Question Paper Preview

Question Paper Name: Instrumentation Engineering 12th May 2017 Shift 1
Subject Name: Instrumentation Engineering
Duration: 120

Instrumentation Engineering

Display Number Panel: Yes
Group All Questions: No

Question Number : 1 Question Id : 871112961 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Let A be the square matrix $\begin{pmatrix} 5 & 4 \\ 1 & 2 \end{pmatrix}$. Then the eigen vectors of A are

Options :

1. linearly dependent

2. linearly Independent

3. orthogonal

4. contain the zero vector

Question Number : 2 Question Id : 871112962 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

$\int_0^1 \int_0^{x^2} x e^y \, dy \, dx$ is equal to

Options :

1. $\frac{e}{2}$

2. $e - 1$

3. $1 - e$

4. $\frac{e}{2} - 1$

Question Number : 3 Question Id : 871112963 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If curl $\bar{f} = \bar{0}$ then $\bar{f}$ is called as

Options :

1. solenoidal

2. irrotational

3. unit normal

4. null

Question Number : 4 Question Id : 871112964 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The order and the degree of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^3 = c^2\left(\frac{d^2y}{dx^2}\right)^2$ is

Options :

1. 2, 3

2. 1, 2

3. 2, 2

4. 3, 2

Question Number : 5 Question Id : 871112965 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

$\frac{1}{D-\alpha} X =$

Options :

1. $e^{\alpha x}\int Xe^{-\alpha x}dx$

2. $e^{-\alpha x}\int Xe^{\alpha x}dx$

3. $e^{-\alpha x}\int Xe^{-\alpha x}dx$

4. $e^{\alpha x}\int Xe^{\alpha x}dx$

Question Number : 6 Question Id : 871112966 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The value of the integral $\int_C \frac{z^2 - z + 1}{z - 1}$ where c is the circle $|z| = \frac{1}{2}$ is

Options :

1. $\frac{-3}{2}$
2. 1
3. 0
4. $2\pi i$

Question Number : 7 Question Id : 871112967 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If a fair coin is tossed 4 times, probability that 2 heads and 2 tails will result is

Options :

1. $\frac{3}{8}$
2. $\frac{1}{2}$
3. $\frac{5}{8}$
4. $\frac{3}{4}$

Question Number : 8 Question Id : 871112968 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If the mean of a Poisson variate X is 1, then P(X = 1) is

Options :

1. e^{-2}
2. e^{-1}
3. e^{2}
4. 1

Question Number : 9 Question Id : 871112969 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following is an algebraic equation?

Options :

1. $xe^x - 2 = 0$

2. $x^3 + 4x^2 + 6x - 1 = 0$

3. $\cos x - xe^x = 0$

4. $x^2 - \log_{10} x - 1.2 = 0$

Question Number : 10 Question Id : 871112970 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The rate of convergence of secant method is

Options :

1. 1.84

2. 1.450

3. 1.618

4. 2.00

Question Number : 11 Question Id : 871112971 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Superposition theorem is applicable only to networks that are

Options :

1. linear

2. non Linear

3. time-Invariant

4. passive

Question Number : 12 Question Id : 871112972 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A first order thermometer has a time constant of 50 sec, is subjected to a sinusoidal input signal of 0.002 Hz. The time lag of this instrument is

Options :

1. 50 sec

2. 46.6 sec

3. 500 sec

4. 0.01 sec

Question Number : 13 Question Id : 871112973 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In the calculation of the volume of a cube of a nominal size of 5", the uncertainty in the measurement of each side is 10%. The uncertainty in the measurement of volume would be

Options :

1. 5.477%

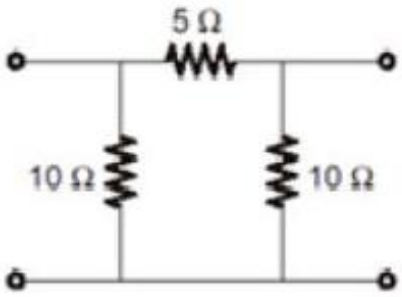
2. 10.00%

3. 17.32%

4. 30.00%

Question Number : 14 Question Id : 871112974 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The 2 – port Admittance matrix of the circuit shown is given by



Options :

1. $\begin{bmatrix} 0.3 & 0.2 \\ 0.2 & 0.3 \end{bmatrix}$

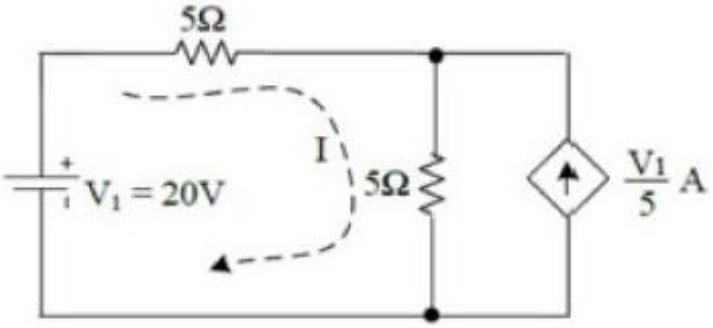
2. $\begin{bmatrix} 15 & 5 \\ 5 & 15 \end{bmatrix}$

3. $\begin{bmatrix} 3.33 & 5 \\ 5 & 3.33 \end{bmatrix}$

4. $\begin{bmatrix} 0.3 & 0.4 \\ 0.4 & 0.3 \end{bmatrix}$

Question Number : 15 Question Id : 871112975 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The dependent current source shown in the figure _____.



