

# Andhra Pradesh State Council of Higher Education

## Notations :

- 1.Options shown in green color and with ✓ icon are correct.
- 2.Options shown in red color and with ✘ icon are incorrect.

<b>Question Paper Name :</b>	Instrumentation Engineering 30th April 2026 Shift 1
<b>Subject Name :</b>	Instrumentation Engineering
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<b>Total Marks :</b>	120
<b>Display Marks:</b>	No
<b>Change Font Color :</b>	No
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## Instrumentation Engineering

<b>Group Number :</b>	1
<b>Group Id :</b>	75207660
<b>Group Maximum Duration :</b>	0
<b>Group Minimum Duration :</b>	120
<b>Show Attended Group? :</b>	No
<b>Edit Attended Group? :</b>	No
<b>Break time :</b>	0
<b>Group Marks :</b>	120

# Instrumentation Engineering

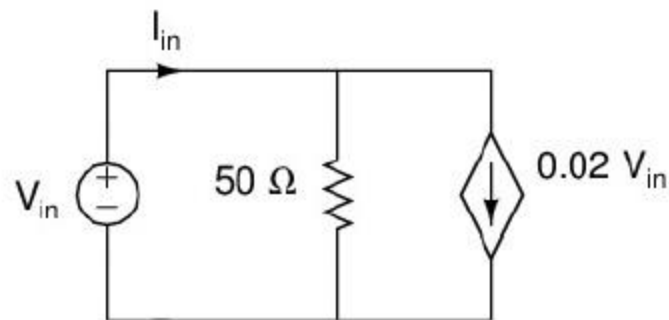
Section Id :	75207660
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	120
Number of Questions to be attempted :	120
Section Marks :	120
Section Negative Marks :	0
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	75207660
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 1 Question Id : 7520767081 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The input resistance  $\frac{V_{in}}{I_{in}}$  for the network

shown in the figure is



Options :

1. ✘  $1\ \Omega$

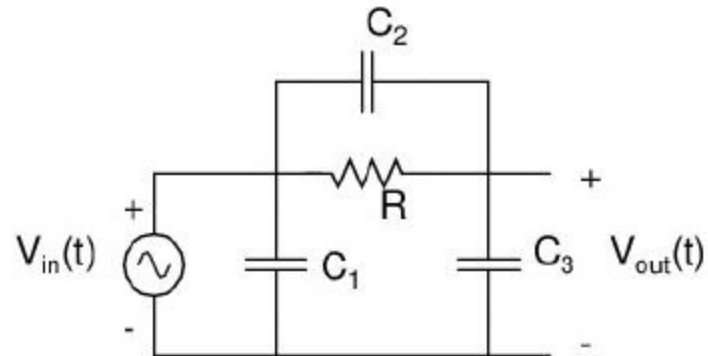
2. ✘  $500\Omega$

3. ✔  $25\Omega$

4. ✘  $50\Omega$

Question Number : 2 Question Id : 7520767082 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

The time constant (in sec.) for the network shown in the figure is



Options :

1. ✘  $RC_3$

2. ✘  $R[C_1+C_2+C_3]$

3. ✘  $R[C_1+C_3]$

4. ✓  $R[C_2+C_3]$

Question Number : 3 Question Id : 7520767083 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The unit of reactive power is

Options :

1. ✗ Watt

2. ✗ Ampere

3. ✗ Volt

4. ✓ VAR

Question Number : 4 Question Id : 7520767084 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A circuit which resonates at 1 MHz has Q of 100. Bandwidth between half-power point is

Options :

1. ✓ 10 KHz

2. ✘ 100 KHz

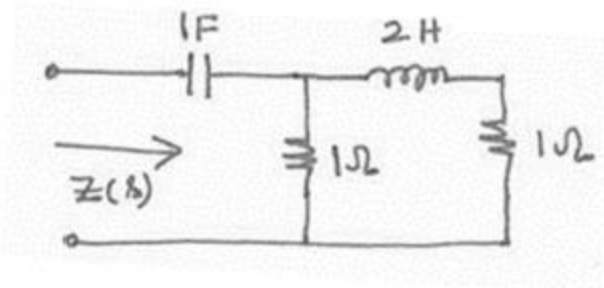
3. ✘ 10 Hz

4. ✘ 100 Hz

Question Number : 5 Question Id : 7520767085 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Find the value of  $Z(s)$  in the figure



Options :

1. ✔  $\frac{s^2 + 1.5s + 1}{s(s + 1)}$

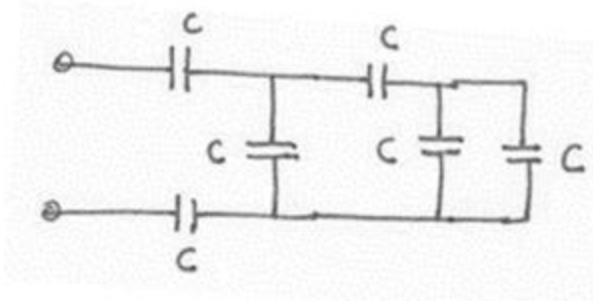
2. ✘  $\frac{s^2 + 3s + 1}{s(s + 1)}$

3. ✘  $\frac{2s^2 + 3s + 2}{s(s + 1)}$

4. ✘ 
$$\frac{2s^2 + 3s + 1}{2s(s + 1)}$$

Question Number : 6 Question Id : 7520767086 Question Type : MCQ  
 Correct Marks : 1 Wrong Marks : 0

The equivalent capacitance for the network shown in the figure is

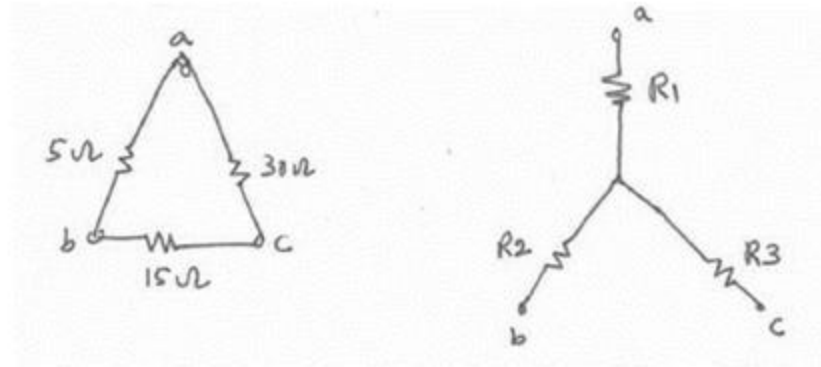


Options :

