

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.

Question Paper Name :	Electronics and Communication Engineering 28th Sep 2021 Shift1
Duration :	120
Total Marks :	120
Display Marks:	No
Share Answer Key With Delivery Engine :	Yes
Calculator :	None
Magnifying Glass Required? :	No
Ruler Required? :	No
Eraser Required? :	No
Scratch Pad Required? :	No
Rough Sketch/Notepad Required? :	No
Protractor Required? :	No
Show Watermark on Console? :	Yes
Highlighter :	No
Auto Save on Console? (SA type of questions will be always auto saved) :	Yes
Is this Group for Examiner? :	No

Electronics and Communication Engineering

Section Id :	5875874
Section Number :	1
Mandatory or Optional :	Mandatory
Number of Questions :	120
Section Marks :	120
Enable Mark as Answered Mark for Review and Clear Response :	Yes

Question Number : 1 Question Id : 587587361 Display Question Number : Yes Is Question

Mandatory : No

Let L denote the inductance in henry (H) and C denote the capacitance in farad (F). The reciprocal of the geometric mean of L and C has unit -----.

Options :

1. ✖ hertz
2. ✖ radian
3. ✖ second
4. ✔ radian per second

Question Number : 2 Question Id : 587587362 Display Question Number : Yes Is Question

Mandatory : No

Suppose that the time-varying current through a capacitor of $9\ \mu\text{F}$ is $9\delta(t)$ microampere. The time-varying voltage across the capacitor is -----.

Options :

1. ✖ $9u(t)$
2. ✔ $u(t)$

3. ✖ $81 u(t)$

4. ✖ $(1/9) u(t)$

Question Number : 3 Question Id : 587587363 Display Question Number : Yes Is Question

Mandatory : No

Suppose that three identical 9 A, 1 Ω Norton equivalent circuits are connected in parallel with like polarity. Then, the net current and conductance in the combined Norton equivalent circuit will be -----.

Options :

1. ✖ 27 A, 1 mho

2. ✔ 27 A, 3 mho

3. ✖ 9 A, 1 mho

4. ✖ 9 A, 3 mho

Question Number : 4 Question Id : 587587364 Display Question Number : Yes Is Question

Mandatory : No

Suppose that a dc source with source resistance R_s could provide a current of 4 A when it is short circuited momentarily. Further, it can provide a power of 81 watts to a 9 Ω load. The maximum power delivered to the load is -----.

Options :

1. ✔ 108 watts

2. ✖ 81 watts

3. ✖ 27 watts

4. ✖ 216 watts

Question Number : 5 Question Id : 587587365 Display Question Number : Yes Is Question

Mandatory : No

Consider a series RLC circuit with Q factor 108. Suppose that all the R, L and C components values are quadrupled, the Q factor of the resultant circuit will be -----.

Options :

1. ✖ 108

2. ✖ 432

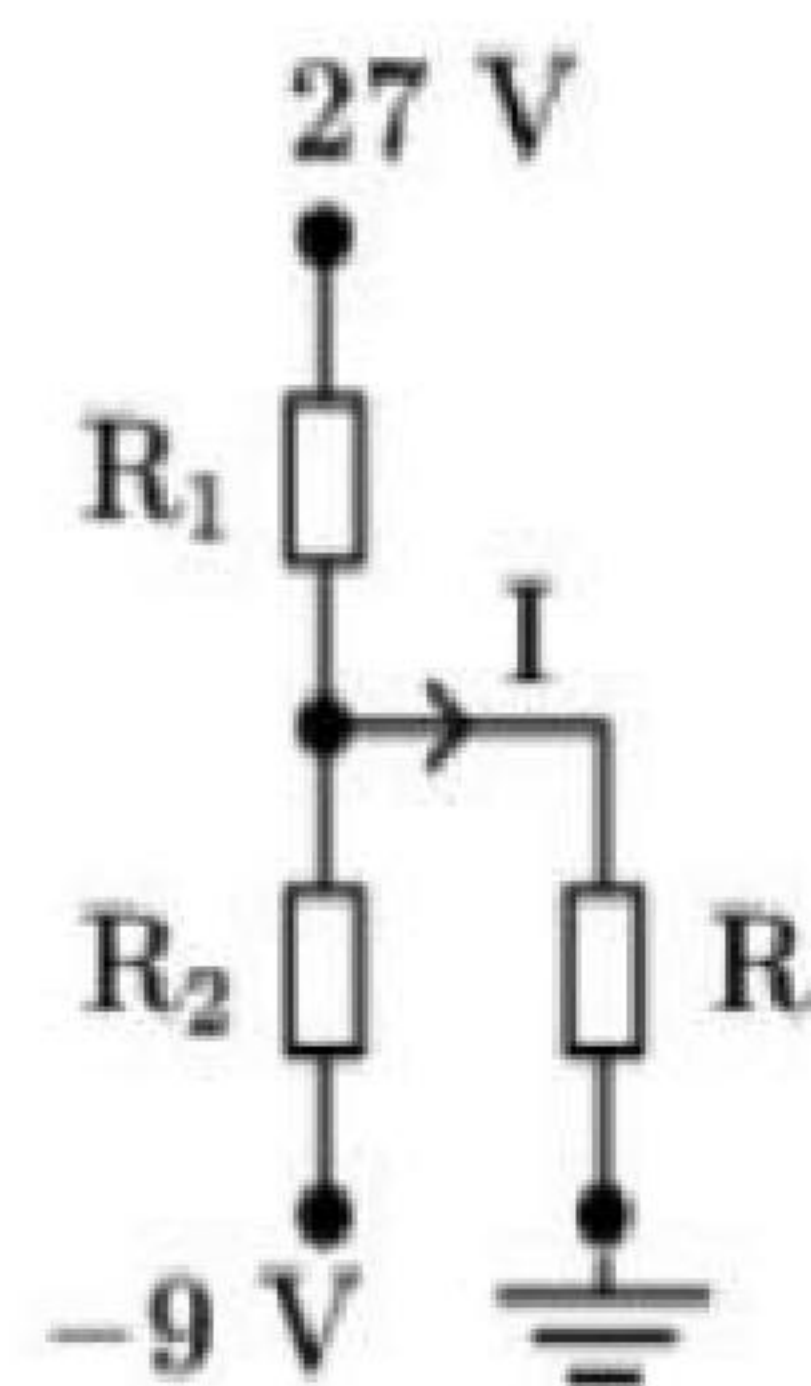
3. ✔ 27

4. ✖ 54

Question Number : 6 Question Id : 587587366 Display Question Number : Yes Is Question

Mandatory : No

Refer to the circuit diagram shown below. In it, $R_1 = R_2 = 10^6 \Omega$ and $I = 9 \mu A$. The resistance R is equal to -----.



Options :

1. ✖ 100 K Ω

2. ✖ 200 K Ω

3. ✖ 400 KΩ

4. ✔ 500 KΩ

Question Number : 7 Question Id : 587587367 Display Question Number : Yes Is Question

Mandatory : No

Suppose that the Z-parameter matrices of two two-port network are $\begin{bmatrix} 4 & 2 \\ 2 & 4 \end{bmatrix}$ and $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$. If the two-port networks are connected in series, the admittance parameters matrix of the overall two-port network is ----.

Options :

1. ✖ $\begin{bmatrix} 2/9 & 1/9 \\ -1/9 & 2/9 \end{bmatrix}$

2. ✔ $\begin{bmatrix} 2/9 & -1/9 \\ -1/9 & 2/9 \end{bmatrix}$

3. ✖ $\begin{bmatrix} 1/9 & 2/9 \\ 2/9 & 1/9 \end{bmatrix}$

4. ✖ $\begin{bmatrix} 1/9 & -2/9 \\ -2/9 & 1/9 \end{bmatrix}$

Question Number : 8 Question Id : 587587368 Display Question Number : Yes Is Question

Mandatory : No

Consider a circuit of sixteen branches and four nodes. Suppose that you use loop analysis to find currents. The number of independent loops is -----.

Options :

1. ✖ 12

2. ✖ 20

3. ✔ 13

4. ✖ 11

Question Number : 9 Question Id : 587587369 Display Question Number : Yes Is Question

Mandatory : No

Suppose that a capacitor stores one microjoule of electrical potential energy. The amount of charge stored in it is $1\text{ }\mu\text{C}$. The capacitance is given by -----.

Options :

1. ✖ $1\text{ }\mu\text{F}$

2. ✖ $2\text{ }\mu\text{F}$

3. ✔ $0.5\text{ }\mu\text{F}$

4. ✖ $10\text{ }\mu\text{F}$

Question Number : 10 Question Id : 587587370 Display Question Number : Yes Is Question

Mandatory : No

Suppose that the average power in a pure resistance that carries a time-varying current $i(t) = \cos(\omega t)\text{ A}$, is 9 watt. The resistor is of -----.

