Started on	Saturday, 26 August 2023, 10:23 AM
State	Finished
Completed on	Saturday, 26 August 2023, 11:05 AM
Time taken	41 mins 8 secs
Grade	**12.00** out of 15.00 (**80**%)

Question 1

Correct

Mark 1.00 out of 1.00

A discrete- time signal $x[n] = \sin(\pi^2 n)$, where n being an integer, is

Select one:

- periodic with period $\pi/2$
- periodic with period π^2
- periodic with period π
- not periodic ✓

The correct answer is: not periodic

Question 2

Correct

Mark 1.00 out of 1.00

If the signal $x(t)$ has total energy of $E = 5$, the total energy of the signal $y(t) = 2x(3t - 4)$ is

Select one:

- 10/3
- 20
- 20/3 ✓
- 60

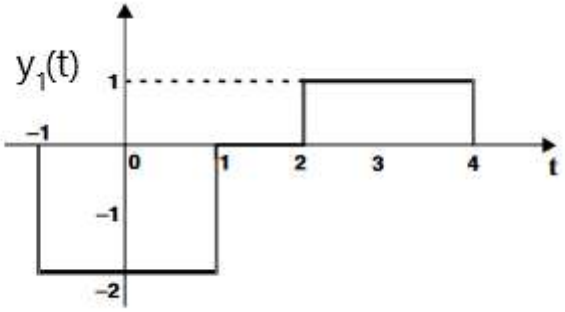
The correct answer is: 20/3

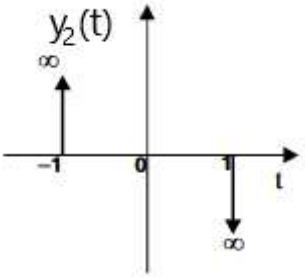
Question 3

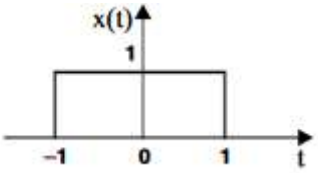
Incorrect

Mark 0.00 out of 1.00

The signals $y_1(t)$, $y_2(t)$ and $x(t)$ are as shown in figure below







$y_1(t)$ and $y_2(t)$ can be written in terms of $x(t)$ as:

Select one:

- $y_1(t) = x(t-3) - 2x(-t), y_2(t) = \dfrac{dx(t)}{dt}$
- $y_1(t) = x(t-3) - 2x(-t), y_2(t) = \dfrac{-dx(t)}{dt}$ ✘
- $y_1(t) = -x(3-t) + 2x(t), y_2(t) = \dfrac{dx(t)}{dt}$
- $y_1(t) = -x(3-t) + 2x(t), y_2(t) = \dfrac{-dx(t)}{dt}$

The correct answer is: $y_1(t) = x(t-3) - 2x(-t), y_2(t) = \dfrac{dx(t)}{dt}$

Question 4

Correct

Mark 1.00 out of 1.00

Consider a single input single output discrete-time system with $x[n]$ as input and $y[n]$ as output, where the two are related as:

$$y[n] = \begin{cases} n|x[n]| & 0 \leq n \leq 10 \\ x[n] - x[n-1] & otherwise \end{cases}.$$

Which of the following is true about the system?

Select one:

- It is causal and stable ✓
- It is not causal but stable.
- It is neither causal nor stable.
- It is causal but not stable.

The correct answer is: It is causal and stable

Question 5

Correct

Mark 1.00 out of 1.00

Consider the signal $f(t) = 1 + 2\cos(\pi t) + 3\sin(\frac{2\pi t}{3}) + 4\cos(\frac{\pi}{2}t + \frac{\pi}{4})$, where t is in seconds. Its fundamental time period in seconds is given by:

Select one:

- 12 ✓
- 16
- 8
- 6

The correct answer is: 12

Question 6

Correct

Mark 1.00 out of 1.00

A system with input $x[n]$ and output $y[n]$ is given by;

$y[n] = \sin(\frac{5}{6}\pi n)x[n]$.