- 1. ✘ C/4
- 2. ✔ 5C/13
- 3. ✘ 5C/2
- 4. ✘ 3C

Question Number : 7 Question Id : 7520767087 Question Type : MCQ  
 Correct Marks : 1 Wrong Marks : 0

A delta connected network with its wyes equivalent is shown in the figure. The resistances  $R_1$ ,  $R_2$  and  $R_3$  (in ohm) are respectively

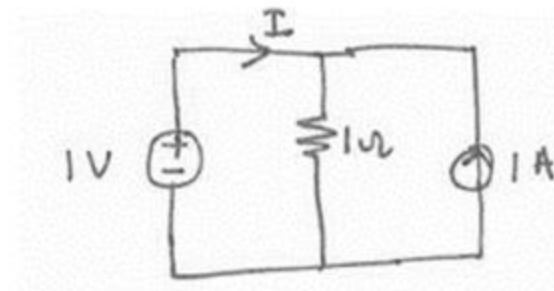


Options :

1. ✘ 1.5, 3 and 9
2. ✘ 3, 9 and 1.5
3. ✘ 9, 3 and 1.5
4. ✔ 3, 1.5 and 9

Question Number : 8 Question Id : 7520767088 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

The current  $I$  supplied by the DC voltage source in the circuit shown in the figure is \_\_\_\_\_



Options :

1. ✓ zero
2. ✗ 0.5 A
3. ✗ 1A
4. ✗ 2A

Question Number : 9 Question Id : 7520767089 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A particular band-pass function has a network function as

$$H(s) = \frac{3s}{s^2 + 4s + 3} \text{ then its quality factor } Q \text{ is defined by}$$

Options :

1. ✓  $\sqrt{3}/4$
2. ✗  $2/\sqrt{3}$
3. ✗  $\sqrt{3}/2$

4. ✘  $4/\sqrt{3}$

Question Number : 10 Question Id : 7520767090 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following statements is true with respect to effective mass of an electron in a semiconductor lattice?

Options :

1. ✘ Inversely related to the curvature of E-k diagram and directly related to bandwidth
2. ✔ Inversely related to both the curvature of E-k diagram and bandwidth
3. ✘ Directly related to the curvature of E-k diagram and inversely related to bandwidth
4. ✘ Directly related to both the curvature of E-k diagram and bandwidth

Question Number : 11 Question Id : 7520767091 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

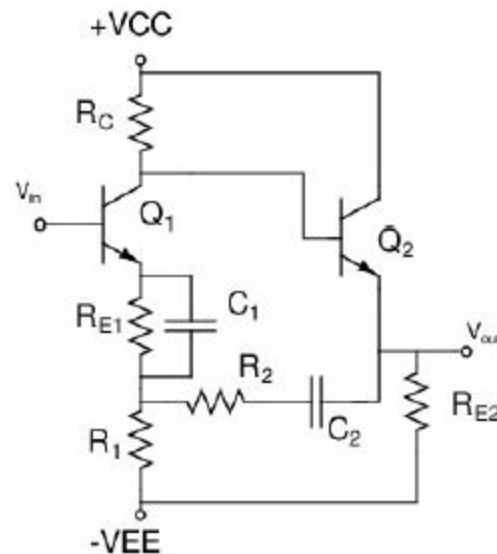
The avalanche breakdown voltage of a *p-n* junction:

Options :

1. ✘ Increases with increase in doping and also with increase in band gap
2. ✔ Decreases with increase in doping and also with decrease in band gap
3. ✘ Increases with decrease in band gap and also with increase in doping
4. ✘ Decreases with increase in band gap and also with increase in doping

Question Number : 12 Question Id : 7520767092 Question Type : MCQ  
 Correct Marks : 1 Wrong Marks : 0

For a negative feedback amplifier as shown in the figure, the type of feedback present in the circuit is

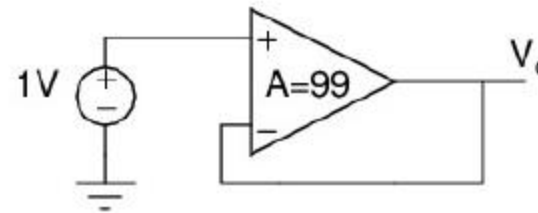


Options :

1. ✓ Series-Shunt feedback
2. ✗ Series-Series feedback
3. ✗ Shunt-Shunt feedback
4. ✗ Shunt-Series feedback

Question Number : 13 Question Id : 7520767093 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

A voltage follower is as shown in figure. Given that the open loop gain of an op-amp ( $A = 99$ ), then what is the value of the output voltage  $V_o$ . Assume that the op-amp is ideal except that it is having a finite open loop gain.



Options :

1. ✗ 1V
2. ✗ 0.09V

3. ✓ 0.99V

4. ✘ 0.9V

**Question Number : 14 Question Id : 7520767094 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

The average value of a half wave rectified sinusoidal voltage with peak amplitude 10 Volts is

**Options :**

1. ✘  $\frac{20}{\pi}$  Volts

2. ✓  $\frac{10}{\pi}$  Volts

3. ✘ 0 Volts

4. ✘  $\frac{12}{\pi}$  Volts

**Question Number : 15 Question Id : 7520767095 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

In a common emitter amplifier, which one of the following statement is TRUE?

Options :

In a mid-band region, the coupling capacitors and junction capacitances are short circuited.

1. ✘

In a mid-band region, the coupling capacitors are open circuited and junction capacitances are short circuited.

2. ✘

In a mid-band region, the coupling capacitors are short circuited and junction capacitances are open circuited.

3. ✔

In a mid-band region, the coupling capacitors and junction capacitances are open circuited.

4. ✘

Question Number : 16 Question Id : 7520767096 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following statement is incorrect in a series-series feedback?

Options :

Closed loop input impedance increases

1. ✘

2. ✘ Closed loop output impedance increases

3. ✔ It is trans-resistance amplifier

4. ✘ Input is voltage

**Question Number : 17 Question Id : 7520767097 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0**

The capacitance, in force-current analogy, is analogous to

**Options :**

1. ✘ momentum

2. ✘ velocity

3. ✘ displacement

4. ✔ mass

**Question Number : 18 Question Id : 7520767098 Question Type : MCQ**

Correct Marks : 1 Wrong Marks : 0

The gain margin of a system can be determined from the gain at

Options :

1. ✖ 0 dB
2. ✖ 3 dB
3. ✖ Gain crossover frequency
4. ✔ Phase crossover frequency

Question Number : 19 Question Id : 7520767099 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Phase margin of a system is used to specify which of the following?

