which of the following descriptions corresponds to a casual system ?

Select one:

○ a. $y(t) = (t - 4)x(t + 1)$

○ b. $y(t) = x(t - 3) + x(t + 2)$

○ c. $y(t) = (t + 3)x(t + 3)$

⊙ d. $y(t) = (t + 5)x(t - 1)$

✔

Your answer is correct.

The correct answer is: $y(t) = (t + 5)x(t - 1)$

Question 19

Correct

Mark 1.00 out of 1.00

Consider the following discrete time sequence:

x[n]={1,2,3,4,5,6,7(origin),6,5,4,3,2,1}

Evaluate **x[2n]** and **x[3n]**

Select one:

- a. **x[3n]={1,3,5,7(origin),5,3,1}** and **x[2n]={1,4,7(origin),4,1}**
- b. **x[2n]={2,5,6(origin),3,1}** and **x[3n]={2,4,6,6(origin),4,2,1}**
- c. **x[2n]={1,3,5,7(origin),5,3,1}** and **x[3n]={1,4,7(origin),4,1}** ✓
- d. **x[2n]={2,4,6,6(origin),4,2,1}** and **x[3n]={2,5,6(origin),3,1}**

Your answer is correct.

The correct answers are: **x[2n]={1,3,5,7(origin),5,3,1}** and **x[3n]={1,4,7(origin),4,1}**, **x[2n]={2,4,6,6(origin),4,2,1}** and **x[3n]={2,5,6(origin),3,1}**

Question 20

Correct

Mark 1.00 out of 1.00

Find the fundamental time period of the signal:

$$x(t) = sin(2t) + cos(3\pi t)$$

Select one:

- a. None of these ✓
- b. 3π
- c. 2
- d. 1

Your answer is correct.

The correct answer is: None of these

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