Options :

1. ✖ $9\text{ }\Omega$

2. ✔ $18\text{ }\Omega$

3. ✖ $3\text{ }\Omega$

4. ✖ 81 Ω

Question Number : 11 Question Id : 587587371 Display Question Number : Yes Is Question

Mandatory : No

Consider a 9 V battery having negligible internal resistance is connected to a coil of inductance 4 H and resistance 1 Ω . The amount of energy stored in the magnetic field is -----.

Options :

1. ✖ 81 joules

2. ✖ 9 joules

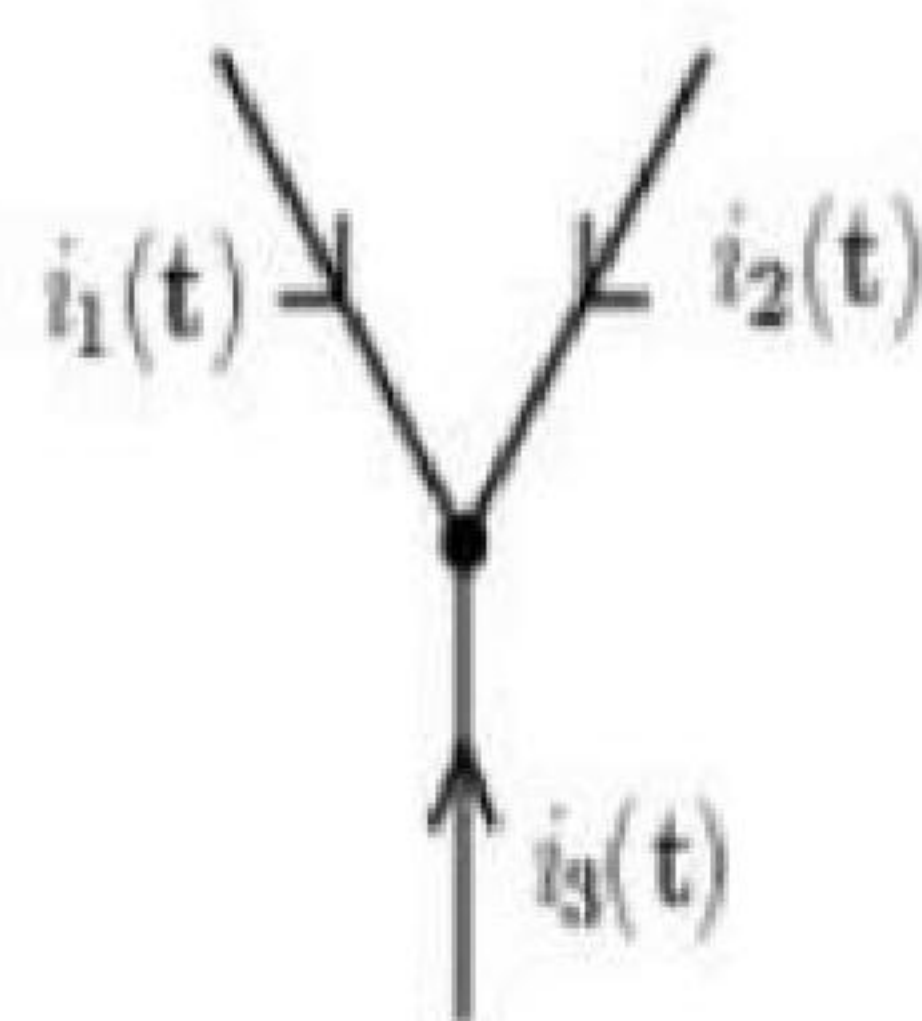
3. ✖ 36 joules

4. ✔ 162 joule

Question Number : 12 Question Id : 587587372 Display Question Number : Yes Is Question

Mandatory : No

The time-varying currents $i_1(t)$, $i_2(t)$, and $i_3(t)$ (in mA), are meeting at a junction as shown in the Fig. below. Suppose that $i_1(t) = 8 \cos(\omega t)$, $i_2(t) = -9 \sin(\omega t)$. The current $i_3(t)$ is given by -----.



Options :

1. ✔ -8-j9 mA

2. ✖ 8-j9 mA

3. ✖ $8+j9$ mA

4. ✖ $-1+j0$ mA

Question Number : 13 Question Id : 587587373 Display Question Number : Yes Is Question

Mandatory : No

Suppose that a series resonant circuit has a resistance of $33\ \Omega$, inductance of 1 H , and capacitance of $1\ \mu\text{F}$. Let the supply voltage is 29.7 V . The current flowing through the circuit at resonance is -----.

Options :

1. ✖ 0.3 A

2. ✖ 0.6 A

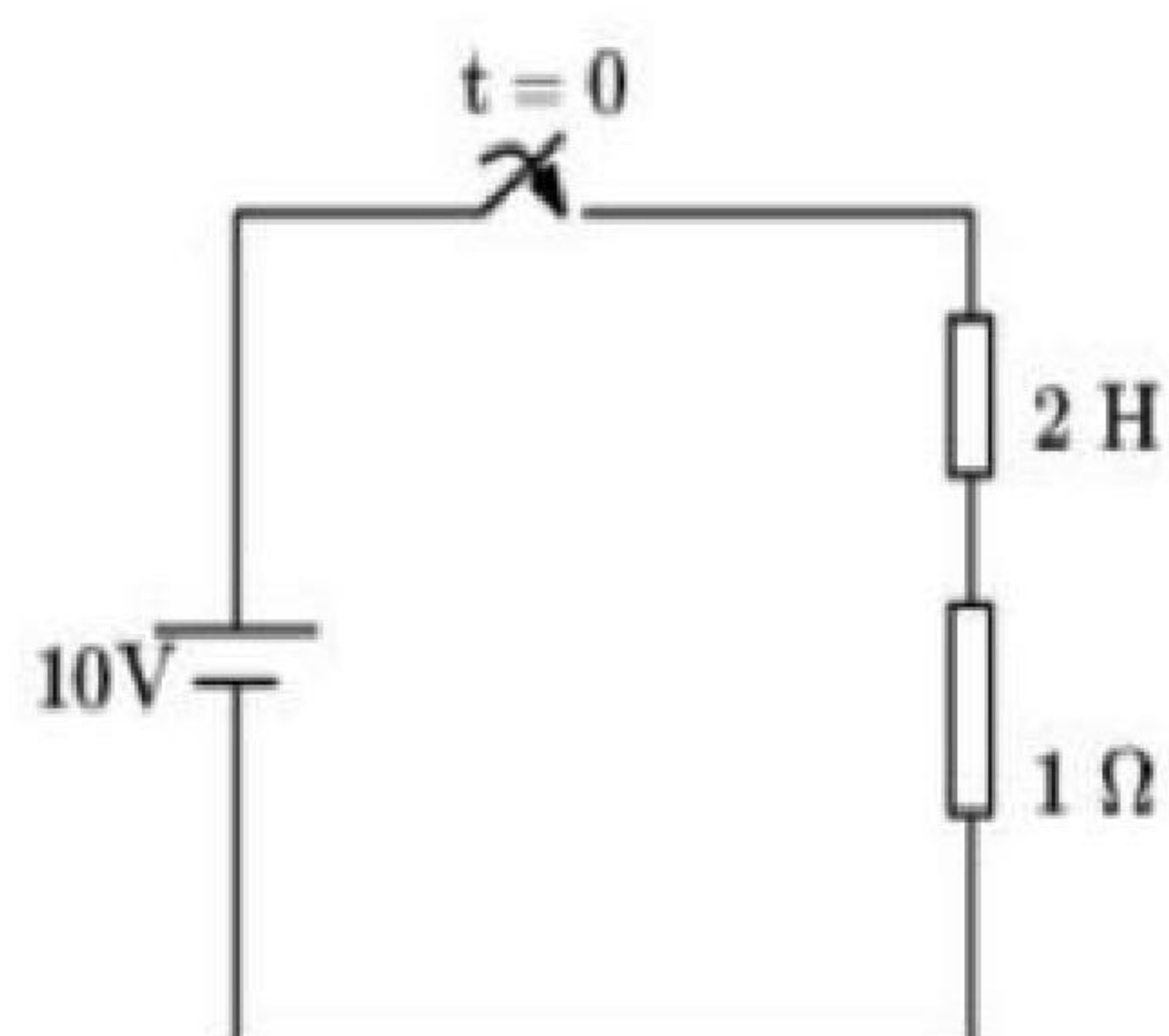
3. ✔ 0.9 A

4. ✖ 3 A

Question Number : 14 Question Id : 587587374 Display Question Number : Yes Is Question

Mandatory : No

Refer to the circuit shown below. Suppose that the switch closes at $t = 0$. The value of current at $t = 2$ second is approximately-----.