Options :

1. ✖ Frequency response
2. ✖ Absolute stability

3. ✓ Relative stability

4. ✗ Time response

**Question Number : 20 Question Id : 7520767100 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0**

For overdamped systems, the closed loop poles are

**Options :**

1. ✗ real and equal.

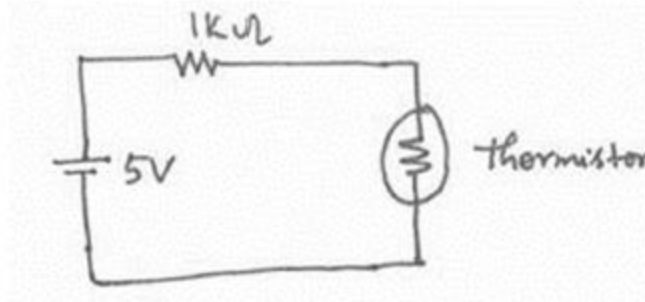
2. ✓ real and distinct.

3. ✗ purely imaginary.

4. ✗ complex conjugate.

**Question Number : 21 Question Id : 7520767101 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0**

A thermistor has a resistance of  $10\text{k}\Omega$  at  $25^\circ\text{C}$  and  $1\text{k}\Omega$  at  $100^\circ\text{C}$ . The range of operation of is  $0^\circ\text{C}$  to  $150^\circ\text{C}$ . The excitation voltage is  $5\text{V}$  and a series resistance of  $1\text{k}\Omega$  is connected to the thermistor. The power dissipated in the thermistor is



Options :

1. ✘ 4.0 mW
2. ✘ 4.7 mW
3. ✔ 5.5 mW
4. ✘ 6.1 mW

Question Number : 22 Question Id : 7520767102 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

Thermoelectric cooler works on the principle of

Options :

1. ✘ Hall effect
2. ✘ Seebeck effect
3. ✘ Piezoelectric effect
4. ✔ Peltier effect

**Question Number : 23 Question Id : 7520767103 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

A resistance potentiometer is:

**Options :**

1. ✔ Zero order element
2. ✘ First order element
3. ✘ Second order element
4. ✘ Third order element

Question Number : 24 Question Id : 7520767104 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The minimum value of input which is necessary to cause a detectable change from zero output is called:

Options :

1. ✘ least count

2. ✔ resolution

3. ✘ threshold

4. ✘ drift

Question Number : 25 Question Id : 7520767105 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A strain gauge has a nominal resistance of  $600\Omega$  and a gauge factor of 2.5. The strain gauge is connected in a DC bridge with three other resistances of  $600\Omega$  each. The bridge is excited by a 4V battery. If the strain gauge is subjected to a strain of  $1\mu\text{m/m}$ , the magnitude of the bridge output will be

Options :

1. ✘ zero
2. ✔ 2.50  $\mu\text{V}$
3. ✘ 500  $\mu\text{V}$
4. ✘ 750  $\mu\text{V}$

Question Number : 26 Question Id : 7520767106 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

A resistance potentiometer has a total resistance of  $10000\Omega$  and is rated 4W. If the range of the potentiometer is 0 to 100 mm, then its sensitivity in V/mm is:

Options :

1. ✘ 1.0
2. ✔ 2.0
3. ✘ 2.5

4. ✘ 25

**Question Number : 27 Question Id : 7520767107 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

A Pirani gauge measures vacuum pressure and works on the principle of

**Options :**

1. ✘ change in ionizing potential
2. ✔ change in thermal conductivity
3. ✘ deformation of elastic body
4. ✘ change of self-inductance

**Question Number : 28 Question Id : 7520767108 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

A McLeod gauge having volume of bulbs and mercury capillary,  $V = 100 \times 10^{-6} \text{m}^3$  and the diameter of measuring capillary is 1mm. For the reading of 60 mm, the pressure will be

Options :

1. ✘ 14 $\mu\text{m}$
2. ✔ 28  $\mu\text{m}$
3. ✘ 42  $\mu\text{m}$
4. ✘ 56  $\mu\text{m}$

Question Number : 29 Question Id : 7520767109 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The devices which are used for the measurement of very high temperature are

Options :

1. ✘ thermistors
2. ✘ thermocouples
3. ✔ pyrometers

## RTDs

4. ✘

Question Number : 30 Question Id : 7520767110 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

For the two-port network shown in figure, The voltages and currents are given by a relation  $V_1 = 2I_1 + I_2$  and  $V_2 = I_1 + I_2$ . The admittance matrix [ Y ] of this network is



Options :

1. ✔ 
$$\begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$$

2. ✘ 
$$\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$$

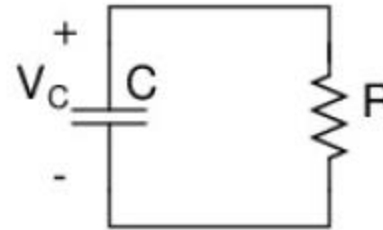
3. ✘ 
$$\begin{bmatrix} 2 & -1 \\ -1 & 1 \end{bmatrix}$$

4. ✘ 
$$\begin{bmatrix} -1 & -1 \\ -1 & 2 \end{bmatrix}$$

Question Number : 31 Question Id : 7520767111 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

Given the initial voltage in a capacitor C is

$V_C(0) = 5V$ ,  $R=10K\Omega$  and  $C=1\mu F$ . For the network shown in the figure, the value of  $V_C(t)$  at time  $t=\infty$  is:

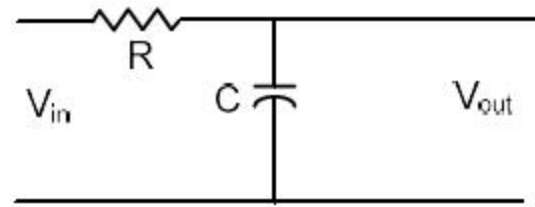


Options :

- 1. ✘ 0.13 V
- 2. ✔ 0 V
- 3. ✘ 2.5 V
- 4. ✘ 5 V

Question Number : 32 Question Id : 7520767112 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

The transfer function of the circuit as shown in the figure is expressed as



Options :

1. ✘  $\frac{R}{1 + sRC}$

2. ✘  $\frac{s}{1 + sRC}$

3. ✔  $\frac{1}{1 + sRC}$

4. ✘  $\frac{C}{1 + sRC}$

Question Number : 33 Question Id : 7520767113 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The derivative of a parabolic function becomes

Options :

1. ✘ unit-impulse function
2. ✔ ramp function
3. ✘ gate function
4. ✘ triangular function

Question Number : 34 Question Id : 7520767114 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

If the phase margin of a system is zero degrees, then the system is

Options :

1. ✘ stable.
2. ✘ unstable.
3. ✔ marginally stable.
4. ✘ conditionally stable.