Options :

1. delivers 80 W

2. absorbs 80 W

3. delivers 40 W

4. absorbs 40 W

Question Number : 16 Question Id : 871112976 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A barium titanate piezoelectric crystal with d_{33} = 150 pC/N, $C_{crystal}$ = 25 pF and $R_{crystal} = 10^{10}\ \Omega$ is used to measure the amplitude of a step force. The voltage output is measured using a digital voltmeter with input impedance $10^{13}\ \Omega$ connected across the crystal. All other capacitances and resistances may be neglected. A step force of 2N is applied from direction "3" on the crystal. The time in milliseconds within which the voltmeter should sample the crystal output voltage so that the drop from the peak value is no more than 0.12 V is _____.

Options :

1. 248

2. 24.8

3. 0.248

4. 0.248

Question Number : 17 Question Id : 871112977 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Semiconductor strain gages typically have much higher gage factors than those of metallic strain gages, primarily due to

Options :

1. higher temperature sensitivity

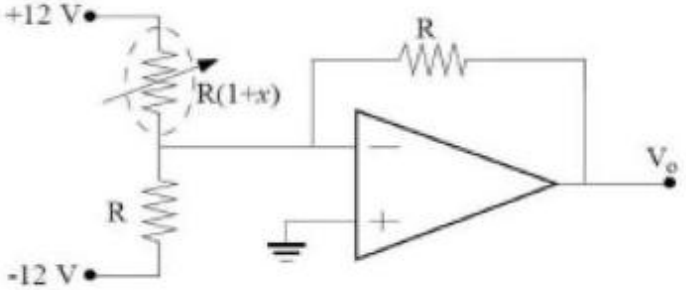
2. higher Poisson's ratio

3. higher piezoresitive coefficient

4. higher magnetostrictive coefficient

Question Number : 18 Question Id : 871112978 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A Resistance Temperature Detector (RTD) is connected to a circuit, as shown in the following figure,



Assume the op-amp to be ideal. If $V_0 = +2.0V$, then the value of x is _____.

Options :

1. 11

2. 0.2

3. 9

4. 2.2

Question Number : 19 Question Id : 871112979 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A full bridge configuration circuit used as signal conditioning circuit for measurement using strain gauges, gives _____.

Options :

1. same output as quarter bridge configuration

2. two times higher output than quarter bridge configuration

3. eight times higher output than quarter bridge configuration

4. four times higher output than quarter bridge configuration

Question Number : 20 Question Id : 871112980 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A resistance potentiometer is a zero order instrument with increase of load to potentiometer resistance, its non-linearity _____.

Options :

1. decreases

2. increases

3. increases as square root of resistance

4. remain constant

Question Number : 21 Question Id : 871112981 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Compared to RTD, thermistor has _____.

Options :

1. low sensitivity and high nonlinearity

2. high sensitivity and low nonlinearity

3. high sensitivity and high nonlinearity

4. low sensitivity and low nonlinearity

Question Number : 22 Question Id : 871112982 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The primary reason for fixing strain gages at 45°, with respect to the shaft axis, in a torque meter for measuring torque in a cylinder is_____.

Options :

1. to pick up maximum strain

2. to perform temperature compensation

3. to safeguard strain gages from damages

4. to reduce the effect of vibration

Question Number : 23 Question Id : 871112983 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

_____ is not used for measuring pressure.

Options :

1. LVDT

2. Strain gage

3. Capacitance Sensor

4. Electromagnetic sensor

Question Number : 24 Question Id : 871112984 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The temperature transducers exhibit non- linear behavior. The order in which they exhibit non-linearity from highest to lowest is_____.

Options :

1. Thermocouples, RTD, Thermistor

2. Thermistor, Thermocouples, RTD

3. RTD, Thermocouples, Thermistor

4. Thermistor, RTD, Thermocouples

Question Number : 25 Question Id : 871112985 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a strain gauge torque transducer, the strain gauges should be mounted at

Options :

1. 0° to the shaft axis

2. 45° to the shaft axis

3. 60° to the shaft axis

4. 90° to the shaft axis

Question Number : 26 Question Id : 871112986 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

What is the kinematic viscosity of a liquid having a density of 1.2 g/cm^3 and dynamic viscosity of 2 cP?