Options :

1. ✖ 0.63 A

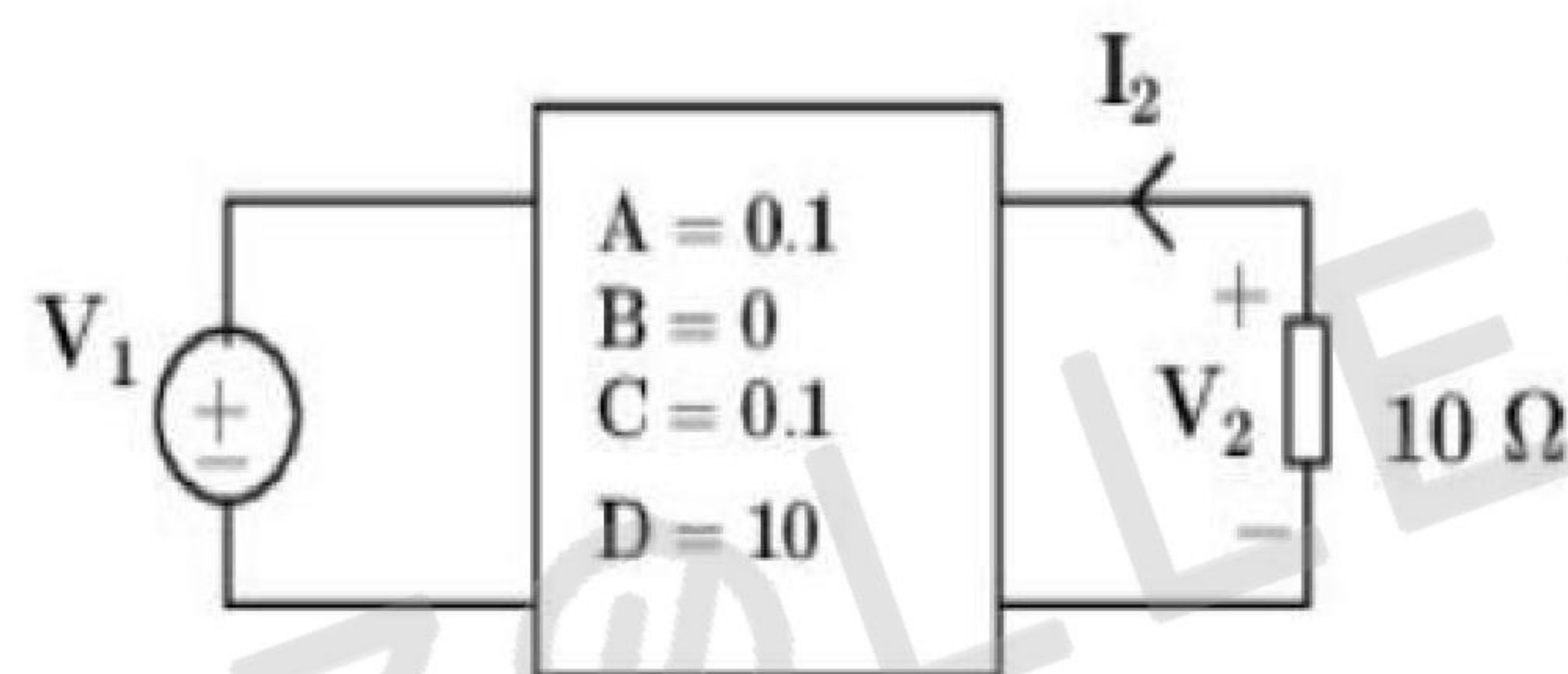
2. ✓ 6.3 A

3. ✗ 3.6 A

4. ✗ 10 A

Question Number : 15 Question Id : 587587375 Display Question Number : Yes Is Question Mandatory : No

Refer to the two-port network shown below. In it, the value of Z_{in} is equal to -----.



Options :

1. ✓ $(1/11)\ \Omega$

2. ✗ $(2/11)\ \Omega$

3. ✗ $(3/11)\ \Omega$

4. ✗ $(4/11)\ \Omega$

Question Number : 16 Question Id : 587587376 Display Question Number : Yes Is Question Mandatory : No

Suppose that the length of an intrinsic silicon bar is 5 cm and its cross-section is 2 mm by 4 mm. Assuming room temperature and resistivity equal to $2.4 \times 10^5\ \Omega - cm$, the resistance of the bar is equal to -----.

Options :

1. ✖ 1.5 MΩ

2. ✔ 15 MΩ

3. ✖ 150 MΩ

4. ✖ 0.15 MΩ

Question Number : 17 Question Id : 587587377 Display Question Number : Yes Is Question

Mandatory : No

Suppose that an electric field intensity of 1 volt/cm is applied across a semiconductor at a certain temperature. If the average drift velocity of free electrons is equal to 10 m/s, the electron mobility is equal to -----.

Options :

1. ✖ 10 cm²/V-sec.

2. ✖ 100 cm²/V-sec.

3. ✖ 0.1 cm²/V-sec.

4. ✔ 1000 cm²/V-sec.

Question Number : 18 Question Id : 587587378 Display Question Number : Yes Is Question

Mandatory : No

The key purpose of the metallization process is to -----.

Options :

1. ✖ serve as a ground plane

2. ✖ protect the chip from oxidation

- 3. ✓ interconnect various circuit elements
- 4. ✗ supply a bonding interface for mounting the chip

Question Number : 19 Question Id : 587587379 Display Question Number : Yes Is Question

Mandatory : No

Compared to discrete component systems, monolithic integrated systems offer superior reliability. This is due to -----,

Options :

- 1. ✗ use of silicon
- 2. ✓ fewer interconnections
- 3. ✗ hermetically sealed
- 4. ✗ reduction in size is achieved

Question Number : 20 Question Id : 587587380 Display Question Number : Yes Is Question

Mandatory : No

Unlike BJT, the thermal runaway is not a problem in FET. The thermal stability in FET is because as temperature increases, -----,

Options :

- 1. ✗ transconductance increases
- 2. ✓ mobility decreases
- 3. ✗ mobility increases

4. ✖ the drain current increases

Question Number : 21 Question Id : 587587381 Display Question Number : Yes Is Question Mandatory : No

Which of the following is the basic material commonly used for the fabrication for an LED?

Options :

1. ✖ SiC

2. ✖ Ge

3. ✔ GaAs

4. ✖ SiO₂

Question Number : 22 Question Id : 587587382 Display Question Number : Yes Is Question Mandatory : No

Suppose that a Si sample is doped with arsenic (As) atoms having concentration 10^{18} As atoms/cm³. The equilibrium hole concentration at room temperature is -----.
(Note: Intrinsic concentration for Si at room temperature = $1.5 \times 10^{10} \text{ cm}^{-3}$.)

Options :

1. ✖ $1.5 \times 10^2 \text{ cm}^{-3}$

2. ✖ $0.15 \times 10^2 \text{ cm}^{-3}$

3. ✔ $2.25 \times 10^2 \text{ cm}^{-3}$

4. ✖ $22.5 \times 10^2 \text{ cm}^{-3}$

Question Number : 23 Question Id : 587587383 Display Question Number : Yes Is Question

Mandatory : No

The duration it takes for an average electron to drift $2.7\mu\text{m}$ in pure Si at an electric field of 100 V/cm is -----, (Given: $\mu_n = 1350\text{ cm}^2/\text{V}\cdot\text{sec.}$)

Options :

1. ✖ 1 ns

2. ✔ 2 ns

3. ✖ 3 ns

4. ✖ 4 ns

Question Number : 24 Question Id : 587587384 Display Question Number : Yes Is Question

Mandatory : No

Energy E (in eV), wavelength λ (in nm) of a photon are related through the expression given by -----,

Options :

1. ✔ $\lambda = \frac{0.00124}{E}$

2. ✖ $\lambda = \frac{1.24}{E}$

3. ✖ $\lambda = \frac{0.0124}{E}$

4. ✖ $\lambda = \frac{12.4}{E}$

Question Number : 25 Question Id : 587587385 Display Question Number : Yes Is Question

Mandatory : No

Suppose that increasing the MOSFET device temperature, the subthreshold source-to-drain leakage current of the MOSFET -----.