Question Number : 35 Question Id : 7520767115 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

If the open loop transfer function of a system is  $G(s)H(s) = \frac{K(s+1)}{s(s+3)(s+4)}$  then its

centroid is:

Options :

1. ✓ (-3, 0)
2. ✗ (-3.5, 0)
3. ✗ (-2, 0)
4. ✗ (-4, 0)

Question Number : 36 Question Id : 7520767116 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which one of the following statements is True?

Options :

1. ✓ The number of sign changes present in the first column of Routh Array shows the number of poles of the closed loop system in the right half of S plane.

2. ✘ The number of sign changes present in the first column of Routh Array shows the number of zeros of the closed loop system in the right half of S plane.

3. ✘ The number of sign changes present in the first column of Routh Array shows the number of zeros of the open loop system in the right half of S plane.

4. ✘ The number of sign changes present in the first column of Routh Array shows the number of poles of the open loop system in the right half of S plane.

**Question Number : 37 Question Id : 7520767117 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

For critically damped system, the value of the damping ratio  $\zeta$  is:

**Options :**

1. ✘ 0

2. ✘  $>1$

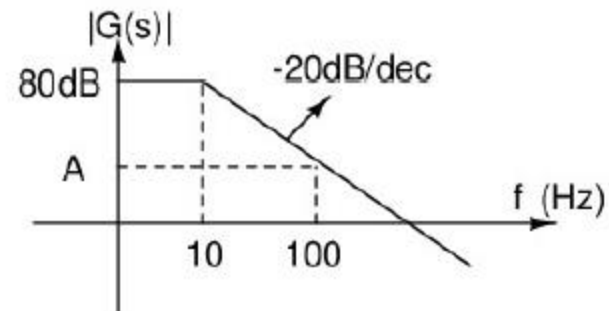
3. ✘  $<1$

4. ✔ 1

Question Number : 38 Question Id : 7520767118 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A Bode plot of a transfer function  $G(s)$  is shown in the figure. The gain 'A' in dB at frequency  $f = 100\text{Hz}$  is:



Options :

1. ✘ -20dB/dec
2. ✔ +60dB/dec
3. ✘ +40dB/dec
4. ✘ +40dB/dec

Question Number : 39 Question Id : 7520767119 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

If the negative feedback system is marginally stable, then the location of closed loop poles will be

Options :

1. ✘ in the right half of s-plane.
2. ✘ in the left half of s-plane.
3. ✔ on the Imaginary axis.
4. ✘ on the real axis.

Question Number : 40 Question Id : 7520767120 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A unit step input is applied to the negative feedback system whose closed loop transfer function is  $\frac{63}{S^2 + 4.8S + 9}$ , then the steady state value of the output is

Options :

1. ✔ 7
2. ✘ 1
3. ✘ 63
4. ✘ 9

Question Number : 41 Question Id : 7520767121 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The minimum number of NOR gates required to implement  $A(A+B)(A+B+C)$  is equal to

Options :

1. ✓ zero
2. ✗ 3
3. ✗ 4
4. ✗ 7

Question Number : 42 Question Id : 7520767122 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which has the highest fan-out?

Options :

1. ✓ TTL standard
2. ✗ ECL

3. ✘ Schottky TTL

4. ✘ CMOS+

Question Number : 43 Question Id : 7520767123 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

Identify the logic gate family, which is slowest among the given logic?

Options :

1. ✘ ECL

2. ✘ TTL

3. ✔ CMOS

4. ✘ I<sup>2</sup>L

Question Number : 44 Question Id : 7520767124 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

The advantage of using dual slope ADC in a digital voltmeter is that

Options :

1. ✘ its conversion time is small
2. ✔ its accuracy is high
3. ✘ it gives output in BCD format
4. ✘ it does not require a comparator

**Question Number : 45 Question Id : 7520767125 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

A 10-bit A/D converter is used to digitize an analog voltage signal in 0 - 5V range. The maximum peak to peak ripple voltage that can be allowed in DC voltage is

**Options :**

1. ✘ nearly 100 mV
2. ✘ nearly 50 mV
3. ✘ nearly 25 mV

4. ✓ nearly 5 mV

**Question Number : 46 Question Id : 7520767126 Question Type : MCQ**  
**Correct Marks : 1 Wrong Marks : 0**

What is size of bit addressable memory in 8051 microcontroller?

**Options :**

1. ✓ 16 bytes

2. ✗ 32 bytes

3. ✗ 64 bytes

4. ✗ 128 bytes

**Question Number : 47 Question Id : 7520767127 Question Type : MCQ**  
**Correct Marks : 1 Wrong Marks : 0**

How many special function registers are there in 8051 microcontroller?