Options :

1. $1.67\ m^2\ s^{-1}$

2. $0.6\ m^2\ s^{-1}$

3. $0.6 \times 10^{-6}\ m^2\ s^{-1}$

4. $1.67 \times 10^{-6}\ m^2\ s^{-1}$

Question Number : 27 Question Id : 871112987 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A force digital transducer measures the pressure in the range of 0-200N with a resolution of 0.1% of full scale. The smallest change it can measure is

Options :

1. 0.2 N

2. 0.4 N

3. 0.5 N

4. 1.0 N

Question Number : 28 Question Id : 871112988 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A diaphragm has a natural frequency of 30 kHz. If both the diameter and thickness are halved, the natural frequency is

Options :

1. 50 kHz

2. 240 kHz

3. 120 kHz

4. 60 kHz

Question Number : 29 Question Id : 871112989 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a resistant thermometer a metal wire shows a resistance of 500 Ω at ice point and 550 Ω at steam point. What is the temperature that corresponds to resistance of 535 Ω?

Options :

1. 60°C

2. 65°C

3. 70°C

4. 75°C

Question Number : 30 Question Id : 871112990 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A copper constant thermocouple with reference junction temperature of 20°C is used to measure an unknown temperature $(E_2 - E_0) = 0.7936$ mV. The reading of potentiometer is 2.877 mV. The slope of the curve is 0.04 mV/°C. The unknown temperature will be

Options :

1. 46°C

2. 70.7°C

3. 86.6°C

4. 92°C

Question Number : 31 Question Id : 871112991 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A venturi flume is built in a rectangular channel 1 m wide. It has a throat width of 400 mm, the upstream head is 570 mm and measured head in throat is 500 mm. The discharge through the venturi flume is

Options :

1. $0.11\ m^3/s$

2. $0.22\ m^3/s$

3. $0.33\ m^3/s$

4. $0.414\ m^3/s$

Question Number : 32 Question Id : 871112992 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The resistance of thermistor at 300 K is 5000 Ω. Its resistance temperature co-efficient is 0.04/°C. A measurement with a lead resistance of 10 Ω will cause an error of

Options :

1. 0.025° C

2. 0.05° C

3. 0.075° C

4. 0.10° C

Question Number : 33 Question Id : 871112993 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Active transducer is a _____.

Options :

1. photo emissive cell

2. photo voltaic cell

3. Selsyn

4. strain gauge

Question Number : 34 Question Id : 871112994 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The flow meter whose output is independent of all the physical properties (like pressure, temperature, density, viscosity etc.) is _____.

Options :

1. orifice flow meter

2. electromagnetic flow meter

3. rotameter

4. vortex flow meter

Question Number : 35 Question Id : 871112995 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Unbounded strain gages are

Options :

1. exclusively used for transducer applications

2. exclusively used for stress analysis

3. used for unbounded strains only

4. used for strain analysis

Question Number : 36 Question Id : 871112996 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following circuits has the greatest bandwidth?

Options :

1. $f_r = 1$ MHz , Q = 10

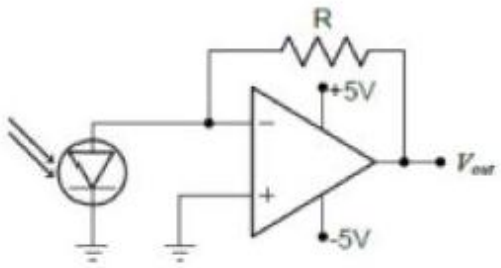
2. $f_r = 455$ MHz , Q = 100

3. $f_r = 1$ MHz , Q = 100

4. $f_r = 50$ MHz , Q = 50

Question Number : 37 Question Id : 871112997 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The responsivity of the PIN photodiode shown is 0.9 A/W. To obtain V_{out} of –1 V for an incident optical power of 1 mW, the value of R to be used is



Options :

1. 0.9 Ω
2. 1.1 Ω
3. 0.9 kΩ
4. 1.1 kΩ

Question Number : 38 Question Id : 871112998 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A P-N junction diode in series with a 100 Ω resistor is forward biased to cause a current flow of 100 mA. If voltage across this combination is instantaneously reversed at t = 0, current through the diode is approximately given by

Options :

1. 0 mA
2. 200 mA
3. 100 mA
4. 50 mA

Question Number : 39 Question Id : 871112999 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

An amplifier with a mid-band gain | A |= 500 has a negative feedback $\beta = \frac{1}{100}$. If upper cut-off without feedback is at 60 Hz, then with feedback it would become

Options :

1. 10 kHz
2. 12 kHz

3. 300 kHz

4. 360 kHz

Question Number : 40 Question Id : 8711121000 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

An Op-Amp used as a tuned amplifier has the tuned circuit connected _____.