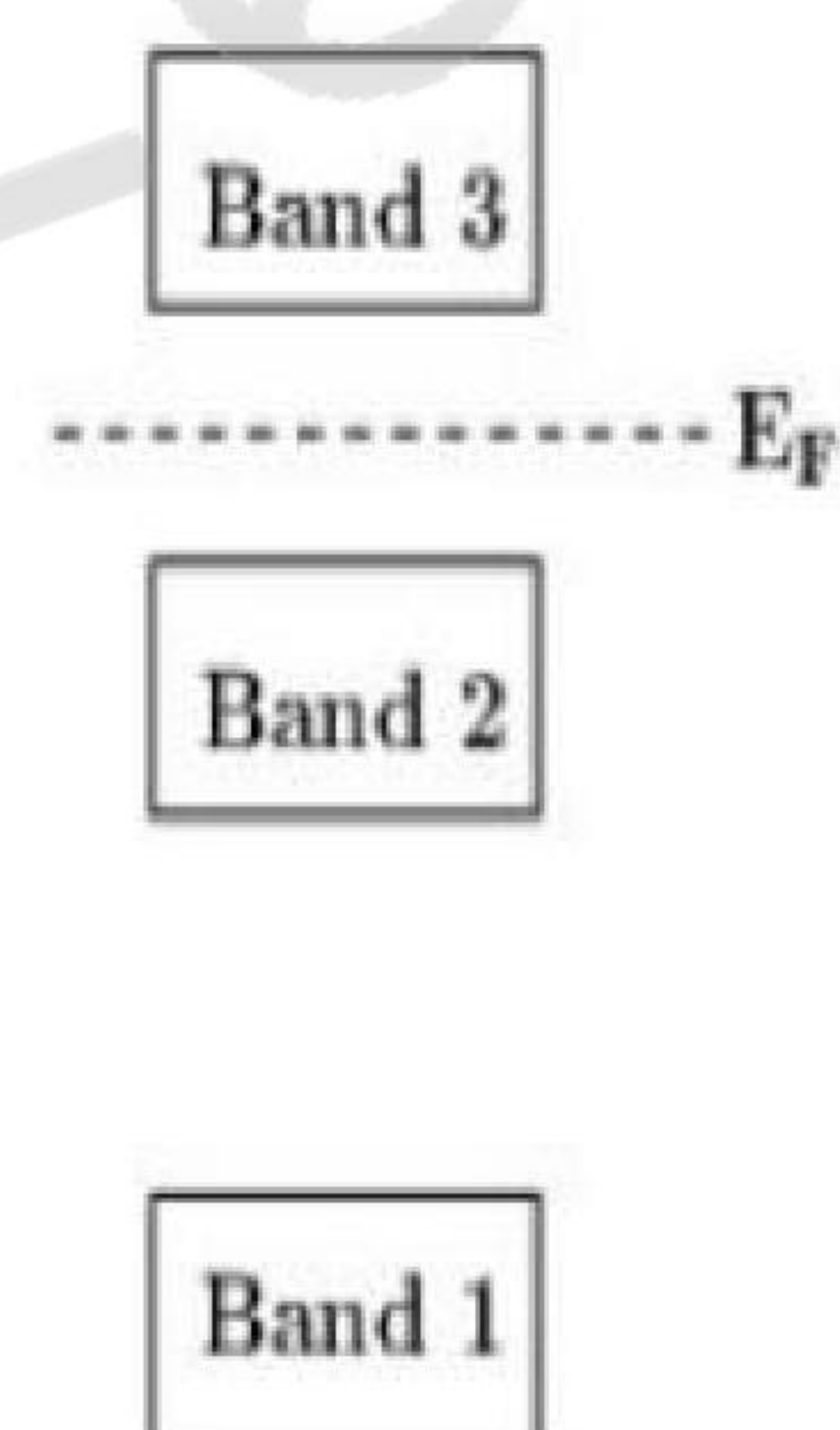
Options :

1. ✖ decreases
2. ✖ unchanged
3. ✔ increases
4. ✖ Increases initially, then decreases after some threshold

Question Number : 26 Question Id : 587587386 Display Question Number : Yes Is Question

Mandatory : No

Refer to the following energy band diagram. In it, E_F denotes Fermi level energy. The energy band diagram characterizes a -----.



Options :

1. ✖ Insulator
2. ✖ Metal
3. ✖ Non-metal conductor
4. ✔ Semiconductor

Question Number : 27 Question Id : 587587387 Display Question Number : Yes Is Question

Mandatory : No

A 90 mW, 900 nm LASER beam is focused onto a GaAs sample of thickness 100 μ m. The energy of one photon is approximately equal to -----.

Options :

1. ✖ 1.24 eV

2. ✔ 1.38 eV

3. ✖ 0.62 eV

4. ✖ 0.69 eV

Question Number : 28 Question Id : 587587388 Display Question Number : Yes Is Question

Mandatory : No

Suppose that an abrupt Si p-n junction of area 10^{-8} m^2 and has n-side $\mu_p = 500 \text{ cm}^2/\text{V-sec}$. at room temperature. For the minority carrier the diffusion constant (for holes) is approximately -----.

Options :

1. ✖ $1.3 \text{ cm}^2/\text{sec}$

2. ✖ $130 \text{ cm}^2/\text{sec}$

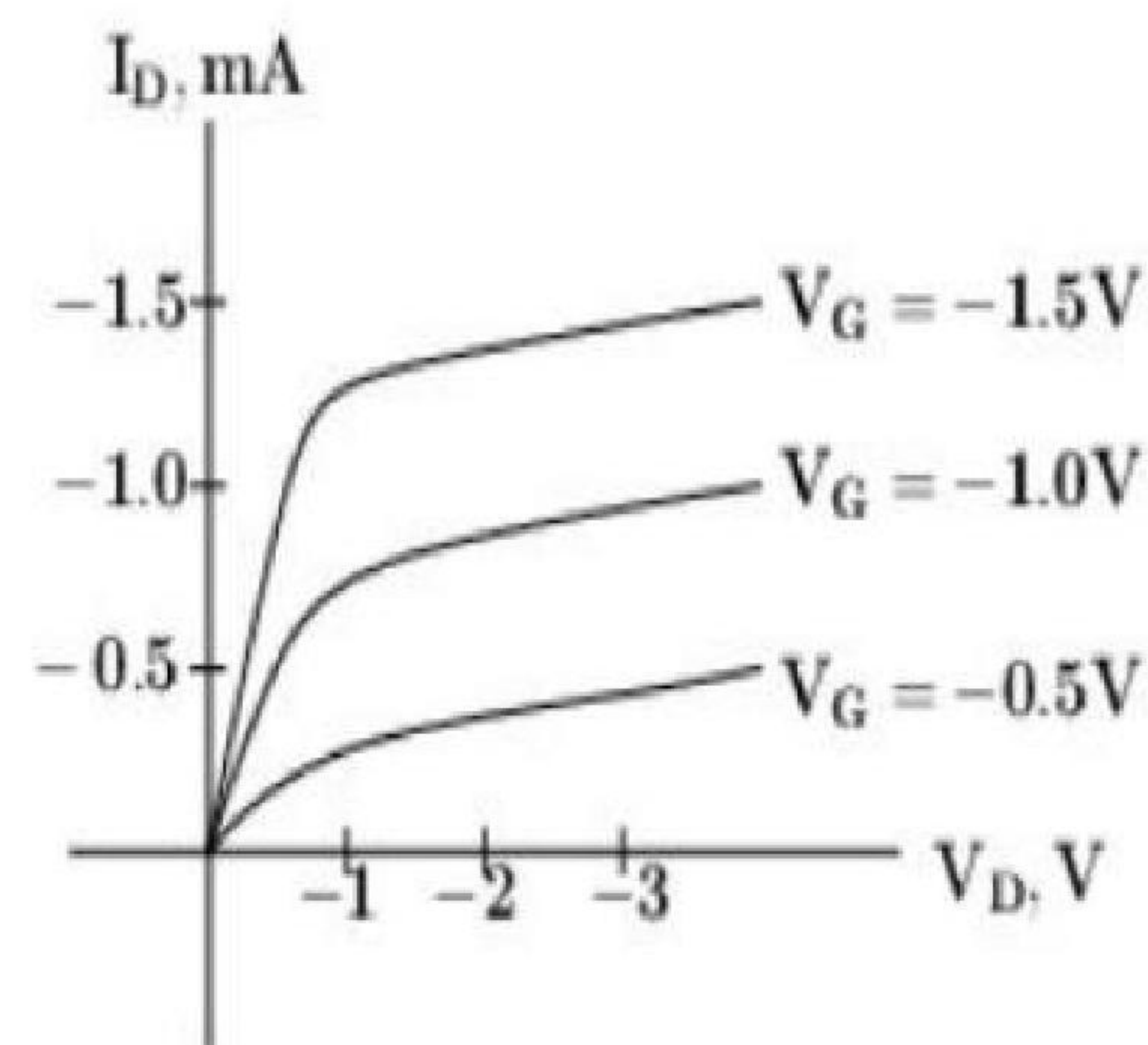
3. ✔ $13 \text{ cm}^2/\text{sec}$

4. ✖ $26 \text{ cm}^2/\text{sec}$

Question Number : 29 Question Id : 587587389 Display Question Number : Yes Is Question

Mandatory : No

Consider the MOSFET characteristic curves shown in Fig. The transconductance g_m (in mho) at $V_D = -1.0$ V is -----.



Options :

1. ✗ 0.5 millimho
2. ✓ 1 millimho
3. ✗ 1.5 millimho
4. ✗ 0.25 millimho

Question Number : 30 Question Id : 587587390 Display Question Number : Yes Is Question

Mandatory : No

Suppose that in the BJT characteristic curves $\Delta I_C = 5$ mA and $\Delta I_B = 0.1$ mA. The common emitter gain β is approximately equal to -----.