**Options :**

1. ✗ 5

- 2. ✘ 8
- 3. ✘ 10
- 4. ✔ 20

**Question Number : 48 Question Id : 7520767128 Question Type : MCQ**  
**Correct Marks : 1 Wrong Marks : 0**

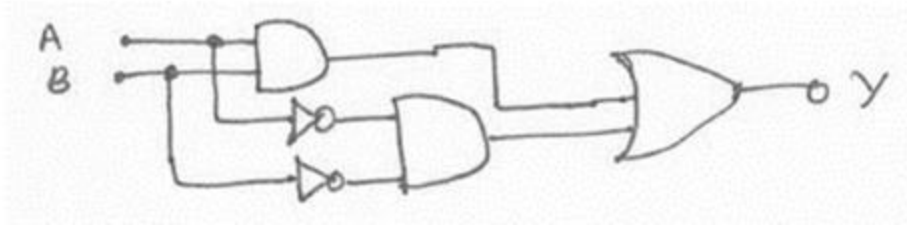
The number of comparators required in an 8-bit flash-type A/D converter is

**Options :**

- 1. ✘ 8
- 2. ✘ 7
- 3. ✘ 256
- 4. ✔ 255

**Question Number : 49 Question Id : 7520767129 Question Type : MCQ**  
**Correct Marks : 1 Wrong Marks : 0**

The logic circuit shown in the figure is



Options :

1. ✘ half adder
2. ✘ XOR
3. ✔ equality detector
4. ✘ full adder

Question Number : 50 Question Id : 7520767130 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A digital voltmeter uses a 10MHz clock and has a voltage controlled generator which provides a width of  $10\mu\text{s}$  per volt of unit signal. 10V of input signal would corresponds to a pulse count of

Options :

1. ✘ 1500
2. ✘ 750
3. ✔ 1000
4. ✘ 500

Question Number : 51 Question Id : 7520767131 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

The period of signal  $x(t) = 10\sin 5t - 4\cos 9t$  is

Options :

1. ✘  $24\pi/35$
2. ✘  $4\pi/35$
3. ✔  $2\pi$
4. ✘ not periodic

Question Number : 52 Question Id : 7520767132 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The Fourier transform of signal  $\delta(t+1) + \delta(t-1)$  is

Options :

1. ✘  $2/(1 + j\omega)$

2. ✘  $2/(1 - j\omega)$

3. ✔  $2\cos \omega$

4. ✘  $\cos \omega$

Question Number : 53 Question Id : 7520767133 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The output of two digital filters can be added or the same effect can be achieved by

Options :

1. ✔ adding their coefficients

2. ✘ subtracting their coefficients

3. ✘ Convolvering their coefficients

4. ✘ averaging their coefficients and then using Blackman window

Question Number : 54 Question Id : 7520767134 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following pulse modulation is analog?

Options :

1. ✘ PCM

2. ✘ Differential PCM

3. ✔ PWM

4. ✘ Delta

Question Number : 55 Question Id : 7520767135 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The root mean squared value of  $x(t) = 3 + 2\sin(t)\cos(2t)$  is

Options :

1. ✘  $\sqrt{3}$

2. ✘  $\sqrt{8}$

3. ✘  $\sqrt{10}$

4. ✔  $\sqrt{11}$

Question Number : 56 Question Id : 7520767136 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A PLL can be used to modulate

Options :

1. ✘ PAM signals
2. ✘ PCM signals
3. ✔ FM signals
4. ✘ DSB-SC signals

Question Number : 57 Question Id : 7520767137 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The full scale deflection current of an ammeter is 1mA and its internal resistance is  $100\Omega$ . If this meter is to have full deflection of 5A, what is the value of the shunt resistance to be used?

Options :

1. ✘  $49.99\Omega$

2. ✓  $1/49.99\Omega$

3. ✗  $1\Omega$

4. ✗  $2\Omega$

**Question Number : 58 Question Id : 7520767138 Question Type : MCQ**  
**Correct Marks : 1 Wrong Marks : 0**

Low resistance is measured by

**Options :**

1. ✗ De-Sauty's bridge

2. ✗ Maxwell's bridge

3. ✓ Kelvin's double bridge

4. ✗ Wein's bridge

**Question Number : 59 Question Id : 7520767139 Question Type : MCQ**

Correct Marks : 1 Wrong Marks : 0

X and Y plates of a CRO are connected to unequal voltages of equal frequency with phase of  $90^\circ$ . The Lissajous figure on the screen will be

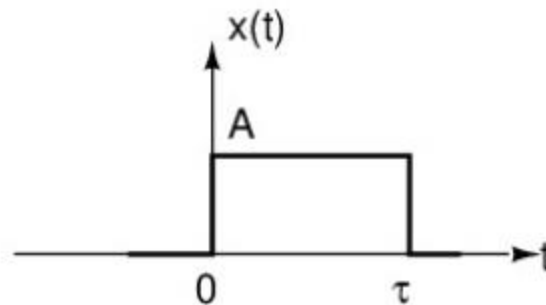
Options :

1. ✘ circle
2. ✘ straight line
3. ✔ ellipse
4. ✘ figure of 8

Question Number : 60 Question Id : 7520767140 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The Fourier transform of the continuous time signal  $x(t)$  as shown in the figure is



Options :

1. ✘  $e^{-j2\pi ft} A\tau \text{sinc}(f\tau)$

2. ✔  $e^{-j\pi ft} A\tau \text{sinc}(f\tau)$

3. ✘  $e^{j\pi ft} 2A\tau \text{sinc}(f\tau)$

4. ✘  $e^{j\pi ft} A\tau \text{sinc}(f\tau)$

Question Number : 61 Question Id : 7520767141 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

The z-transform of the discrete time signal  $x(n) = u(-n)$  is

Options :

1. ✘  $\frac{1}{1-z}, \text{ROC: } |z| > 1$

2. ✘  $\frac{1}{z-1}, \text{ROC: } |z| > 1$

3. ✘  $\frac{1}{z-1}$ , ROC:  $|z| < 1$

4. ✔  $\frac{1}{1-z}$ , ROC:  $|z| < 1$

Question Number : 62 Question Id : 7520767142 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The z-transform of the discrete time signal  $x(n) = u(n) * u(n)$  with ‘\*’ being convolution is

Options :

1. ✘  $\frac{1}{[1-z^{-1}]^2}$ , ROC:  $|z| < 1$

2. ✔  $\frac{1}{[1-z^{-1}]^2}$ , ROC:  $|z| > 1$

3. ✘  $\frac{1}{[1-z]^2}$ , ROC:  $|z| > 1$

$$\frac{1}{[1-z]^2}, \text{ ROC: } |z| < 1$$

4. ✖

Question Number : 63 Question Id : 7520767143 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

If DTFT of  $x_1(n)$  is  $X_1(\omega)$ , then the DTFT of the signal  $x_2(n) = nx_1(n)$  is

Options :

$$-\frac{d}{d\omega} X_1(\omega)$$

1. ✖

$$-j \frac{d}{d\omega} X_1(\omega)$$

2. ✖

$$j \frac{d}{d\omega} X_1(\omega)$$

3. ✔

$$\frac{d}{d\omega} X_1(\omega)$$

4. ✖

Question Number : 64 Question Id : 7520767144 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In order to compute an N-point DFT, the number of complex multiplications and complex additions required respectively are

