

9/16/2020

National Testing Agency

Question Paper Name :	Electronic Systems for Sensor A Shift 1
Subject Name :	Electronic Systems for Sensor A
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Share Answer Key With Delivery Engine :	Yes
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Electronic Systems for Sensor Applications

Group Number :	1
Group Id :	89951444
Group Maximum Duration :	0
Group Minimum Duration :	120
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	50
Is this Group for Examiner? :	No

Electronic Systems for Sensor Applications

Section Id :	89951446
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory

9/16/2020

Number of Questions : 42
Number of Questions to be attempted : 42
Section Marks : 50
Display Number Panel : Yes
Group All Questions : Yes
Mark As Answered Required? : Yes
Sub-Section Number : 1
Sub-Section Id : 89951459
Question Shuffling Allowed : Yes

Question Number : 1 Question Id : 8995143950 Question Type : MCQ Option Shuffling : No Display Question : Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

The name of the data analysis technique to estimate optimal averaging time for achieving best resolution for a sensor output is:

- A. Weibull distribution
- B. Arrhenius plot
- C. Allan variance
- D. None of the above

Options :

- 89951415755. 1
- 89951415756. 2
- 89951415757. 3
- 89951415758. 4

Question Number : 2 Question Id : 8995143951 Question Type : MCQ Option Shuffling : No Display Question : Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

9/16/2020

In the low noise vs low power trade-off case study of the accelerometer used as tilt sensor, the specification to choose the most suitable sensor is:

- A. Energy consumption
- B. Power consumption
- C. Averaging time
- D. RMS noise

Options :

89951415759. 1

89951415760. 2

89951415761. 3

89951415762. 4

Question Number : 3 Question Id : 8995143952 Question Type : MCQ Option Shuffling : No Display Question : Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The random vibrations causes vibration rectification in an accelerometer causing a shift in:

- A. RMS noise
- B. Offset
- C. Bandwidth
- D. Sensitivity

Options :

89951415763. 1

89951415764. 2

89951415765. 3

89951415766. 4

Question Number : 4 Question Id : 8995143953 Question Type : MCQ Option Shuffling : No Display Question : Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

9/16/2020

In an application of an active sensor, which circuit may be used for maximizing the signal to noise ratio of the sensor output:

- A. Trans-impedance amplifier
- B. Auto-zero amplifier
- C. Chopper amplifier
- D. Lock-in amplifier

Options :

89951415767. 1

89951415768. 2

89951415769. 3

89951415770. 4

Question Number : 5 Question Id : 8995143954 Question Type : MCQ Option Shuffling : No Display Question : Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is a highly linear capacitive transducer?

- A. Comb-drive
- B. Cantilever resonator
- C. Folded flexure beam
- D. Gap-closing capacitive actuator

Options :

89951415771. 1

89951415772. 2

89951415773. 3

89951415774. 4

Question Number : 6 Question Id : 8995143955 Question Type : MCQ Option Shuffling : No Display Question : Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

9/16/2020

Which of the following forms the operating principle of MEMS gyroscopes discussed in the course?

- A. Euler force
- B. Centrifugal force
- C. Coriolis force
- D. None of the above

Options :

89951415775. 1

89951415776. 2

89951415777. 3

89951415778. 4

Question Number : 7 Question Id : 8995143956 Question Type : MCQ Option Shuffling : No Display Question : Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Sampling an analog sensor output at less-than Nyquist sampling rate results in which of these errors:

- A. Higher noise due to out-of-band signals
- B. Non-linear output due to mixing
- C. Reduced sensitivity due to sub-sampling
- D. All of the above

Options :

89951415779. 1

89951415780. 2

89951415781. 3

89951415782. 4

Question Number : 8 Question Id : 8995143957 Question Type : MCQ Option Shuffling : No Display Question : Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

9/16/2020

Which of the following is an invalid boundary condition for a MEMS beam structure?