Options :

1. across input

2. across feedback impedance Z_f

3. across series impedance at the input

4. across output

Question Number : 41 Question Id : 8711121001 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If $X = 1$ in the logic equation $[X + Z\{\overline{Y} + (\overline{Z} + X\overline{Y})\}]\{\overline{X} + \overline{Z}(X + Y)\} = 1$. Then

Options :

1. $Y = Z$

2. $Y = \overline{Z}$

3. $Z = 1$

4. $Z = 0$

Question Number : 42 Question Id : 8711121002 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A memory system of size 26K bytes is required to be designed using memory chips which have 12 address lines and 4 data lines each. The number of such chips required to design the memory system is _____.

Options :

1. 2

2. 4

3. 8

4. 13

Question Number : 43 Question Id : 8711121003 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The resolution of a 4 bit counting ADC is 0.5 volts. For an analog input of 6.6 volts, the digital output of the ADC will be

Options :

1. 1011

2. 1101

3. 1100

4. 1110

Question Number : 44 Question Id : 8711121004 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A bulb in a staircase has two switches, one switch being at the ground floor and the other one at the first floor. The bulb can be turned ON and also can be turned OFF by any one of the switches irrespective of the state of the other switch. The logic of switching of the bulb resembles

Options :

1. an AND gate

2. an OR gate

3. a XOR gate

4. a NAND gate

Question Number : 45 Question Id : 8711121005 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A 6 bit ladder D/A converter has input 101001. For logic 1 = 10 V and logic 0 = 0 V, the output is

Options :

1. 4.23

2. 6.51

3. 5.52

4. 9.23

Question Number : 46 Question Id : 8711121006 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A multiplexer with four select bits is a _____ multiplexer.

Options :

1. 4×1

2. 8×1

3. 16×1

4. 32×1

Question Number : 47 Question Id : 8711121007 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Specify the number of times loop is executed

```
LOOP : MVI B, F2H
       MOV A,B
       DCR A
       JNZ LOOP
```

Options :

1. Infinite

2. F2 H

3. 01 H

4. 00 H

Question Number : 48 Question Id : 8711121008 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The ADC 0804 has _____ resolution.

Options :

1. 4 bit

2. 8 bit

3. 16 bit

4. 32 bit

Question Number : 49 Question Id : 8711121009 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The minimum number of NAND gates required to implement $A + A\overline{B} + A\overline{B}C$ is equal to

Options :

1. 3
2. 4
3. 1
4. 0

Question Number : 50 Question Id : 8711121010 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Four, 16 × 4 memory chips are connected to the common address lines. The resultant system memory size is _____.

Options :

1. 64 × 4
2. 32 × 8
3. 16 × 16
4. 256 × 1

Question Number : 51 Question Id : 8711121011 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The Fourier transform of a signal h (t) is $H(j\omega) = (2\cos\omega)(\sin 2\omega)/\omega$. The value of h(0) is

Options :

1. 1/4
2. 1/2
3. 1
4. 2

Question Number : 52 Question Id : 8711121012 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Consider the differential equation $\frac{dx}{dt} = 10 - 0.2x$ with initial condition $x(0) = 1$. The response x(t) for $t > 0$ is

Options :

1. $2 - e^{-0.2t}$

2. $2 - e^{0.2t}$

3. $50 - 49\ e^{-0.2t}$

4. $50 - 49\ e^{0.2t}$

Question Number : 53 Question Id : 8711121013 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The diagonal clipping in Amplitude Demodulation (using envelope detector) can be avoided if RC time-constant of the envelope detector satisfies which of the following condition, (here w is message bandwidth and ω is carrier frequency both in rad/sec)

Options :

1. $RC < 1/w$

2. $RC > 1/w$

3. $RC < 1/\omega$

4. $RC > 1/\omega$

Question Number : 54 Question Id : 8711121014 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The signal $\cos(\omega_c t) + 0.5 \cos(\omega_m t) \sin(\omega_c)t$ is

Options :

1. FM only

2. AM only

3. both AM and FM

4. neither AM nor FM

Question Number : 55 Question Id : 8711121015 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In delta modulation, the slope overload distortion can be reduced by

Options :

1. decreasing the step size

2. decreasing the granular noise

3. decreasing the sampling rate

4. increasing the step size

Question Number : 56 Question Id : 8711121016 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Fourier transform of the function f(at) is

Options :

1. $aF(\Omega)$

2. $F(a\Omega)$

3. $F(\Omega)$

4. $\frac{1}{a} F\left(\frac{\Omega}{a}\right)$

Question Number : 57 Question Id : 8711121017 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The peak frequency deviation for a binary frequency shift keying signal with a mark frequency of 49 kHz, a space frequency of 51 kHz and an input baud rate of 2 kbps is

Options :

1. 1 kHz

2. 2 kHz

3. 3 kHz

4. 4 kHz

Question Number : 58 Question Id : 8711121018 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A carrier is simultaneously modulated by two sine waves with modulation indices of 0.3 and 0.4. The total modulation index is

Options :