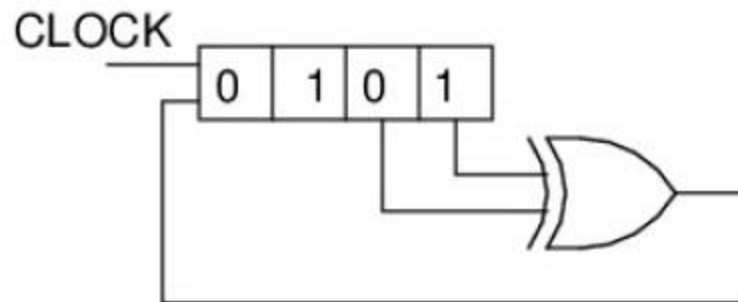
Options :

1. ✘  $N^2$  complex multiplications and  $(N^2-1)$  complex additions.
2. ✔  $N^2$  complex multiplications and  $(N^2-N)$  complex additions.
3. ✘  $N^2$  complex multiplications and  $N^2$  complex additions.
4. ✘  $\frac{N}{2} \log_2 N$  complex multiplications and  $N \log_2 N$  complex additions

Question Number : 65 Question Id : 7520767145 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The initial contents of the 4-bit Serial in parallel out, right shift, shift register shown in figure is 0101. After three clock pulses, the contents of the shift register will be



**Options :**

1. ✓ 1110
2. ✗ 1100
3. ✗ 0110
4. ✗ 1010

**Question Number : 66 Question Id : 7520767146 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

Minimum number of comparators required to implement 6-bit flash ADC

**Options :**

1. ✓ 63
2. ✗ 31
3. ✗ 127
4. ✗ 65

Question Number : 67 Question Id : 7520767147 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Minimum number of 2-input NAND gates required to implement XOR is

Options :

1. ✘ 3

2. ✔ 4

3. ✘ 5

4. ✘ 6

Question Number : 68 Question Id : 7520767148 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which logic family has lowest power dissipation?

Options :

1. ✘ RTL

2. ✘ DTL

3. ✘ TTL

4. ✓ CMOS

Question Number : 69 Question Id : 7520767149 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The 8-bit signed 2's complement representation of -26 is

Options :

1. ✗ 01100110

2. ✗ 11100101

3. ✓ 11100110

4. ✗ 01100101

Question Number : 70 Question Id : 7520767150 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A spectrophotometer is used to measure the concentration of a molecule in a solution based on Beer's law using cuvette of path length 10mm and detectable absorbance of 0.01. The molar absorptivity of the solution is  $10^4$  l/mol-m. The minimum concentration of the solution that can be detected is

Options :

1. ✓  $1 \mu\text{mol/l}$
2. ✗  $24 \mu\text{mol/l}$
3. ✗  $5 \mu\text{mol/l}$
4. ✗  $10 \mu\text{mol/l}$

Question Number : 71 Question Id : 7520767151 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

An experiment was carried out twice using magnetic deflection type mass-spectrometer to estimate a certain molecule present in the compound under test. In the first test, the sample was excited and the potential difference between the accelerating plate was kept at 1000 V and in the second case, the potential difference was at 10000 V. Determine the ratio of the radius of curvature of the circular path travelled by the ions when they pass through the magnetic field oriented right angle to their motion in the test to that of the second

Options :

1. ✓  $1/\sqrt{10}$

2. ✘  $1/10$

3. ✘  $\sqrt{10}$

4. ✘ 10

**Question Number : 72 Question Id : 7520767152 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

X- ray electromagnetic radiation lies in the range

**Options :**

1. ✘ 2.5  $\mu\text{m}$  to 25  $\mu\text{m}$

2. ✘ 400 nm to 800 nm

3. ✔ 0.1 nm to 1 nm

4. ✘ 10 nm to 100 nm

**Question Number : 73 Question Id : 7520767153 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

In a spectrophotometer, the monochromator must be able to resolve two wavelengths 599.0nm and 600.1nm. The required resolution is

Options :

1. ✘ 100
2. ✘ 500
3. ✘ 1000
4. ✔ 3000

Question Number : 74 Question Id : 7520767154 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

Light appears to travel in straight lines, since

Options :

1. ✘ it is not absorbed by the atmosphere
2. ✘ it is reflected by the atmosphere
3. ✔ its wavelength is very small

4. ✘ its velocity is very large

Question Number : 75 Question Id : 7520767155 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The Refractive Index (RI) of the glass and water is 1.5 and 1.33 respectively. If the glass is immersed in water, its refractive index is

Options :

1. ✘ 0.89

2. ✔ 1.13

3. ✘ 1.99

4. ✘ 2.83

Question Number : 76 Question Id : 7520767156 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Find the distance between two successive position of the movable mirror of the Michelson interferometer giving best fringes in the case of sodium source with lines of  $\lambda=5890\text{\AA}$  and  $5896\text{\AA}$

Options :

1. ✘ 280 nm
2. ✘ 282 nm
3. ✘ 308 nm
4. ✔ 289 nm

**Question Number : 77 Question Id : 7520767157 Question Type : MCQ**  
**Correct Marks : 1 Wrong Marks : 0**

Which of the following type of image is produced by a CT scan machine?

**Options :**

1. ✘ 1-D image only
2. ✘ 1-D and 2-D images only
3. ✔ 2-D and 3-D images only
4. ✘ 1-D, 2-D and 3-D images

**Question Number : 78 Question Id : 7520767158 Question Type : MCQ**

Correct Marks : 1 Wrong Marks : 0

In an electromagnetic blood flow meter, the induced voltage is directly proportional to the

Options :

1. ✓ blood flow rate
2. ✗ square root of blood flow rate
3. ✗ square of blood flow rate
4. ✗ logarithm of the blood flow rate

Question Number : 79 Question Id : 7520767159 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Cardiac output is

Options :

1. ✗ the amount of air pumped by lungs per minute
2. ✗ the amount of air pumped by lungs per second
3. ✓ the amount of blood delivered by the heart to the aorta per minute

4. ✘ the amount of blood delivered by the heart to the aorta per second

Question Number : 80 Question Id : 7520767160 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

For a blood sample, 15 g of Hb is present per deciliter (dl) of the blood and there are  $5 \times 10^{12}$  RBCs per liter of the blood. The mean cell haemoglobin is