- A. Fixed
- B. Guided
- C. Free
- D. Bonded

Options :

89951415783. 1

89951415784. 2

89951415785. 3

89951415786. 4

Question Number : 9 Question Id : 8995143958 Question Type : MCQ Option Shuffling : No Display Question

Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The spring constant of a cantilever beam fixed at one end and subjected to a point load at the other end is given by: (Young's modulus = E, width = W, height = H, length = L)

- A. $\frac{EWH^3}{12L^3}$
- B. $\frac{EWH^3}{4L^3}$
- C. $\frac{EWH^3}{6L^3}$
- D. $\frac{EWH^3}{L^3}$

Options :

89951415787. 1

89951415788. 2

89951415789. 3

89951415790. 4

Question Number : 10 Question Id : 8995143959 Question Type : MCQ Option Shuffling : No Display Question

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

9/16/2020

Which of the following circuits was introduced as a read-out circuit for a capacitively transduced accelerometer?

- A. Lock-in amplifier
- B. Switched-capacitor integrator
- C. Chopper amplifier
- D. Comb-drive

Options :

89951415791. 1

89951415792. 2

89951415793. 3

89951415794. 4

Question Number : 11 Question Id : 8995143960 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A lock-in amplifier utilizes which of the following principles:

- A. Phase sensitive detection
- B. Synchronous demodulation
- C. Narrow band filtering
- D. All of the above

Options :

89951415795. 1

89951415796. 2

89951415797. 3

89951415798. 4

Question Number : 12 Question Id : 8995143961 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

9/16/2020

Which MEMS transduction principle was not discussed in this course:

- A. Capacitive transduction
- B. Thermal transduction
- C. Piezoelectric transduction
- D. None of the above

Options :

89951415799. 1

89951415800. 2

89951415801. 3

89951415802. 4

Question Number : 13 Question Id : 8995143962 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For a distribution of measurements with mean M and standard deviation S , the convention for the 'typical' specification is:

- A. $M \pm 5S$
- B. $M \pm 5.5S$
- C. $M \pm 3S$
- D. $M \pm S$

Options :

89951415803. 1

89951415804. 2

89951415805. 3

89951415806. 4

Sub-Section Number :

2

Sub-Section Id :

89951460

Question Shuffling Allowed :

Yes

Question Id : 8995143963 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Gro

: No

9/16/2020

Question Numbers : (14 to 15)

Question Label : Comprehension

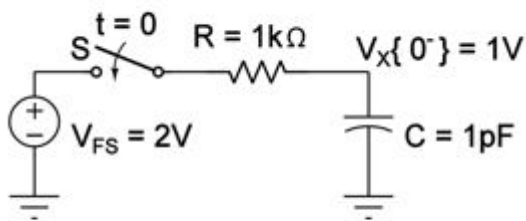


Figure 1. Capacitor charging.

Sub questions

Question Number : 14 Question Id : 8995143964 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In Figure 1, the capacitor C is charged to 1V at time $t=0(-)$. Switch S closes at time $t=0$. What is the energy drawn by the voltage source V_{FS} from time $t = 0^+$ to time $t = \infty$?

- A. 4 pJ
- B. 2 pJ
- C. 1 pJ
- D. 0.5 pJ

Options :

89951415807. 1

89951415808. 2

89951415809. 3

89951415810. 4

Question Number : 15 Question Id : 8995143965 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

9/16/2020

Correct Marks : 1 Wrong Marks : 0

In Figure 1, the capacitor C is charged to 1 V at time $t = 0^-$. Switch S closes at time $t=0$. What is the total charge stored on capacitor C at time $t = \infty$?

- A. 6 pC
- B. 4 pC
- C. 2 pC
- D. 1 pC

Options :

89951415811. 1

89951415812. 2

89951415813. 3

89951415814. 4

Sub-Section Number :

3

Sub-Section Id :

89951461

Question Shuffling Allowed :

Yes

Question Id : 8995143966 **Question Type :** COMPREHENSION **Sub Question Shuffling Allowed :** Yes **Group :** No