1. 0.4

2. 0.5

3. 0.6

4. 0.7

Question Number : 59 Question Id : 8711121019 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The relationship between the input x(t) and the output y(t) of a casual system is defined as $d^2y(t)/dt^2 + dy(t)/dt - 2\ y(t) = 4\ x(t) + 5\ dx(t)/dt$. The impulse response of system is

Options :

1. $3\ e^{-t}\ u(t) + 2\ e^{2t}\ u(t)$

2. $(3\ e^{-t} + 2\ e^{2t})\ u(t)$

3. $3\ e^{-t}\ u(t) - 2e^{2t}\ u(-t)$

4. $(3\ e^{-t} - 2\ e^{2t})\ u(-t)$

Question Number : 60 Question Id : 8711121020 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The Fourier series representation of a periodic current is $[2+ 6 \cos \omega t + \sqrt{48} \sin \omega t]$ A. The effective value of current is

Options :

1. $(2 + 6 + \sqrt{24})$ A

2. 6 A

3. 8 A

4. 2 A

Question Number : 61 Question Id : 8711121021 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The region of convergence of Z transform of unit step function is

Options :

1. $|z| > 1$

2. $|z| < 1$

3. (Real part of z) > 0

4. (Real part of z) < 0

Question Number : 62 Question Id : 8711121022 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a pulse coded modulation system, each quantization level is encoded with 8 bits. The signal to quantization ratio is equal to

Options :

1. 24 dB

2. 48 dB

3. 64 dB

4. 256 dB

Question Number : 63 Question Id : 8711121023 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If the sequence $|x_n|^{1/n}$ converges, then the series $\sum_{n=0}^{\infty} x_n$ converges absolutely is

Options :

1. ratio test

2. root test

3. convergence test

4. divergence test

Question Number : 64 Question Id : 8711121024 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A Hilbert transformer is a

Options :

1. non-linear system

2. non-causal system

3. time-varying system

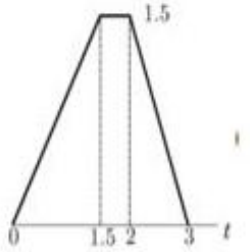
low-pass system

4.

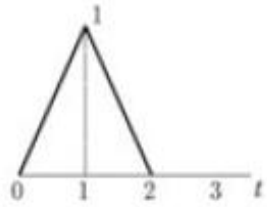
Question Number : 65 Question Id : 8711121025 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Let u(t) be the step function. Which of the waveforms in the figure corresponds to the convolution of u(t) – u(t – 1) with u(t) – u(t - 2)?

Options :



1.



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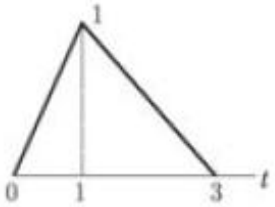

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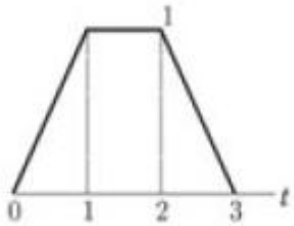


4.

Question Number : 66 Question Id : 8711121026 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

An ammeter whose internal resistance is 0.2 Ω has current range of 0-5 A. Which resistance is to be added in order to change the range to 0-25 A?

Options :

0.05 Ω in parallel with the meter

1.

0.2 Ω in parallel with the meter

2.

3. 0.05 Ω in series with the meter

4. 1 Ω in series with the meter

Question Number : 67 Question Id : 8711121027 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The bridge most suited for measurement of a four-terminal resistance in the range of 0.001 Ω to 0.1 Ω is

Options :

1. Wien's bridge

2. Maxwell's bridge

3. Schering bridge

4. Kelvin double bride

Question Number : 68 Question Id : 8711121028 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A Lissajous pattern as shown in figure is observed on screen of a CRO when the voltage of frequencies f_x and f_y and applied to the x and y plates respectively then $f_x : f_y$ =

Options :

1. 3:2

2. 1:2

3. 2:3

4. 2:1

Question Number : 69 Question Id : 8711121029 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A 0-20 A ammeter has a guaranteed accuracy of 2% of full scale deflection. The limiting error while reading 2.5 A is

Options :

1. 4%

2. 8%

3. 16%

4. 20%

Question Number : 70 Question Id : 8711121030 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Standardization of potentiometers is done in order that they become

Options :

1. accurate only

2. accurate and provide direct reading

3. precise only

4. accurate and precise

Question Number : 71 Question Id : 8711121031 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The sensitivity of a voltmeter that uses 50 μA meter movement is

Options :

1. 200 kΩ/V

2. 500 kΩ/V

3. 50 kΩ/V

4. 20 kΩ/V

Question Number : 72 Question Id : 8711121032 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In which of the transformer is the secondary nearly short circuited under normal operating condition?