Options :

1. ✘ 29 pg

2. ✔ 30 pg

3. ✘ 39 pg

4. ✘ 60 pg

Question Number : 81 Question Id : 7520767161 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A step index fibre has core diameter  $40\mu\text{m}$  with core refractive index of 1.3 and numerical aperture 0.5, then the refractive index of cladding is

Options :

1. ✓ 1.2

2. ✗ 1.1

3. ✗ 0.9

4. ✗ 0.8

**Question Number : 82 Question Id : 7520767162 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0**

Optical sensors used for the displacement measurement works on the principle:

**Options :**

1. ✗ Intensity of light increases with distance

2. ✓ Intensity of light decreases with distance

3. ✗ Intensity of light remains constant with distance

4. ✗ Intensity of light increases with time

**Question Number : 83 Question Id : 7520767163 Question Type : MCQ**

Correct Marks : 1 Wrong Marks : 0

The ionization gauge is an instrument used for the measurement of

Options :

1. ✓ Vacuum pressure
2. ✗ Medium pressure
3. ✗ High pressure
4. ✗ Very high pressure

Question Number : 84 Question Id : 7520767164 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The displacement measuring instruments is

Options :

1. ✗ thermocouple
2. ✓ LVDT
3. ✗ RTD

4. ✖ Thermistor

Question Number : 85 Question Id : 7520767165 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

What is the output of a thermocouple?

Options :

1. ✔ Voltage

2. ✖ Current

3. ✖ Resistance

4. ✖ Change in capacitance

Question Number : 86 Question Id : 7520767166 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following instruments indicate the instantaneous value of the electrical quantity being measured at the time at which it is being measured?

Options :

1. ✘ Absolute instruments
2. ✔ Indicating instruments
3. ✘ Recording instruments
4. ✘ Integrating instruments

**Question Number : 87 Question Id : 7520767167 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

Feed forward control can be used only:

**Options :**

1. ✔ If the disturbance variable is measured
2. ✘ If the disturbance variable is manipulated
3. ✘ If the disturbance variable is ignored
4. ✘ If a regulatory control is needed

Question Number : 88 Question Id : 7520767168 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A pneumatic actuator converts:

Options :

1. ✘ The pneumatic signal into electrical signal
2. ✔ The pneumatic signal into position
3. ✘ The pneumatic signal into pressure
4. ✘ The electrical signal into pneumatic signal

Question Number : 89 Question Id : 7520767169 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

I/P Converter converts:

Options :

1. ✔ (4-20)mA to (3-15)psi
2. ✘ (0-20)mA to (3-15)psi

3. ✘ (4-20)mV to (3-15)psi

4. ✘ (0-20)mV to (3-15)psi

**Question Number : 90 Question Id : 7520767170 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

If Proportional band(PB) increases then,  $K_p$

**Options :**

1. ✘ increases

2. ✔ decreases

3. ✘ constant

4. ✘ PB and  $K_p$  are not related

**Question Number : 91 Question Id : 7520767171 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

Principle of radiation pyrometer is based on

**Options :**

1. ✘ Kirchoff's law
2. ✘ Seeback Effect
3. ✔ Stefan Boltzman law
4. ✘ Peltier effect

**Question Number : 92 Question Id : 7520767172 Question Type : MCQ**  
**Correct Marks : 1 Wrong Marks : 0**

Load cells are used for the measurement of

**Options :**

1. ✔ weight
2. ✘ stress
3. ✘ strain
4. ✘ pressure

**Question Number : 93 Question Id : 7520767173 Question Type : MCQ**

Correct Marks : 1 Wrong Marks : 0

PH meter has

Options :

1. ✘ one cell
2. ✔ two cells
3. ✘ three cells
4. ✘ no cell

Question Number : 94 Question Id : 7520767174 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which is the most suitable instrument to calibrate the pressure gauges?

Options :

1. ✘ Ionization guage
2. ✘ Bourdon Guage
3. ✘ Mc Leod guage

4. ✓ Dead weight tester

Question Number : 95 Question Id : 7520767175 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which thermocouple can be used to measure 1500<sup>0</sup>C temperature?

Options :

1. ✗ Copper constaton

2. ✗ Chromel alumel

3. ✓ Platinum rhodium

4. ✗ Iron constanton

Question Number : 96 Question Id : 7520767176 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

PPG is used to measure

Options :

1. ✓ pulse rate

2. ✘ ECG

3. ✘ lung volume

4. ✘ EEG

**Question Number : 97 Question Id : 7520767177 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

Zirconia analyzer is used to measure

**Options :**

1. ✔ oxygen

2. ✘ nitrogen

3. ✘ CO

4. ✘ carbon dioxide

**Question Number : 98 Question Id : 7520767178 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

Which device is used to isolate the radiation of the desired wavelength from wavelength of the continuous spectra?

Options :

1. ✘ source
2. ✘ detector
3. ✔ monochromator
4. ✘ isolator

Question Number : 99 Question Id : 7520767179 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

What is the principle of IR spectroscopy?

Options :

1. ✔ absorption
2. ✘ emission

3. ✘ adsorption

4. ✘ AAS

**Question Number : 100 Question Id : 7520767180 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

To avoid cavitation the valve should be designed such that

**Options :**

1. ✘ high pressure recovery characteristics with high  $F_L$  and  $K_C$

2. ✘ high pressure recovery characteristics with low  $F_L$  and  $K_C$

3. ✔ low pressure recovery characteristics with high  $F_L$  and  $K_C$

4. ✘ low pressure recovery characteristics with low  $F_L$  and  $K_C$

**Question Number : 101 Question Id : 7520767181 Question Type : MCQ**

**Correct Marks : 1 Wrong Marks : 0**

Principal advantage of hydraulic system over electric system is

**Options :**

1. ✘ small response time
2. ✘ greater flexibility
3. ✔ smaller size
4. ✘ safety

**Question Number : 102 Question Id : 7520767182 Question Type : MCQ**  
**Correct Marks : 1 Wrong Marks : 0**

Proportional band of an ON –OFF controller is

**Options :**

1. ✔ zero
2. ✘ 100%
3. ✘ un defined
4. ✘ Infinity

**Question Number : 103 Question Id : 7520767183 Question Type : MCQ**

Correct Marks : 1 Wrong Marks : 0

The error signal produced in a control system is constant. The output of derivative action will be

Options :

1. ✓ zero
2. ✗ linear
3. ✗ constant
4. ✗ Infinity

Question Number : 104 Question Id : 7520767184 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following devices is not needed in measurement of velocity of rolled bars in a rolling mill?