Options :

1. ✗ 100
2. ✓ 50
3. ✗ 150
4. ✗ 200

Question Number : 31 Question Id : 587587391 Display Question Number : Yes Is Question

Mandatory : No

Consider an open-circuited p-n junction diode at room temperature. Suppose that the donor ions concentration N_D is changed by a factor of 10000 and acceptor ions concentration N_A remains unchanged. The contact difference of potential V_0 is approximately equal to -----
--. (Use: $\ln 9 \approx 2.3$, $V_T = 0.026 \text{ V}$.)

Options :

1. ✓ 0.24 V

2. ✗ 2.4 V

3. ✗ 24 mV

4. ✗ 1.2 V

Question Number : 32 Question Id : 587587392 Display Question Number : Yes Is Question

Mandatory : No

Consider a Si diode ($\eta = 2$) operating in the conducting region at room temperature. The approximate change in voltage for a tenfold increase in current is -----.

(Use: $I \approx I_0 e^{V/\eta V_T}$, $\ln 10 \approx 2.3$, $V_T = 0.026 \text{ V}$.)

Options :

1. ✗ 0.24 V

2. ✗ 0.06 V

3. ✓ 0.12 V

4. ✗ 0.48 V

Question Number : 33 Question Id : 587587393 Display Question Number : Yes Is Question

Mandatory : No

Suppose that two p-n Si diodes ($\eta = 2$) are connected in series opposing. In it, the reverse saturation current is 10 nA. A 6 V battery is connected to this series arrangement. If the Zener (Avalanche) voltage is 10 V, the voltage across the reverse bias diode is -----.

(Use: $\ln 2 \approx 0.693, V_T = 0.026 \text{ V}$.)

Options :

1. ✗ 0.036 V

2. ✓ 5.964 V

3. ✗ 6 V

4. ✗ 6.036 V

Question Number : 34 Question Id : 587587394 Display Question Number : Yes Is Question

Mandatory : No

Suppose that a Si p-n diode is in series with a 2 K Ω resistor and 10 V power supply. If the diode is forward biased, the approximate current in the circuit is -----.

(Assume $V_f = 0.6 \text{ V}$.)

Options :

1. ✗ 0.35 mA

2. ✗ 5.65 mA

3. ✗ 0 mA

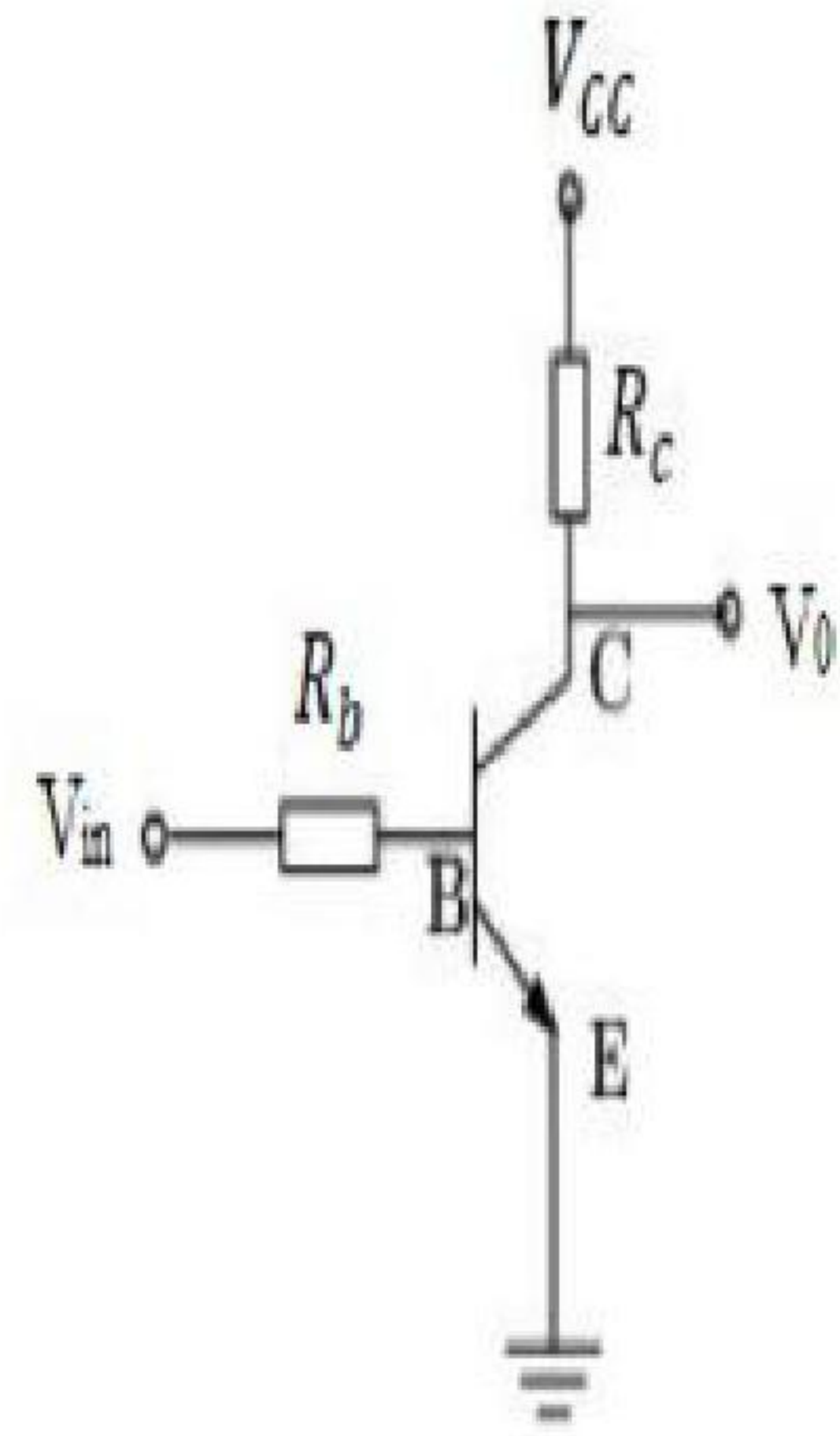
4. ✓ 4.65 mA

Question Number : 35 Question Id : 587587395 Display Question Nui

Mandatory : No

A Si transistor with $h_{FE} = 100$ is used in the circuit shown. In it, $V_{CC} = 10\text{ V}$, $R_C = 4.9\text{ K}\Omega$, $V_{in} = 5\text{ V}$.

The maximum value of R_B for which the transistor remains in saturation is (Assume $V_{BE,sat} = 0.6\text{ V}$.)



Options :

1. ✓ 210 K Ω

2. ✗ 21 K Ω

3. ✗ 2.1 K Ω

4. ✗ 2.1 M Ω

Question Number : 36 Question Id : 587587396 Display Question Number : Yes Is Question

Mandatory : No

Suppose that A BJT has $\alpha = 0.99$, $I_B = 10\text{ }\mu\text{A}$, $I_{CBO} = 100\text{ nA}$. The dc collector current is

Options :

1. ✗ 10.1 mA

2. ✓ 1.10 mA

3. ✗ 0.01 mA

4. ✗ 101 μA

Question Number : 37 Question Id : 587587397 Display Question Number : Yes Is Question

Mandatory : No

Consider a p-n diode whose internal resistance is $10\ \Omega$. This diode is to supply power to a $900\ \Omega$ load from a $\frac{100}{\sqrt{2}}$ (rms) power supply. The dc load current is approximately -----.

Options :