Options :

1. current transformer

2. potential transformer

3. distribution transformer

4. power Transformer

Question Number : 73 Question Id : 8711121033 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A permanent magnet moving coil type ammeter and moving iron type ammeter are connected in series in a resistive circuit fed from output of a half wave rectifier voltage source. If the moving iron instrument reads 5 A, the PMMC type instrument is likely to read

Options :

1. 0

2. 2.5 A

3. 3.18 A

4. 5 A

Question Number : 74 Question Id : 8711121034 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A digital voltmeter uses a 10 MHz clock and has a voltage controlled oscillator which provides a pulse width of 10 μs/volt of unit signal. 10 V of input signal would correspond to pulse count of

Options :

1. 500

2. 750

3. 1000

4. 1500

Question Number : 75 Question Id : 8711121035 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The maximum percentage quantization error for a 12 bit analog to digital converter is

Options :

1. ± 0.00076 %

2. ± 0.0122207 %

3. $\pm 3.125\ \%$

4. $\pm 4.17\ \%$

Question Number : 76 Question Id : 8711121036 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Wagner's earth devices used on AC bridge circuit for

Options :

1. Eliminating the effect of inter-component capacitances

2. Eliminating the effect of strong electrostatic fields

3. Shielding the bridge elements

4. Eliminating the effect of each capacitance.

Question Number : 77 Question Id : 8711121037 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A CRO can display

Options :

1. AC signals only

2. DC signals only

3. AC and DC signals

4. Time – invariant signals

Question Number : 78 Question Id : 8711121038 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Magnetostriction is the effect produced when a magnetic material is subjected to change of magnetization results due to change of _____.

Options :

1. permittivity

2. dimensions

3. permeability

4. temperature

Question Number : 79 Question Id : 8711121039 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A d.c voltmeter has a sensitivity of 1000 Ω/volt. When it measures half full scale in 100V range, the current through the voltmeter will be

Options :

1. 100 mA

2. 1 mA

3. 0.5 mA

4. 50 mA

Question Number : 80 Question Id : 8711121040 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Digital instruments have input impedance of the order of

Options :

1. few ohms

2. few tens of ohms

3. few mega ohms

4. few kilo ohms

Question Number : 81 Question Id : 8711121041 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In measurements made using a Q-meter, high impedance elements should preferably be connected in

Options :

1. star

2. delta

3. series

4. parallel

Question Number : 82 Question Id : 8711121042 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If a dynamometer type Wattmeter is connected in an AC circuit, the power indicated by the Wattmeter will be

Options :

1. Volt-Ampere product

2. average power

3. peak power

4. instantaneous power

Question Number : 83 Question Id : 8711121043 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The main advantage of using three OP-Amp instrumentation amplifier over a single OP-Amp differential amplifier lies on

Options :

1. higher value of CMRR

2. low noise figure

3. simplicity of gain adjustment

4. elimination of the need for accurate matching of resistance

Question Number : 84 Question Id : 8711121044 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In CRT aquadag carries

Options :

1. aqueous solution of graphite

2. sweep voltage

3. secondary emission electrons

4. phosphor material

Question Number : 85 Question Id : 8711121045 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Creeping in a single phase induction type energy meter may not be due to

Options :

1. over compensation for friction
2. over voltage
3. vibrations
4. over usage

Question Number : 86 Question Id : 8711121046 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

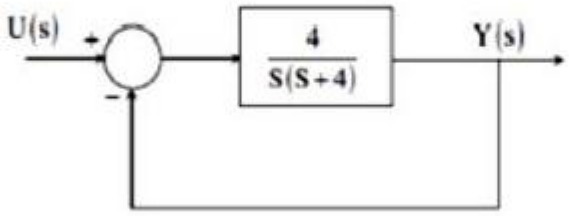
The gain margin of the system $G(s)H(s) = \frac{100}{s(s+10)^2}$ under closed loop unity negative feedback is _____.

Options :

1. 0 dB
2. 20 dB
3. 26 dB
4. 46 dB

Question Number : 87 Question Id : 8711121047 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For the second order closed-loop system shown in the figure, the natural frequency (in rad/s) is



Options :

1. 16
2. 4
3. 2
4. 1

Question Number : 88 Question Id : 8711121048 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The term hysteresis is associated with

Options :

1. ON-OFF control
2. P-I control
3. Ratio control
4. Feed-forward control

Question Number : 89 Question Id : 8711121049 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

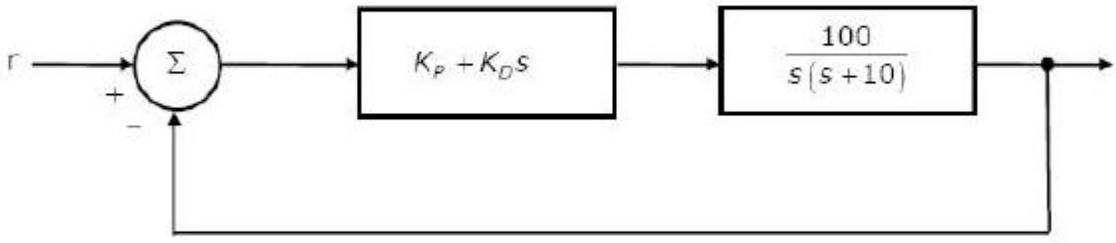
Flapper nozzle is used in a/an _____ controller.