The system is :

Select one:

- linear, unstable, and invertible
- linear, stable, and invertible
- linear, stable, and non-invertible ✓
- non-linear, stable, and non-invertible

The correct answer is: linear, stable, and non-invertible

Question 7

Incorrect

Mark 0.00 out of 1.00

The value of $\int_{-\infty}^{+\infty} e^{-t}\delta(2t-2)dt$, where $\delta(t)$ is a dirac-delta function

Select one:

- $\frac{1}{2e^2}$
- Incomplete question or none of the options is correct.
- $\frac{1}{2e}$
- $\frac{1}{e}$ ✗
- $\frac{1}{e^2}$

The correct answer is: $\frac{1}{2e}$

Question 8

Correct

Mark 1.00 out of 1.00

Consider a discrete-time system with input $x[n]$ and output $y[n] = \max\{x[n], x[n-1], x[n-2], \ldots\ldots, x[-\infty]\}$. The system is

Select one:

- Linear, Memoryless
- Linear, Not Memoryless
- Non-Linear, Memoryless
- Non-Linear, Not Memoryless ✓

The correct answer is: Non-Linear, Not Memoryless

Question 9

Correct

Mark 1.00 out of 1.00

Consider the signal $x(t) = \sum_{k=-\infty}^{\infty} (-1)^k \delta(t - 2k)$, where t is in seconds. Is signal periodic?

Select one:

- Periodic with fundamental period = 3 seconds
- None of the above ✓
- Not Periodic
- Periodic with fundamental period = 2 seconds

The correct answer is: None of the above

Question 10

Correct

Mark 1.00 out of 1.00

Two systems are defined with inputs and outputs as follows:

(I) $\frac{dy_1(t)}{dt} + t^2 y_1(t) = (2t + 3)x_1(t)$

(II) $y_2(t)\frac{dy_2(t)}{dt} + 3y_2(t) = x_2(t)$

Which of the following options is true for both systems:

Select one:

- Both (I) and (II) are linear
- Both (I) and (II) are non-linear
- (I) is non-linear, (II) is linear
- (I) is linear, (II) is non-linear ✓

The correct answer is: (I) is linear, (II) is non-linear

Question 11

Correct

Mark 1.00 out of 1.00

The input $x(t)$ and output $y(t)$ of a system are related as $y(t) = \int_{-\infty}^{t} x(\tau)\cos(3\tau)d\tau$.

The system is

Select one:

- time-variant and stable
- time-invariant and stable
- time-variant and not stable ✓
- time-invariant and not stable

The correct answer is: time-variant and not stable

Question 12

Correct

Mark 1.00 out of 1.00

A signal $f(t)$ which is periodic with period T=4 is defined in one of its time periods as given below

$$f(t) = \begin{cases} 3 & 0 \le t \le 2 \\ -2 & 2 \le t \le 4 \end{cases}.$$

A signal $g(t)$ is defined as $g(t) = \sum_{k=-\infty}^{\infty} \delta(t - 4k)$.

If $\frac{df(t)}{dt} = a_1 g(t - t_1) + a_2 g(t - t_2)$. The values of $a_1, a_2; t_1, t_2$ are

Select one:

- $-5, -5; -4k, 4k \pm 2$
- $5, 25; 3k, 3k \pm 2$
- $5, -5; 4k, 4k \pm 2$
- $1, -5; 2k, 2k \pm 2$

The correct answer is: $5, -5; 4k, 4k \pm 2$

Question 13

Incorrect

Mark 0.00 out of 1.00

Find the energy in the conjugate symmetric signal of

$f[n] = [-2 - 4j, 2 - 2j, 4 + 2j]$, origin at $2 - 2j$.

Select one:

- 12
- 36
- 20
- 24

The correct answer is: 24

Question 14

Correct

Mark 1.00 out of 1.00

Consider the cascade of two LTI systems H and G. Both H and G are causal and stable.

Consider following statements for overall system:

Statement I : The overall system would be causal.

Statement II : The overall system would be stable.

Select one:

- Statement I is true but Statement II is false.
- Statement I is false but Statement II is true.
- Both Statement I and Statement II are true. ✓
- Both Statement I and Statement II are false.

The correct answer is: Both Statement I and Statement II are true.

Question 15

Correct

Mark 1.00 out of 1.00

The power in the signal $s(t) = 8\cos(20\pi t - \frac{\pi}{2}) + 4\sin(15\pi t)$ is

Select one:

- 42
- 82
- 40 ✓
- 41

The correct answer is: 40

◀ Discussion on Tutorial Problems, Problems in Textbook and general dounts

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Quiz II ▶