1. ✖ 320 mA

2. ✔ 32 mA

3. ✖ 16 mA

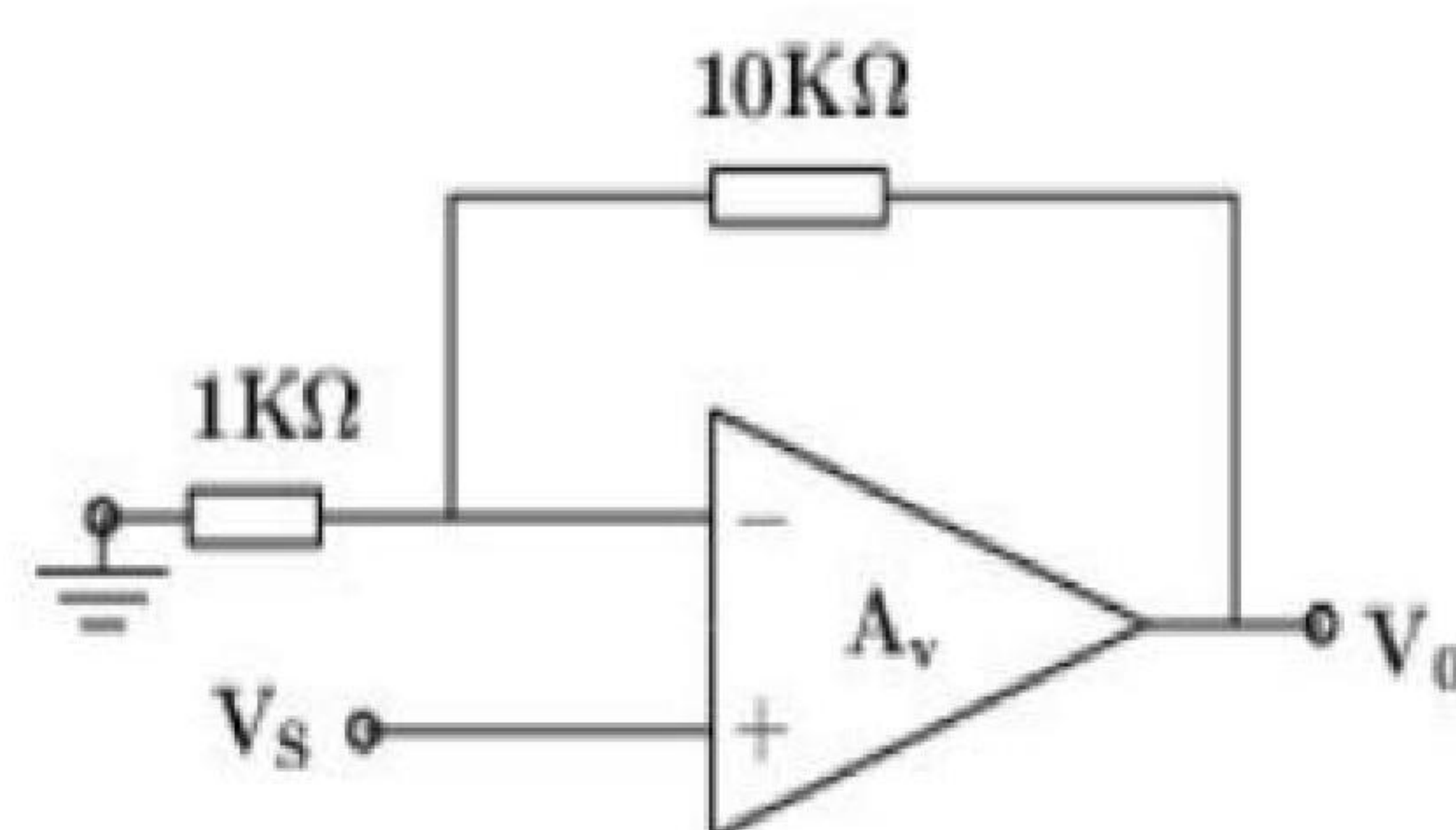
4. ✖ $0.32\ \mu\text{A}$

Question Number : 38 Question Id : 587587398 Display Question Number : Yes Is Question

Mandatory : No

Refer to the Op-Amp circuit diagram shown. The voltage gain is equal to -----.

(Given: open-loop gain = 99.)



Options :

1. ✖ 99.9

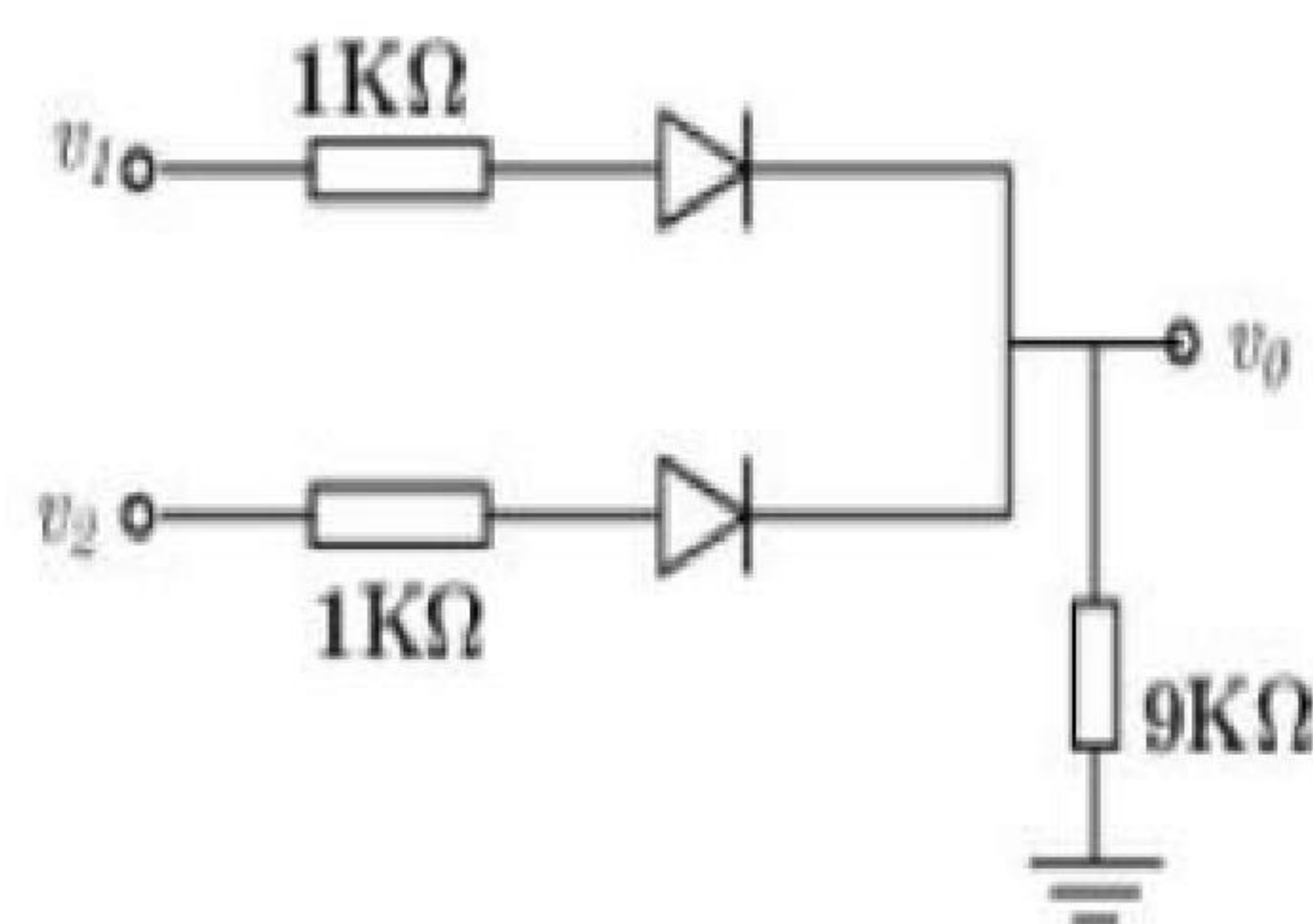
2. ✖ 9

3. ✔ 9.9

4. ✖ 11

Question Number : 39 Question Id : 587587399 Display Question Number : Yes Is Question Mandatory : No

For the circuit shown in Fig., let $v_1 = 10\text{ V}$, $v_2 = 0\text{ V}$. Suppose that the p-n diode cut-in voltage is 0.6 V and the voltage drop across the conducting diode is 0.7 V . Assuming an infinite resistance for a diode which is reverse biased, the output v_0 is approximately-----.



Options :

1. ✔ 8.4 V

2. ✖ 0.84 V

3. ✖ 9.6 V

4. ✖ 0.6 V

Question Number : 40 Question Id : 587587400 Display Question Number : Yes Is Question Mandatory : No

Consider a power supply that has no load voltage of 21.4 V . The approximate full load voltage for 7% regulation is approximately -----.

Options :

1. ✖ 10 V

2. ✔ 20 V

3. ✖ 30 V

4. ✖ 15 V

Question Number : 41 Question Id : 587587401 Display Question Number : Yes Is Question

Mandatory : No

Consider a BJT operating in saturation region. Suppose that $V_{CC} = 9\text{ V}$, $R_C = x\text{ K}\Omega$, $h_{FE} = 100$, $V_{CE,sat} = 0.3\text{ V}$
The collector current at saturation is 17.4 mA. The resistance R_C is -----

Options :

1. ✖ 1 K Ω

2. ✖ 2 K Ω

3. ✔ 0.5 K Ω

4. ✖ 3 K Ω

Question Number : 42 Question Id : 587587402 Display Question Number : Yes Is Question

Mandatory : No

Suppose that a power amplifier has a power gain (in linear scale) of 128. The power gain in dB is approximately equal to -----.

Options :

1. ✖ 42 dB

2. ✔ 21 dB

3. ✖ 7 dB

4. ✖ 14 dB

Question Number : 43 Question Id : 587587403 Display Question Number : Yes Is Question

Mandatory : No

Consider FET Hartley oscillator with $C = 250 \text{ pF}$, $L_{eq} = 4 \text{ mH}$. The oscillation frequency is -----, (Use: $\frac{1}{2\pi} \approx 0.16$.)