Options :

1. ✗ PD controller
2. ✓ Tachometer

3. ✘ Ward Leonard controller

4. ✘ ON-OFF controller

**Question Number : 105 Question Id : 7520767185 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0**

For measurement of mutual inductance we can use

**Options :**

1. ✘ Anderson bridge

2. ✘ Maxwell's bridge

3. ✔ Heaviside bridge

4. ✘ Wheat stone bridge

**Question Number : 106 Question Id : 7520767186 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0**

To measure radio frequency, the suitable frequency meter is

**Options :**

1. ✘ Weston frequency meter
2. ✘ reed vibrator frequency meter
3. ✔ Hetrodyne frequency meter
4. ✘ Electrical resonance frequency meter

Question Number : 107 Question Id : 7520767187 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following signals are generated by Wien-bridge oscillators?

Options :

1. ✘ Square wave
2. ✔ Sine wave
3. ✘ Triangular wave
4. ✘ Pulse wave

Question Number : 108 Question Id : 7520767188 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The conductivity of the intrinsic semiconductor at absolute temperature is

Options :

1. ✓ Zero
2. ✗ 0.5 eV
3. ✗ 1.1 eV
4. ✗ Infinity

Question Number : 109 Question Id : 7520767189 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

An equal percentage valve has

Options :

1. ✓ high sensitivity at high flow rates
2. ✗ high sensitivity at low flow rates

3. ✘ low sensitivity at high flow rates

4. ✘ low sensitivity at low flow rates

**Question Number : 110 Question Id : 7520767190 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0**

Process reaction curve method of tuning is done for a system in

**Options :**

1. ✔ open loop

2. ✘ closed loop

3. ✘ interacting loop

4. ✘ non interacting loop

**Question Number : 111 Question Id : 7520767191 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0**

The number of values of  $k$  for which the following system of linear equations

$$\begin{pmatrix} 4 & k & 2 \\ k & 4 & 1 \\ 2 & 2 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

possess a non-zero solution, is \_\_\_\_\_

Options :

1. ✘ 1
2. ✔ 2
3. ✘ 3
4. ✘ Infinite

Question Number : 112 Question Id : 7520767192 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Let  $A$  be a  $2 \times 2$  matrix such that  $\text{trace}(A) = \det(A) = a (a \neq 0)$ . Then the trace of

$A^{-1}$  is

Options :

1. ✘  $a$

2. ✓ 1

3. ✗  $\frac{1}{a}$

4. ✗  $-\frac{1}{a}$

Question Number : 113 Question Id : 7520767193 Question Type : MCQ  
Correct Marks : 1 Wrong Marks : 0

The value of  $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy$  is

Options :

1. ✗  $\sqrt{\frac{\pi}{2}}$

2. ✗  $\sqrt{\frac{\pi}{6}}$

3. ✗  $\frac{\sqrt{\pi}}{2}$

4. ✓  $\frac{\pi}{4}$

Question Number : 114 Question Id : 7520767194 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A unit vector which is perpendicular to the surface of the paraboloid of revolution

$z = x^2 + y^2$  at the point (1,2,5) is

Options :

1. ✓  $\pm \frac{1}{\sqrt{21}}(2\hat{i} + 4\hat{j} - \hat{k})$

2. ✗  $\pm \frac{1}{\sqrt{21}}(4\hat{i} + 2\hat{j} - \hat{k})$

3. ✗  $\pm \frac{1}{\sqrt{21}}(2\hat{i} + 2\hat{j} - \hat{k})$

4. ✗  $\pm \frac{1}{\sqrt{21}}(2\hat{i} + 4\hat{j} + \hat{k})$

Question Number : 115 Question Id : 7520767195 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A function  $y(x)$  such that  $y(0) = 1$  and  $y(1) = 4e$  is a solution of the differential equation  $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 0$ . Then,  $y(2)$  is equal to \_\_\_\_\_

Options :

1. ✘  $-5e^2$

2. ✔  $7e^2$

3. ✘  $-5e$

4. ✘  $7e$

Question Number : 116 Question Id : 7520767196 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

If  $y(x) = C_1 \cos 2x + C_2 \sin 2x + A(x) \log (\sec 2x + \tan 2x)$  is the general solution of the differential equation  $\frac{d^2y}{dx^2} + 4y = \tan 2x$ , then  $A(x) =$  \_\_\_\_\_

Options :

1. ✘  $-\frac{\sin 2x}{4}$

2. ✘  $\frac{\sin 2x}{4}$

3. ✔  $-\frac{\cos 2x}{4}$

4. ✘  $\frac{\cos 2x}{4}$

Question Number : 117 Question Id : 7520767197 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The residue of  $f(z) = e^{-1/z}$  at  $z = 0$  is

Options :

1. ✘ 0

2. ✔ -1

3. ✘ 1

4. ✘  $\frac{1}{2}$

Question Number : 118 Question Id : 7520767198 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

If  $A$  and  $B$  are two events of a random experiment such that

$$P(\bar{A}) = 0.3, P(B) = 0.4 \text{ and } P(A \cap \bar{B}) = 0.5, \text{ then } P(A \cup B) = \underline{\hspace{2cm}}$$

Options :

1. ✘ 1
2. ✔ 0.9
3. ✘ 0.5
4. ✘ 0.6

Question Number : 119 Question Id : 7520767199 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The variance of the Binomial distribution with probability mass function

$$p(x) = {}^{15}C_x \left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{15-x}, x = 0, 1, \dots, 15, \text{ is } \underline{\hspace{2cm}}$$

Options :

1. ✘  $\frac{5}{3}$
2. ✔  $\frac{10}{3}$

3. ✘  $\frac{1}{3}$

4. ✘  $\frac{2}{3}$

Question Number : 120 Question Id : 7520767200 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

To find the root of the equation  $f(x) \equiv e^{-x} - x = 0$ , the Newton-Raphson method is used. If the initial guess for the root is 1, then the estimate of the root after first iteration is \_\_\_\_\_

Options :

1. ✘  $\frac{1}{1+e}$

2. ✘  $\frac{e}{1+e}$

3. ✔  $\frac{2}{1+e}$

4. ✖  $\frac{2e}{1+e}$