Question Numbers : (16 to 18)**Question Label :** Comprehension

9/16/2020

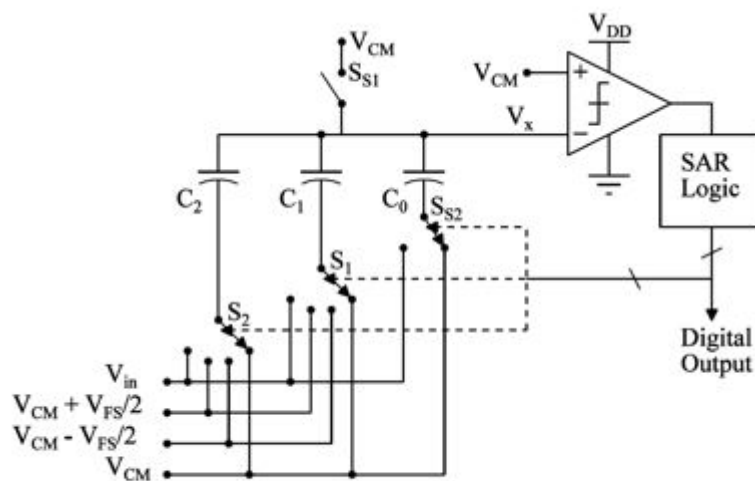


Figure 2. Traditional single ended 3-bit SAR ADC.

Sub questions

Question Number : 16 Question Id : 8995143967 Question Type : MCQ Option Shuffling : No Display Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is the value of V_x during MSB comparison?

- A. $V_{CM} - V_{in}$
- B. $V_{CM} + V_{in}$
- C. $2V_{CM} - V_{in}$
- D. $2V_{CM} + V_{in}$

Options :

- 89951415815. 1
- 89951415816. 2
- 89951415817. 3
- 89951415818. 4

Question Number : 17 Question Id : 8995143968 Question Type : MCQ Option Shuffling : No Display Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

9/16/2020

What is the value of LSB in terms of V_{FS} ?

- A. $V_{FS}/2$
- B. $V_{FS}/4$
- C. $V_{FS}/8$
- D. $V_{FS}/16$

Options :

- 89951415819. 1
- 89951415820. 2
- 89951415821. 3
- 89951415822. 4

Question Number : 18 Question Id : 8995143969 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Consider $V_{FS} = 2$ V, $V_{CM} = 1$ V, $C_0 = 5$ fF. Large signal DC input $V_{in} = 1.6$ V is applied. Find the value of V_X during each bit conversion ($B_2 B_1 B_0$) of the 3-bit SAR ADC shown in Figure 2.

- A. $V_{X,B2} = 1.6$ V, $V_{X,B1} = 1.1$ V, $V_{X,B0} = 0.95$ V
- B. $V_{X,B2} = 0.4$ V, $V_{X,B1} = 1.1$ V, $V_{X,B0} = 0.85$ V
- C. $V_{X,B2} = 0.4$ V, $V_{X,B1} = 0.9$ V, $V_{X,B0} = 0.65$ V
- D. $V_{X,B2} = 0.4$ V, $V_{X,B1} = 0.9$ V, $V_{X,B0} = 1.15$ V

Options :

- 89951415823. 1
- 89951415824. 2
- 89951415825. 3
- 89951415826. 4

Sub-Section Number :

4

Sub-Section Id :

89951462

9/16/2020

Question Shuffling Allowed :

Yes

Question Number : 19 Question Id : 8995143970 Question Type : MCQ Option Shuffling : No Display Que**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical****Correct Marks : 1 Wrong Marks : 0**

With increase in sampling frequency of a 3-bit SAR ADC, the percentage of total power consumed due to leakage in digital circuit:

- A. decreases.
- B. remains same.
- C. increases.
- D. depends on SAR control logic.

Options :

89951415827. 1

89951415828. 2

89951415829. 3

89951415830. 4

Sub-Section Number :

5

Sub-Section Id :

89951463

Question Shuffling Allowed :

Yes

Question Id : 8995143971 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Gro
: No

Question Numbers : (20 to 22)**Question Label : Comprehension**

9/16/2020

Consider $V_{FS} = 2 \text{ V}$, $C_0 = 5 \text{ fF}$. V_X at time T is $V_X\{T\} = 0.4 \text{ V}$.

