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NPTEL

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Courses » Basics of Noise and its Measurements

Announcements Course Ask a Question Progress



Unit 7 - Week 6

Course outline

How to access the portal

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

- Quiz : Week 6 Assignment
- Lecture 31: Discrete Fourier Transform (DFT)
- Lecture 32: Discrete Fourier Transform (DFT)- Continuation
- Lecture 33: DFT: Calculating Frequencies and Padding
- Lecture 34: DFT: Influence of Duration and Sampling frequency on resolution
- Lecture 35: FFT and Inverse FFT
- Lecture 36: Considerations while deciding instrumentation
- Week 6 Assignment

Week 6 Assignment

The due date for submitting this assignment has passed. **Due on 2017-03-03, 23:59 IST**
As per our records you have not submitted this assignment.

1) when X data points are recorded per second, then X is termed as _____. 1 point

- frequency of the signal.
- sampling frequency.
- period of the signal.
- duration of the signal.

No, the answer is incorrect.

Score: 0

Accepted Answers:

sampling frequency.

2) from the given options, which one is not true for DFT (Discrete Fourier Transform)? 1 point

- DFT maps time domain data to frequency domain data.
- DFT helps determine amplitudes associated with each of the frequency components.
- DFT is used for determining Fourier transform for continuous/analog signals
- None of the options are correct.

No, the answer is incorrect.

Score: 0

Accepted Answers:

DFT is used for determining Fourier transform for continuous/analog signals

3) In DFT (Discrete Fourier Transform) the magnitude of a signal corresponding to k^{th} frequency component is _____. 1 point

- X_k
- (kf_s / N)
- $(Nf_s) / k$
- $(2X_k)/N$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$(2X_k)/N$

4) What is the maximum possible frequency that can be extracted by DFT (Discrete Fourier Transform)? (Assuming sampling frequency to be f_s) 1 point

- f_s
- $f_s/2$

Solution

Week 7

Week 8

 $2f_s$ $f_s/3$ **No, the answer is incorrect.****Score: 0****Accepted Answers:** $f_s/2$ 5) What is the relation between frequency resolution (Δf) and duration(T) of the signal?1 point  $\Delta f=1/T$ $\Delta f=f_s/T$ $\Delta f=T$ $\Delta f=f_s T$ **No, the answer is incorrect.****Score: 0****Accepted Answers:** $\Delta f=1/T$

6) Conversion of continuous signal to a discrete signal is called _____.

1 point

 sampling. resolution. padding. filtering.**No, the answer is incorrect.****Score: 0****Accepted Answers:***sampling.*

7) _____ passes signals with a frequency lower than a particular cutoff frequency and attenuates higher frequency signals.

1 point

 A high pass filter A low pass filter A band pass filter A band stop filter**No, the answer is incorrect.****Score: 0****Accepted Answers:***A low pass filter*8) What is the order of number of computations required for finding out DFT (Discrete Fourier Transform)? (Where N is the size of the data set.)

1 point

 N N^2 $N \log(N)$ $N^2 \log(N)$ **No, the answer is incorrect.****Score: 0****Accepted Answers:** N^2 9) What is the order of number of multiplications required for finding out FFT (Fast Fourier Transform)? (Where N is the size of the data set.)

1 point

 N N^2

- $N \log(N)$
- $N^2 \log(N)$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$N \log(N)$

10) Which of the following options is computationally optimized for Fourier analysis?

1 point

- DFT.
- FFT.
- Both DFT and FFT.
- Inverse DFT.

No, the answer is incorrect.

Score: 0

Accepted Answers:

FFT .

11) Which of the following relations is used to calculate which one is an inverse DFT?

1 point

-
-
-
-

No, the answer is incorrect.

Score: 0

Accepted Answers:

12) Which of the following devices can convert an analog signal to a digital signal?

1 point

- Microphone.
- Bandpass filter.
- ADC.
- Accelerometer.

No, the answer is incorrect.

Score: 0

Accepted Answers:

ADC .

13) What is the resolution of a 2 bit analog to digital converter which has a range of 1V?

1 point

- 1V
- 0.5V
- 0.33V
- 0.1V

No, the answer is incorrect.

Score: 0

Accepted Answers:

$0.33V$

14) For an n-bit AD converter, the relationship between range and resolution of an instrument?

1 point

-

$$\text{Resolution} = \frac{\text{Range}}{2^n - 1}$$

-

$$\text{Resolution} = \frac{\text{Range}}{2^n}$$

-



$$\text{Resolution} = \frac{\text{Range}}{n^2 - 1}$$



$$\text{Resolution} = \frac{\text{Range}}{n^2}$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\text{Resolution} = \frac{\text{Range}}{2^n - 1}$$

15) Consider a microphone with sensitivity -40dB (reference 1V/Pa). To measure rms pressure of 1 Pa (reference 0.5 Pa), which of the following analog to digital converter (ADC) is suitable? (Pressure resolution needed is 1/10th of the peak pressure.)

- 16 bit ADC with voltage range $\pm 5\text{V}$.
- 24 bit ADC with voltage range $\pm 5\text{V}$.
- 16 or 24 bit ADC with voltage range $\pm 5\text{V}$.
- none of the options are correct.

No, the answer is incorrect.

Score: 0

Accepted Answers:

16 or 24 bit ADC with voltage range $\pm 5\text{V}$.



Previous Page

End

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