Options :

1. pneumatic
2. hydraulic
3. electronic
4. fuzzy

Question Number : 90 Question Id : 8711121050 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A control system with a PD controller is shown in the figure.



If the velocity error constant $K_v = 1000$ and the damping ratio $\xi = 0.5$, then the values of K_p and K_D are

Options :

1. $K_p = 100, K_D = 0.09$
2. $K_p = 100, K_D = 0.9$
3. $K_p = 10, K_D = 0.09$

4. $K_p = 10, K_D = 0.9$

Question Number : 91 Question Id : 8711121051 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A PD controller is used to compensate a system. Compared to the uncompensated system, the compensated system has

Options :

1. a higher type number

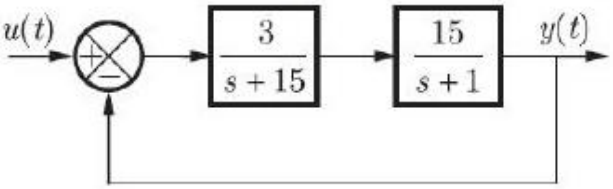
2. reduced damping

3. higher noise amplification

4. larger transient overshoot

Question Number : 92 Question Id : 8711121052 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The block diagram shown in figure gives a unity feedback closed loop control system. The steady state error in the response of the above system to unit step input is



Options :

1. 25%

2. 0.75 %

3. 6%

4. 33%

Question Number : 93 Question Id : 8711121053 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The steady state error of a first order system with gain K and time constant τ, when excited with a unit step change in input is

Options :

1. K

2. Zero

3. $1 - K$

4. $1 + K$

Question Number : 94 Question Id : 8711121054 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The evaluation criteria which furnishes error existing for longer time duration is _____.

Options :

1. IAE

2. ISE

3. ITAE

4. IE

Question Number : 95 Question Id : 8711121055 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Dead band in an ON-OFF controller is included to

Options :

1. minimize steady error rate

2. reduce chattering

3. increase speed of response

4. avoid saturation

Question Number : 96 Question Id : 8711121056 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The widely used "secondary controller" in a cascade control scheme is _____

Options :

1. high gain proportional controller

2. PI controller

3. PD controller

4. PID controller

Question Number : 97 Question Id : 8711121057 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The output of a derivative controller for an applied ramp input is

Options :

1. parabola

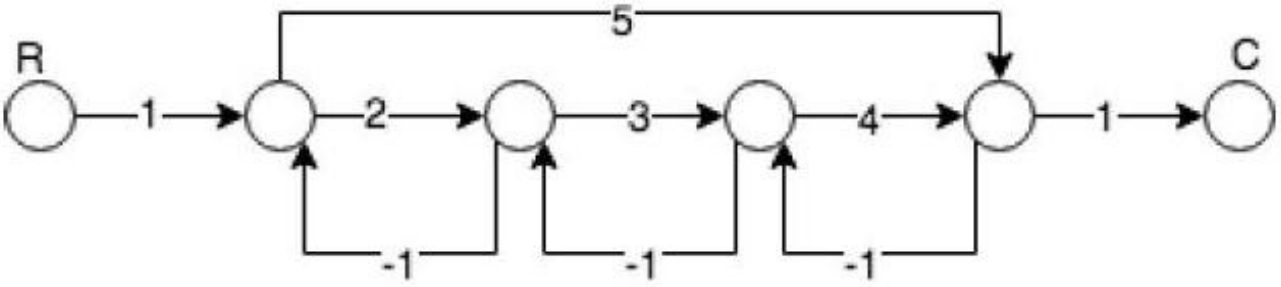
2. constant

3. impulse

4. hyperbola

Question Number : 98 Question Id : 8711121058 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In the signal flow graph of the figure given below, the gain $\frac{C}{R}$ will be



Options :

1. $\frac{11}{9}$

2. $\frac{22}{15}$

3. $\frac{24}{23}$

4. $\frac{44}{23}$

Question Number : 99 Question Id : 8711121059 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In the Bode-plot of a unity feedback control system, the value of phase of G(jw) at the given crossover frequency is $-125°$. The phase margins of the system is

Options :

1. $-125°$

2. $-55°$

3. $+55°$

4. $+125°$

Question Number : 100 Question Id : 8711121060 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The time constant of unity gain, first order plus time delay process is 5 minutes. If the phase lag at a frequency of 0.2 rad/min is 60°, then the dead time of the process in minutes is _____.

Options :

1. $\frac{\pi}{6}$

2. $\frac{\pi}{12}$

3. $\frac{\pi}{3}$

4. $\frac{5\pi}{12}$

Question Number : 101 Question Id : 8711121061 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The phase lead compensation is used to_____.