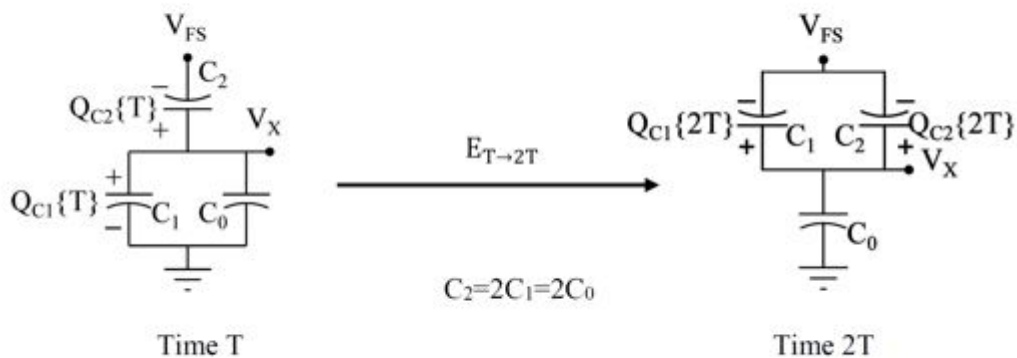


Figure 3. Single capacitor switching.

Sub questions

Question Number : 20 Question Id : 8995143972 Question Type : MCQ Option Shuffling : No Display Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

The charge stored capacitors C_1 and C_2 at time T are $Q_{C1}\{T\}$ and $Q_{C2}\{T\}$, respectively. Which one of the following is correct?

- A. $Q_{C1}\{T\} = 2 \text{ fC}$, $Q_{C2}\{T\} = -16 \text{ fF}$
- B. $Q_{C1}\{T\} = -2 \text{ fC}$, $Q_{C2}\{T\} = -8 \text{ fF}$
- C. $Q_{C1}\{T\} = -2 \text{ fC}$, $Q_{C2}\{T\} = -16 \text{ fF}$
- D. $Q_{C1}\{T\} = 2 \text{ fC}$, $Q_{C2}\{T\} = 16 \text{ fF}$

Options :

- 89951415831. 1
- 89951415832. 2
- 89951415833. 3
- 89951415834. 4

Question Number : 21 Question Id : 8995143973 Question Type : MCQ Option Shuffling : No Display Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

9/16/2020

Correct Marks : 1 Wrong Marks : 0

The charge stored on capacitors C_1 and C_2 at time $2T$ are $Q_{C1}\{2T\}$ and $Q_{C2}\{2T\}$, respectively. Which one of the following is correct?

- A. $Q_{C1}\{2T\} = 5.5 \text{ fC}$, $Q_{C2}\{2T\} = -11 \text{ fF}$
- B. $Q_{C1}\{2T\} = -5.5 \text{ fC}$, $Q_{C2}\{2T\} = -11 \text{ fF}$
- C. $Q_{C1}\{2T\} = -5.5 \text{ fC}$, $Q_{C2}\{2T\} = -5.5 \text{ fF}$
- D. $Q_{C1}\{2T\} = 5.5 \text{ fC}$, $Q_{C2}\{2T\} = 11 \text{ fF}$

Options :

89951415835. 1

89951415836. 2

89951415837. 3

89951415838. 4

Question Number : 22 Question Id : 8995143974 Question Type : MCQ Option Shuffling : No Display Que**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical****Correct Marks : 1 Wrong Marks : 0**

Energy consumed in switching from time T to time $2T$ is.

- A. 2.5 fJ
- B. 1.25 fJ
- C. 10 fJ
- D. 5 fJ

Options :

89951415839. 1

89951415840. 2

89951415841. 3

89951415842. 4

Sub-Section Number :

6

Sub-Section Id :

89951464

Question Shuffling Allowed :

Yes

9/16/2020

Question Number : 23 Question Id : 8995143975 Question Type : MCQ Option Shuffling : No Display Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which of the following method is not helpful in capacitive SAR ADC power saving?

- A. Reducing full scale of the ADC.
- B. Operating digital logic at low voltage.
- C. Reducing sampling frequency of the ADC.
- D. None of the above.