Options :

1. ✖ 16 KHz

2. ✖ 1.6 KHz

3. ✔ 160 KHz

4. ✖ 1.6 MHz

Question Number : 44 Question Id : 587587404 Display Question Number : Yes Is Question

Mandatory : No

For a JFET, g_{m0} denotes the transconductance at $V_{GS} = 0 \text{ V}$. Suppose that a JFET has $I_{DSS} = 12 \text{ mA}$, $V_p = -4 \text{ V}$. The g_{m0} is equal to -----.

Options :

1. ✖ 3 millisiemen

2. ✖ 4 millisiemen

3. ✖ 1 millisiemen

4. ✔ 6 millisiemen

Question Number : 45 Question Id : 587587405 Display Question Number : Yes Is Question

Mandatory : No

Suppose that $I_{DSS} = 9 \text{ mA}$, $V_p = -4 \text{ V}$, $V_{GS} = -2 \text{ V}$. The drain current I_D is equal to -----.

Options :

1. ✖ 1.5 mA

2. ✖ 3 mA

3. ✔ 2.25 mA

4. ✖ 2 mA

Question Number : 46 Question Id : 587587406 Display Question Number : Yes Is Question

Mandatory : No

Consider 8085 microprocessor instruction set. The XRA instruction word size is equal to -----

Options :

1. ✖ 3 bytes

2. ✖ 2 bytes

3. ✖ 4 bytes

4. ✔ 1 byte

Question Number : 47 Question Id : 587587407 Display Question Number : Yes Is Question

Mandatory : No

Consider the following 8085 instruction set. The number of times the loop will be executed is

LXI B, 0009H

LOOP: DCX B

JNZ LOOP

Options :

1. ✖ 8

2. ✖ 9

3. ✖ 10

4. ✔ Infinite loop

Question Number : 48 Question Id : 587587408 Display Question Number : Yes Is Question

Mandatory : No

The number of address lines necessary to address two megabytes (i.e. 2048K) of memory is

Options :

1. ✖ 11

2. ✖ 10

3. ✔ 21

4. ✖ 12

Question Number : 49 Question Id : 587587409 Display Question Number : Yes Is Question

Mandatory : No

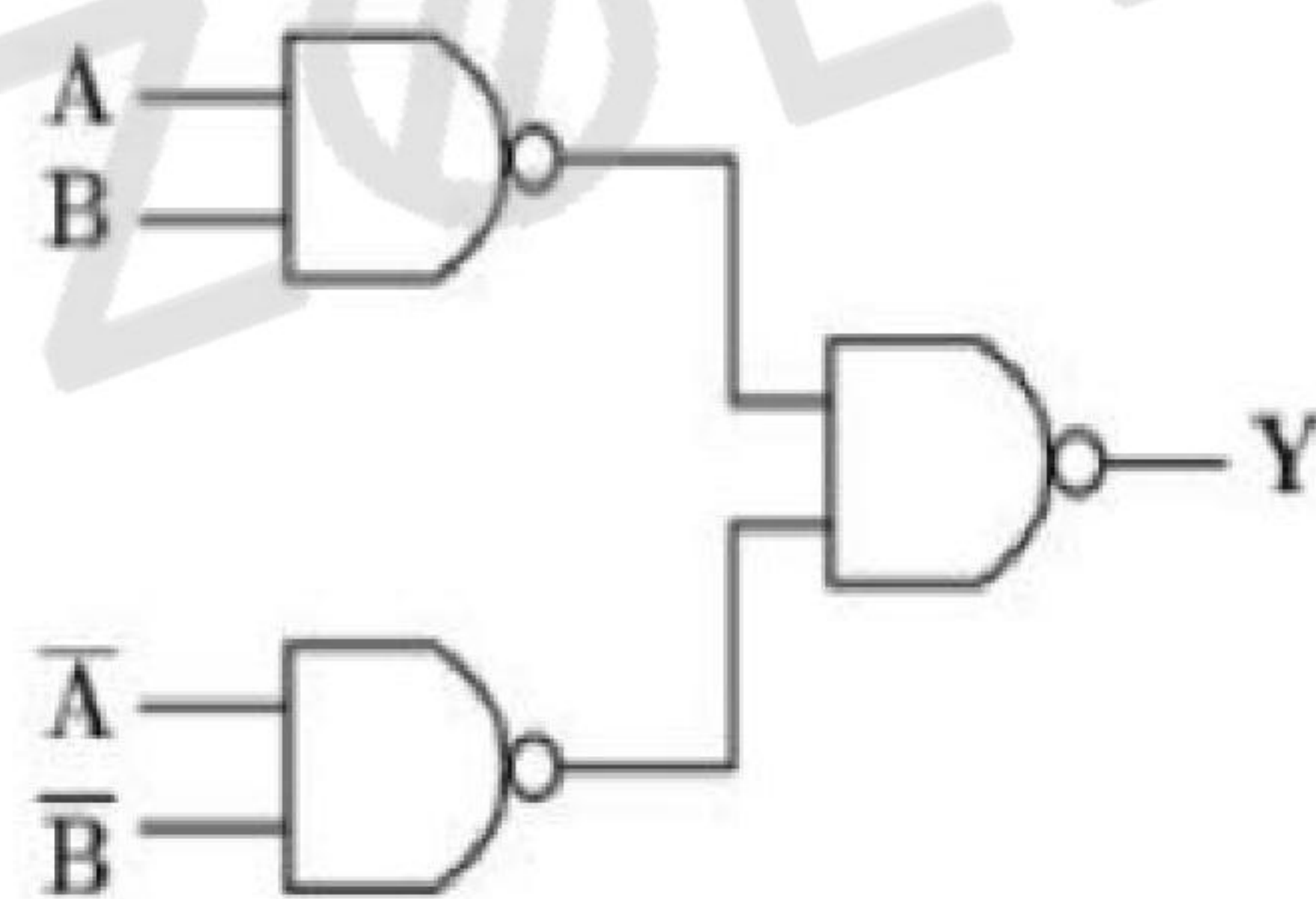
In 8085 microprocessors, if the clock frequency is 3 MHz, the time duration required to execute an instruction of 18 T-states is approximately -----.

Options :

- 1. ✘ $0.6\mu s$
- 2. ✔ $6\mu s$
- 3. ✘ $60\mu s$
- 4. ✘ $600\mu s$

Question Number : 50 Question Id : 587587410 Display Question Number : Yes Is Question Mandatory : No

Refer to the digital logic circuit diagram shown. It performs ----- gate operation.



Options :

- 1. ✘ XNOR
- 2. ✔ XOR
- 3. ✘ NAND
- 4. ✘ NOR

Question Number : 51 Question Id : 587587411 Display Question Number : Yes Is Question Mandatory : No

The binary equivalent of 22.5 (decimal number system) is -----.

Options :

1. ✓ 10110.10

2. ✗ 10110.11

3. ✗ 10110.01

4. ✗ 10110.001

Question Number : 52 Question Id : 587587412 Display Question Number : Yes Is Question

Mandatory : No

Consider a ripple counter that operates at a maximum frequency of 10 MHz. Suppose that the propagation delay time of each flip-flop in the counter is 10 ns, and strobing time is 50 ns, the number of stages in the counter is -----.

Options :

1. ✗ 2

2. ✗ 3

3. ✓ 5

4. ✗ 7

Question Number : 53 Question Id : 587587413 Display Question Number : Yes Is Question

Mandatory : No

Consider a 256×8 – bit ROM using two-dimensional addressing with 8-to-1 selectors. The number of bits needed to address the ROM is -----.

Options :

1. ✗ 11

2. ✖ 9

3. ✖ 6

4. ✔ 8

Question Number : 54 Question Id : 587587414 Display Question Number : Yes Is Question Mandatory : No

Suppose that we need to design a 25:1 asynchronous counter. The number of flip-flops required is -----.

Options :

1. ✖ 4

2. ✔ 5

3. ✖ 6

4. ✖ 8

Question Number : 55 Question Id : 587587415 Display Question Number : Yes Is Question Mandatory : No

Suppose that we need to design a multiplexer to generate the following combinational logic equation:

$$Y = \bar{D}\bar{C}\bar{B}\bar{A} + \bar{D}CB\bar{A} + D\bar{C}B\bar{A} + D\bar{C}\bar{B}A + \bar{D}\bar{C}BA + DC\bar{B}\bar{A} + \bar{D}C\bar{B}A + DCB\bar{A}$$

The number of data inputs required is -----.

Options :

1. ✖ 4

2. ✖ 16

3. ✓ 8

4. ✗ 32

Question Number : 56 Question Id : 587587416 Display Question Number : Yes Is Question

Mandatory : No

Consider the following standard product of sums.

$$f(A, B, C) = (A + \bar{B} + C)(A + B + C)(A + \bar{B} + \bar{C}).$$

This can be simplified to -----.

Options :

1. ✗ $\bar{A} + B C$

2. ✓ $A + \bar{B} C$

3. ✗ $A + \bar{B} \bar{C}$

4. ✗ $\bar{A} + \bar{B} \bar{C}$

Question Number : 57 Question Id : 587587417 Display Question Number : Yes Is Question

Mandatory : No

An 8-bit ADC is used to digitize an analog signal in the 0 to 5 V range. The maximum peak to peak ripple voltage that can be allowed in the dc supply voltage is approximately -----.