Options :

1. increase rise-time and decrease overshoot

2. decrease both rise-time and overshoot

3. increase both rise-time and overshoot

4. decrease rise-time and increase overshoot

Question Number : 102 Question Id : 8711121062 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If number of energy storage elements in a process is greater than 5, which type of control action is preferred?

Options :

1. P control

2. PI control

3. PD control

4. PID control

Question Number : 103 Question Id : 8711121063 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The transfer function of a phase lead compensator is given by $G(S)=\frac{(1+3TS)}{(1+TS)}$ where $T > 0$. What is the maximum phase shift provided by such a compensator?

Options :

1. 90°

2. 45°

3. 30°

4. 60°

Question Number : 104 Question Id : 8711121064 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Force balancing equation of a dashpot element (where x = displacement) is _____.

Options :

1. B d^2x/dt^2

2. B. dx/dt

3. B. x

4. B. x^2

Question Number : 105 Question Id : 8711121065 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Poles and zeros are arranged alternatively on negative real axis, then the type of network is/are

Options :

1. LC network

2. RC network only

3. RL network only

4. RC & RL networks

Question Number : 106 Question Id : 8711121066 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The low cost light source suitable for transmission across an air path is

Options :

1. Tungsten filament lamp

2. Laser diode

3. Light emitting diode

4. IR LED

Question Number : 107 Question Id : 8711121067 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a time-of-flight mass spectrometer if q is the charge and m is the mass of the ionized species, then the time of flight is proportional to

Options :

1. $\frac{\sqrt{m}}{\sqrt{q}}$

2. $\frac{\sqrt{q}}{\sqrt{m}}$

3. $\frac{m}{\sqrt{q}}$

4. $\frac{q}{\sqrt{m}}$

Question Number : 108 Question Id : 8711121068 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which one of these gases is of diamagnetic nature?

Options :

1. nitric oxide

2. nitrogen dioxide

3. oxygen

4. hydrogen

Question Number : 109 Question Id : 8711121069 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Clinicians who perform ultrasound-guided procedures often use a ____ to hold the ultrasonic transducer.

Options :

1. probe positioning system

2. hand position system

3. web guiding system

4. target guiding system

Question Number : 110 Question Id : 8711121070 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In _____ type of sensors, the fiber optic cable is only used to guide light to and from a conventional sensor.

Options :

1. Intrinsic

2. Extrinsic

3. Active

4. Passive

Question Number : 111 Question Id : 8711121071 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

X-ray electromagnetic radiation lie in the range of _____.

Options :

1. 2.5 µm to 25 µm

2. 400 mm to 70 mm

3. 0.1 mm to 9.0 mm

4. 10nm to 100 nm

Question Number : 112 Question Id : 8711121072 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The wavelength of IR radiation of interest to an analytical chemist trying to study organic moles fall between

Options :

1. 2 and 20 µm

2. 10 and 75 µm

3. 20 and 200 µm

4. 200 and 1000 µm

Question Number : 113 Question Id : 8711121073 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a spectrophotometer, the monochromator must be able to resolve two wavelengths 599.9 nm and 600.1 nm. The required resolution is

Options :

1. 3000

2. 2000

3. 1000

4. 5000

Question Number : 114 Question Id : 8711121074 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In CT scan, the acquisition of absorption information by scanning is continued until an angle of _____ has been swept.

Options :

1. 90°

2. 120°

3. 360°

4. 180°

Question Number : 115 Question Id : 8711121075 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If half-life of the radioactive Radon is 3.8 days, then time at the end of which $(1/20)^{th}$ of the Radon sample will remain un-decayed is

Options :

1. 3.5 days

2. 16.5 days

3. 33 days

4. 76 days

Question Number : 116 Question Id : 8711121076 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Source stability in spectrophotometer can be achieved by

Options :

1. constant voltage transformer

2. bridge rectifiers

3. silicon controlled rectifiers

4. FET amplifiers

Question Number : 117 Question Id : 8711121077 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Certain ultrasound machines are capable of Doppler ultrasound, a special ultrasound technique that evaluates blood flow through a blood vessel, including patient's major arteries and veins. Which of the following is not a type of Doppler ultrasound?

Options :

1. Colour Doppler

2. Power Doppler

3. Spectral Doppler

4. Phase Doppler

Question Number : 118 Question Id : 8711121078 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

When placed in a magnetic field, all the random spins of the nuclei _____.

Options :

1. stop

2. go in reverse direction

3. align with the magnetic field

4. rotate to 90° away from the induced field

Question Number : 119 Question Id : 8711121079 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

CMRR of an ECG amplifier when input impedance is 2 MΩ and difference of electrode skin contact at 1 kΩ is

Options :

1. 1000

2. 2000

3. 3000

4. 5000

Question Number : 120 Question Id : 8711121080 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If the voltage across an X-ray tube is doubled, then energy of the characteristic X-rays emitted by this tube will_____.

Options :

1. become double

2. become quadrupled

3. become half

4. remain the same