Options :

89951415843. 1

89951415844. 2

89951415845. 3

89951415846. 4

Sub-Section Number :

7

Sub-Section Id :

89951465

Question Shuffling Allowed :

Yes

Question Id : 8995143976 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Group : No

Question Numbers : (24 to 26)

Question Label : Comprehension

9/16/2020

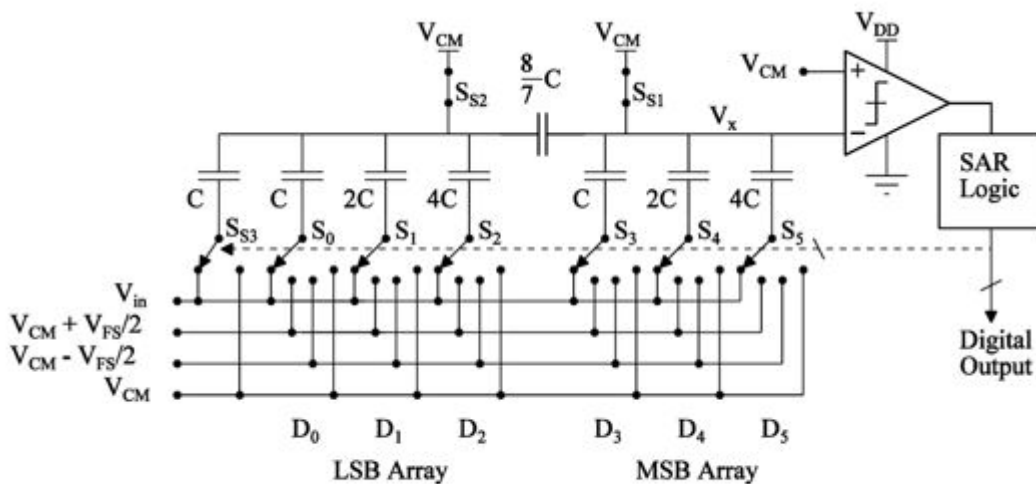


Figure 4. 6-bit split capacitor array SAR ADC.

Sub questions

Question Number : 24 Question Id : 8995143977 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A 6-bit split capacitor array SAR ADC is shown in Figure 4. Assume we would like to replace the 6-bit SAR ADC with an 8-bit ADC so that 4-bits are obtained from LSB array and 4-bits from MSB array. In such 8-bit ADC, what is the size of attenuation capacitor which bridges the MSB DAC and the LSB DAC, in terms of unit capacitor C ?

- A. $\frac{32}{31}C$
- B. $\frac{16}{15}C$
- C. $\frac{15}{16}C$
- D. $\frac{31}{32}C$

Options :

89951415847. 1

9/16/2020

89951415848. 2

89951415849. 3

89951415850. 4

Question Number : 25 Question Id : 8995143978 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A 6-bit split capacitor array SAR ADC is shown in Figure 4. In an N-bit ADC which uses split capacitor array technique, N/2-bits are obtained from LSB array and N/2-bits from MSB array. For such N-bit ADC, what is the size of capacitive DAC in terms of unit capacitor C?

- A. $2^N + \frac{1}{2^{N/2}-1}$
- B. $2^{N-1} + \frac{1}{2^{N/2}-1}$
- C. $2^{N-1} - \frac{1}{2^{N/2}-1}$
- D. $2^N - \frac{1}{2^{N/2}-1}$

Options :

89951415851. 1

89951415852. 2

89951415853. 3

89951415854. 4

Question Number : 26 Question Id : 8995143979 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Split capacitor array technique (shown in Figure 4) is useful:

- A. Only for power saving.
- B. Only for area saving.
- C. For area and power saving.
- D. None of the above.

Options :

9/16/2020

89951415855. 1

89951415856. 2

89951415857. 3

89951415858. 4

Sub-Section Number :

8

Sub-Section Id :

89951466

Question Shuffling Allowed :

Yes

Question Number : 27 Question Id : 8995143980 Question Type : MCQ Option Shuffling : No Display Que**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical****Correct Marks : 1 Wrong Marks : 0**

Consider the random process

$$x[n] = A \cos(n\omega_o + \phi).$$

This process is wide sense stationary (WSS) if

- A. A is a random variable with mean 0 and variance σ_A^2 ; ω_o is constant; ϕ is constant
- B. A is a constant; ω_o is constant; ϕ is uniformly distributed over $[-\pi, \pi]$
- C. A is a constant; ω_o is uniformly distributed over $[-\omega_o - \Delta, \omega_o + \Delta]$; ϕ is constant
- D. any of the above conditions are true

Options :

89951415859. 1

89951415860. 2

89951415861. 3

89951415862. 4

Question Number : 28 Question Id : 8995143981 Question Type : MCQ Option Shuffling : No Display Que**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical****Correct Marks : 1 Wrong Marks : 0**

9/16/2020

The Wiener filter is the optimal filter for minimizing which of the following error functions between desired signal $d[n]$ and estimated signal $\hat{d}[n]$.

