Instrumentation Engineering Sample Questions

Questions And Answers

No.	Question
1	A surface height profile is given by, $y = a + b \sin \frac{2\pi x}{l}$ $(0 \leq x \leq l)$ where a, b, l are constants and x is the horizontal coordinate. The roughness of the surface, based on absolute deviation, is
Options	**A)** $\frac{2b}{\pi}$ **B)** $\frac{4b}{\pi}$ **C)** $\frac{6b}{\pi}$ **D)** $\frac{8b}{\pi}$
Correct Answer	A
2	For N-bit Successive Approximation ADCs, other parameters such as clock frequency remaining constant, the conversion time is proportional to
Options	**A)** N^2 **B)** $\sqrt{N}$ **C)** log N **D)** N
Correct Answer	B
3	The radius of a sphere is given as (40.0 ± 0.5)mm. The estimated error in its mass is:
Options	**A)** ± 3.75% **B)** ± 1.25% **C)** ± 12.5% **D)** ± 0/125%
Correct	B

Answer

4 A zero error in a vernier caliper is termed as

Options
A) accidental error **B)** interference error
C) systematic error **D)** random error

Correct Answer B

5 Given the discrete-time sequence x[n] = [2, 0, -1,-3, 4, 1, -l, $X(e^{j\pi})$ is

Options
A) 8 **B)** 6π
C) 8π **D)** 6

Correct Answer C

6 Linear variable differential transformer has

Options
A) two primary coils connected in phase and a secondary coil
B) two primary coils connected in opposition and a secondary coil
C) one primary coil and two secondary coils connected in phase
D) one primary coil and two secondary coils connected in opposition

Correct Answer D

7 Position sensor units having a constant sensitivity of lV/mm are used for feedback in number of position controlled system units, each having an overall forward path dc gain of 50. If the random dc bias errors in the outputs of various sensor units are characterized as normal with mean 0 and standard deviation (σ) 0.01V, for a constant set point of 5V, the true position outputs of the various controlled system units can be characterized as normal with

Options
A) mean of 5.0, σ of 0.01 **B)** mean of 0.0, σ of 0.01
C) mean of 5.0, σ of 0.0098 **D)** mean of 4.902, σ of 0.0098

Correct C

Answer

8 The refractive index of the core of an optical fiber is n_1 and that of the cladding is nf If $(n_1 - n_2) = \Delta n$, then the fiber can be made single mode with numerical aperture unchanged by

Options
A) reducing core diameter and increasing Δn
B) reducing both core diameter and Δn
C) reducing core diameter alone
D) reducing Δn alone

Correct Answer D

9 For a suppressed carrier amplitude modulator (AM-SC) system, the carrier and the modulating inputs are $x_c(t) = \cos \omega_c t$ and $x_m(t) = 0.5 \sin \omega_m t$, respectively. The output of the system is proportional to

Options
A) $\sin(\omega_c + \omega_m) t - \sin(\omega_c - \omega_m) t$ **B)** $\sin(\omega_c + \omega_m) t + \cos(\omega_c - \omega_m) t$
C) $(1 + 0.5 \sin \omega_m t) \cos \omega_c t$ **D)** $(1 - 0.5 \sin \omega_m t) \cos \omega_c t$

Correct Answer B

10 The 3-dB cut-off frequency of a first analog high pas filter is ω_c the output will have a phase shift of

Options
A) $\frac{-\pi}{2}$ **B)** $\frac{-\pi}{4}$
C) $\frac{\pi}{2}$ **D)** $\frac{\pi}{2}$

Correct Answer B

11 In an INTEL 8085 microprocessor the ADDRESS-DATA bus and the DATA bus are

Options **A)** Non multiplexed **B)** Multiplexed

	C) Duplicated **D)** Same as CONTROL bus
Correct Answer	B
12	A 3 ½ digit nultimeter has an accuracy specification of (± 0.5% of reading ± 5 counts). If the meter reads 2.00 mA on a full scale of 20mA, the worst-case error in the reading is
Options	**A)** 0.5% **B)** 2.5% **C)** 3.0% **D)** 5.5%
Correct Answer	C
13	The measurements of a source voltage are 5.9V, 5.7V and 6.1V. The sample standard deviation of the readings is
Options	**A)** 0.013 **B)** 0.04 **C)** 0.115 **D)** 0.2
Correct Answer	D
14	Consider the following systems: System 2: G(s) = $\frac{1}{2(2s+1)}$ System 1: G(s) = $\frac{1}{2(5s+1)}$ The true statement regarding the system is
Options	**A)** Bandwidth of system 1 is greater than the bandwidth of system 2 **B)** Bandwidth of system 1 is lower than the bandwidth of system 2 **C)** Bandwidth of both the systems are **D)** Bandwidth of both the systems are

	the same infinite
Correct Answer	A

15 The transfer function of a system is

$$\frac{A}{s^2 + \omega^2}$$

The steady-state gain of the system to a unit-step input is

Options **A)** $\frac{A}{\omega^2}$ **B)** 0 **C)** ∞ **D)** not possible to be determined

Correct Answer C

16 In 8085 microprocessor, CY flag may be set by the instruction

Options **A)** SUB **B)** INX **C)** CMA **D)** ANA

Correct Answer A

17 V_1 and V_2 are the input voltages of an instrumentation amplifier. The output of the instrumentation amplifier is found to be $100(V_1 - V_2) + 10^{-4} (V_1 + V_2)$. The gain and the common mode rejection ratio (CMRR) of the instrumentation amplifier respectively are

Options **A)** (50, 60 dB) **B)** (50, 120 dB) **C)** (100, 60dB) **D)** (100, 120 dB)

Correct Answer C

18 The sequence x[n] whose z-transform is $X[z] = e^{(1/Z)}$ is

Options **A)** **B)**

$\frac{1}{n!}$ u[n]

$\frac{1}{-n!}$ u[-n]

C) $(-1)^n$ $\frac{1}{n!}$ u[n]

D) $\frac{1}{-(n+1)!}$ u[-n-1]

19 The time taken by an ionized atom, of mass m kg and charge e Coulombs, pulsed into a field-free region with V volts, to reach a detector L meters away is

Options

A) $\frac{1}{L}\sqrt{\frac{m}{2eV}}$

B) $L\sqrt{\frac{m}{2eV}}$

C) $\frac{m}{L}\sqrt{\frac{L}{2eV}}$

D) $\frac{2}{L}\sqrt{\frac{m}{2eV}}$

Correct Answer B

20 The clock frequency of a timer-counter is 10MHz. The timer-counter is used in the period mode and the input to the timer-counter is a square wave of frequency 2 kHz. The display of the timer-counter will show a value

Options **A)** 200 **B)** 2000 **C)** 5000 **D)** 50000

Correct Answer C