- A. $\zeta = \sum_{i=0}^n (d[i] - \hat{d}[i])$
- B. $\zeta = E\{|d[n] - \hat{d}[n]| \}$
- C. $\zeta = \sum_{i=0}^n |(d[i] - \hat{d}[i])|^2$
- D. $\zeta = E\{|d[n] - \hat{d}[n]|^2 \}$

Options :

- 89951415863. 1
- 89951415864. 2
- 89951415865. 3
- 89951415866. 4

Question Number : 29 Question Id : 8995143982 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The Wiener FIR filter is optimal when minimizing the mean-square error for the following combination of signal and system condition.

- A. deterministic signal and LTI system
- B. non-stationary random signal and LTI system
- C. stationary random signal and LTI system
- D. stationary random signal and non-linear time-invariant system

Options :

- 89951415867. 1
- 89951415868. 2
- 89951415869. 3
- 89951415870. 4

9/16/2020

Question Number : 30 Question Id : 8995143983 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Consider the steepest descent algorithm for updating weights

$$w_{n+1} = w_n + \mu E\{e[n]x^*[n]\}$$

in adaptive filters. Let R_x be the input correlation matrix with eigen-values λ_i and eigen-vectors v_i . The condition for convergence of the algorithm is

- A. $\mu > 0$
- B. $\mu > 2/\lambda_{max}$
- C. $0 < \mu < 2/\lambda_{max}$
- D. $0 \leq \mu \leq 2/\lambda_{max}$

Options :

89951415871. 1

89951415872. 2

89951415873. 3

89951415874. 4

Question Number : 31 Question Id : 8995143984 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The least mean squares (LMS) algorithm has the following weight update step.

- A. $w_{n+1} = w_n + \mu E\{e[n]x^*[n]\}$
- B. $w_{n+1} = w_n + \mu \sum_{m=0}^P e[n-m]x^*[n-m]$
- C. $w_{n+1} = w_n + \mu(r_{dx} - R_x w_n)$
- D. $w_{n+1} = w_n + \mu e[n]x^*[n]$

Options :

9/16/2020

89951415875. 1

89951415876. 2

89951415877. 3

89951415878. 4

Question Number : 32 Question Id : 8995143985 Question Type : MCQ Option Shuffling : No Display Que**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical****Correct Marks : 1 Wrong Marks : 0**Which of the following choice of μ in LMS algorithm has faster convergence

A. $\mu = 0$

B. $\mu = \frac{2}{\lambda_{min}}$

C. $\mu = \frac{2}{\lambda_i}, \text{ where } \lambda_{min} < \lambda_i < \lambda_{max}$

D. $\mu > \frac{2}{\lambda_{max}}$

Options :

89951415879. 1

89951415880. 2

89951415881. 3

89951415882. 4

Question Number : 33 Question Id : 8995143986 Question Type : MCQ Option Shuffling : No Display Que**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical****Correct Marks : 1 Wrong Marks : 0**

9/16/2020

Let $x[n]$ be the input signal; $d[n]$ the desired signal with mean zero; and $v[n]$ white noise signal with mean zero and variance σ_v^2 , related as

$$x[n] = d[n] + v[n].$$

Assume $d[n]$ and $v[n]$ are uncorrelated, and $d[n]$ is WSS. Then the autocorrelations are related as:

- A. $r_{xx}[k] = r_{dd}[k]$
- B. $r_{xx}[k] = r_{dd}[k] + r_{vv}[k]$
- C. $r_{xx}[k] = r_{dd}[k] + \sigma_v^2$
- D. $r_{xx}[k] = \sigma_v^2 r_{dd}[k]$

Options :

89951415883. 1

89951415884. 2

89951415885. 3

89951415886. 4

Question Number : 34 Question Id : 8995143987 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The LMS filter is

- A. linear, time-invariant
- B. linear, time-variant
- C. non-linear, time-invariant
- D. non-linear, time-variant

Options :

89951415887. 1

89951415888. 2

89951415889. 3

89951415890. 4

9/16/2020

Question Number : 35 Question Id : 8995143988 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

By choosing $0 < \mu < 2/\lambda_{max}$, where λ_{max} is the maximum eigen-value of R_x , the LMS algorithm

- A. converges only for WSS signals
- B. converges both for WSS and non-WSS signals independent of the initial weight vector
- C. converges both for WSS and non-WSS signals depending on the initial weight vector
- D. will not converge

Options :

89951415891. 1

89951415892. 2

89951415893. 3

89951415894. 4

Question Number : 36 Question Id : 8995143989 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

For the WSS scenario, the minimum mean-square error ζ_{min} will be obtained by using the steepest descent algorithm. In this case the LMS converges and obtains the error ζ_{LMS} .

- A. $\zeta_{LMS} = 0$
- B. $\zeta_{LMS} = \zeta_{min}$
- C. $\zeta_{LMS} = \zeta_{min} + \epsilon$, where ϵ is a small value.
- D. *Can not be determined the question.*

Options :

89951415895. 1

9/16/2020

89951415896. 2

89951415897. 3

89951415898. 4

Question Number : 37 Question Id : 8995143990 Question Type : MCQ Option Shuffling : No Display Que**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical****Correct Marks : 1 Wrong Marks : 0**The RLS solves for the weight vector w_n using

$$R_x[n]w_n = r_{dx}[n]$$

Here,

- A. $R_x[n]$ is the statistical autocorrelation matrix $E\{x[n]x^T[n]\}$
- B. $R_x[n]$ is the deterministic autocorrelation matrix $x[n]x^T[n]$
- C. $R_x[n]$ is the statistical autocorrelation matrix $E\{\sum_{i=0}^n x[i]x^T[i]\}$
- D. $R_x[n]$ is the deterministic autocorrelation matrix $\sum_{i=0}^n x[i]x^T[i]$

Options :

89951415899. 1

89951415900. 2

89951415901. 3

89951415902. 4

Question Number : 38 Question Id : 8995143991 Question Type : MCQ Option Shuffling : No Display Que**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical****Correct Marks : 1 Wrong Marks : 0**

9/16/2020

Considering LMS and exponentially weighted RLS adaptive filters, which one of the following statements is FALSE.

- A. Both perform well for non-stationary signal conditions
- B. Performance of LMS will be better than RLS
- C. Performance of RLS will be better than LMS
- D. Computational complexity of LMS is less than that of RLS

Options :

- 89951415903. 1
- 89951415904. 2
- 89951415905. 3
- 89951415906. 4

Question Number : 39 Question Id : 8995143992 Question Type : MCQ Option Shuffling : No Display Question : No Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

The name of the pedagogical technique used throughout the lectures delivered by Prof. Vikram M. Gadre is:

- A. Think, Inhale, Pair and Exhale
- B. Think, Reflect, Share, Pair
- C. Think, Inhale, Pair, Exhale and Share
- D. None of the above

Options :

- 89951415907. 1
- 89951415908. 2
- 89951415909. 3
- 89951415910. 4

Question Number : 40 Question Id : 8995143993 Question Type : MCQ Option Shuffling : No Display Question : No Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

9/16/2020

In this technique, one is NOT encouraged to talk to anyone around in the

- A. Think Phase
- B. Inhale Phase
- C. Pair Phase
- D. Exhale Phase

Options :

- 89951415911. 1
- 89951415912. 2
- 89951415913. 3
- 89951415914. 4

Question Number : 41 Question Id : 8995143994 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In this technique, one IS expected to discuss locally with one or more partner(s)
in the

- A. Think Phase
- B. Inhale Phase
- C. Pair Phase
- D. Exhale Phase

Options :

- 89951415915. 1
- 89951415916. 2
- 89951415917. 3
- 89951415918. 4

Question Number : 42 Question Id : 8995143995 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

9/16/2020

In this technique, the entire class participates together and focuses attention on the respondent(s), in responding during the

- A. Inhale Phase
- B. Pair Phase
- C. Exhale Phase
- D. Share Phase

Options :

89951415919. 1

89951415920. 2

89951415921. 3

89951415922. 4

Sub-Section Number :

9

Sub-Section Id :

89951467

Question Shuffling Allowed :

Yes

Question Id : 8995143996 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Group : No

Question Numbers : (43 to 44)

Question Label : Comprehension

When given an opportunity to explain the ideas of their group to the whole class, different groups identified some or all of the following transforms:

- (i) Laplace Transform
- (ii) Fourier Transform
- (iii) Z-Transform
- (iv) Hankel Transform
- (v) Hausdorff transform
- (vi) Wavelet Transform

Sub questions

Question Number : 43 Question Id : 8995143997 Question Type : MCQ Option Shuffling : No Display Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

9/16/2020

Correct Marks : 1 Wrong Marks : 0

Dr. Sanjeev Ahuja and Raja identified the following transforms:

- A. (i), (ii), (iv), (v)
- B. (i), (ii), (iii), (iv)
- C. (ii), (iii), (iv), (v)
- D. (i), (ii), (iii), (v)

Options :

89951415923. 1

89951415924. 2

89951415925. 3

89951415926. 4

Question Number : 44 Question Id : 8995143998 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Prof. Devi from KC College and Dr. Swati Lavand identified the following transforms:

- A. (i), (ii), (iii), (v) only
- B. (i), (ii), (iii), (iv), (v)
- C. (i), (ii), (iii), (v), (vi)
- D. (i), (ii), (iii), (iv) only

Options :

89951415927. 1

89951415928. 2

89951415929. 3

89951415930. 4

Sub-Section Number :

10

Sub-Section Id :

89951468

Question Shuffling Allowed :

Yes

Question Number : 45 Question Id : 8995143999 Question Type : MCQ Option Shuffling : No Display Que

9/16/2020

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A Discrete Sequence is a mapping from

- A. The set of integers to the set of complex numbers
- B. The set of integers to the set of integers
- C. The set of complex numbers to the set of integers
- D. The set of real numbers to the set of complex numbers

Options :

- 89951415931. 1
- 89951415932. 2
- 89951415933. 3
- 89951415934. 4

Question Number : 46 Question Id : 8995144000 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A Discrete System is a mapping from

- A. The set of sequences to the set of complex numbers
- B. The set of complex numbers to the set of sequences
- C. The set of complex numbers to the set of irrationals
- D. The set of sequences to the set of sequences

Options :

- 89951415935. 1
- 89951415936. 2
- 89951415937. 3
- 89951415938. 4

Question Number : 47 Question Id : 8995144001 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

9/16/2020

A two-point moving average is best described by:

- A. $y[n] = 0.5 \{x[n] + x[n - 1]\}$
- B. $y[n] = 0.5 \{x[n] - x[n - 1]\}$
- C. $y[n] = \text{cube root of } \{x[n] x[n - 1]\}$
- D. $y[n] = 0.25 \{x[n] x[n - 1]\}$

Options :

- 89951415939. 1
- 89951415940. 2
- 89951415941. 3
- 89951415942. 4

Question Number : 48 Question Id : 8995144002 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The sequence $x[n] = n$ for all integer n is given as the input to a 2-point moving average. The output $y[n]$ for this sequence $x[n]$ would be the sequence $y[n] =$

- A. $x[n] + 0.5$
- B. $x[n] - 0.5$
- C. $0.5 x[n]$
- D. $n x[n]$

Options :

- 89951415943. 1
- 89951415944. 2
- 89951415945. 3
- 89951415946. 4

Question Number : 49 Question Id : 8995144003 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

9/16/2020

The following CANNOT be a property of the two-point moving average:

- A. Suppression of relatively slower variations in the sequence in comparison to faster ones
- B. Suppression of relatively faster variations in the sequence in comparison to slower ones
- C. Identification of trends across samples
- D. Removing unwanted fluctuations

Options :

89951415947. 1

89951415948. 2

89951415949. 3

89951415950. 4

Question Number : 50 Question Id : 8995144004 Question Type : MCQ Option Shuffling : No Display Que

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A 3-point moving average would give a zero output to the following input sequence:

- A. $x[n] = \cos(\pi n/5)$
- B. $x[n] = \cos(2\pi n/3)$
- C. $x[n] = \cos(\pi n/2)$
- D. $x[n] = \cos(\pi n/4)$

Options :

89951415951. 1

89951415952. 2

89951415953. 3

89951415954. 4