Options :

1. ✓ 20 mV

2. ✗ 10 mV

3. ✗ 5 mV

4. ✖ 40 mV

Question Number : 58 Question Id : 587587418 Display Question Number : Yes Is Question

Mandatory : No

An 8-bit DAC provides an analog output which has a peak value of 5.12 volt. The resolution of the DAC is -----.

Options :

1. ✖ 40 mV

2. ✖ 30 mV

3. ✖ 15 mV

4. ✔ 20 mV

Question Number : 59 Question Id : 587587419 Display Question Number : Yes Is Question

Mandatory : No

The figure of merit of digital IC logic family is the product of -----.

Options :

1. ✖ noise margin and power dissipation

2. ✖ bandwidth and gain

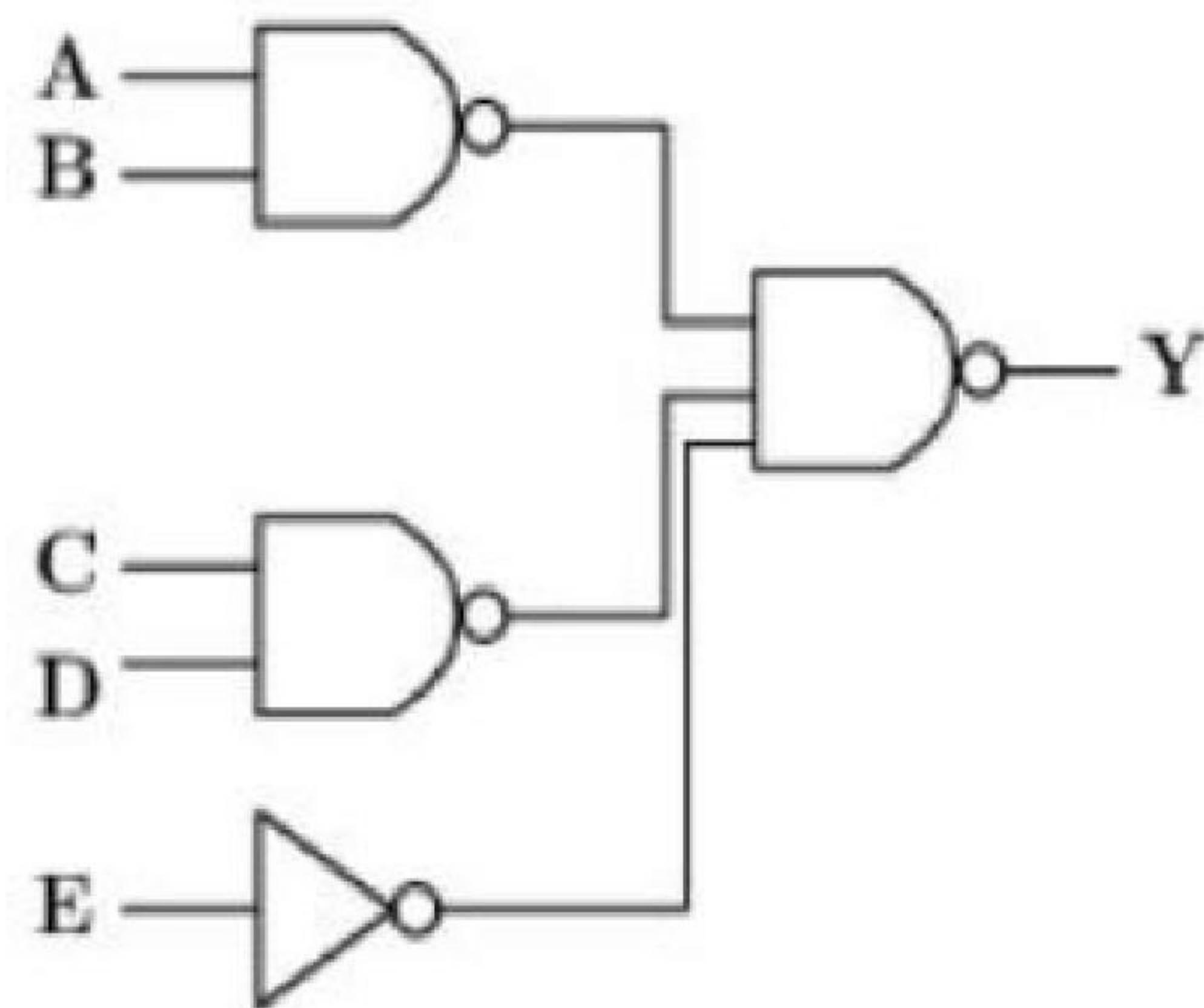
3. ✔ propagation delay and power dissipation

4. ✖ propagation delay and fan-in

Question Number : 60 Question Id : 587587420 Display Question Number : Yes Is Question

Mandatory : No

For the digital logic circuit shown, the expression for Y is given by -----.



Options :

1. ✓ $AB + CD + E$

2. ✗ $AB + CD \bar{E}$

3. ✗ $\bar{A} \bar{B} + CD + \bar{E}$

4. ✗ $AB + \bar{C} \bar{D} + E$

Question Number : 61 Question Id : 587587421 Display Question Number : Yes Is Question

Mandatory : No

Let $g(t) = \sum_{k=-\infty}^{\infty} \delta(t - kT)$, a periodic delta function with period T. The Fourier transform of g(t) denoted by G(f) is -----.

Options :

1. ✗ $(1/T) \sum_{k=-\infty}^{\infty} \delta(f - kT)$

2. ✓ $(1/T) \sum_{k=-\infty}^{\infty} \delta(f - (k/T))$

3. ✗ $\sum_{k=-\infty}^{\infty} \delta(f - (k/T))$

4. ✖ $\sum_{k=-\infty}^{\infty} \delta(f - KT)$

Question Number : 62 Question Id : 587587422 Display Question Number : Yes Is Question

Mandatory : No

The transfer function of a system is given by $H(f) = -2j \operatorname{sgn}(f)$ where 'sgn' denotes the signum function. Its impulse response is given by -----.

Options :

1. ✖ $\frac{2}{t}$

2. ✔ $\frac{2}{\pi t}$

3. ✖ $2t$

4. ✖ πt

Question Number : 63 Question Id : 587587423 Display Question Number : Yes Is Question

Mandatory : No

The transfer function of a low pass filter in the interval $f \in (-0.5, 0.5)$ is given by

$$H(f) = \exp(-j \pi f).$$

What is the impulse response?

Options :

1. ✔ $\operatorname{sinc}(t-0.5)$

2. ✖ $\operatorname{sinc}(t+0.5)$

3. ✖ $\operatorname{sinc}(t-1)$

4. ✖ $\text{sinc}(t+1)$

Question Number : 64 Question Id : 587587424 Display Question Number : Yes Is Question

Mandatory : No

Two time-limited signals $g_1(t)$ and $g_2(t)$ are defined in the interval $[1, 3]$, and $[5, 7]$, respectively. Then, the convolution of the two signals is zero except for -----.

Options :

1. ✖ $1 < t < 7$

2. ✔ $6 < t < 10$

3. ✖ $5 < t < 7$

4. ✖ $3 < t < 5$

Question Number : 65 Question Id : 587587425 Display Question Number : Yes Is Question

Mandatory : No

Suppose that $g(t) = \delta(t)$. The pre-envelope of $g(t)$ is given by -----.

Options :

1. ✖ $\delta(t) + j\left(\frac{1}{t}\right)$

2. ✔ $\delta(t) + j\left(\frac{1}{\pi t}\right)$

3. ✖ $\delta(t) - j\left(\frac{1}{\pi t}\right)$

4. ✖ $\delta(t) - j\left(\frac{1}{t}\right)$

Question Number : 66 Question Id : 587587426 Display Question Number : Yes Is Question Mandatory : No

Consider an exponentially damped sinusoidal signal $g(t) = \exp(-t)\sin t u(t)$, where $u(t)$ is the unit step function. The area under $g(t)$ is equal to -----.

Options :

1. ✖ 0.25

2. ✔ 0.5

3. ✖ 1

4. ✖ 0.75

Question Number : 67 Question Id : 587587427 Display Question Number : Yes Is Question Mandatory : No

The following is/are true regarding autocorrelation function (ACF) $R(\tau)$ of a real-valued energy signal $g(t)$:

Options :

1. ✖ $R(\tau)$ is an even function of τ .

2. ✖ $R(\tau)$ at $\tau = 0$ denotes the area under the energy spectral density (ESD).

3. ✖ ACF and ESD form a Fourier transform pair.

All of the above options are true

4. ✔

Question Number : 68 Question Id : 587587428 Display Question Number : Yes Is Question Mandatory : No

The Z-transform of $2^n u[n]$, where $u[n]$ is the unit step sequence, is given by -----

Options :

1. ✖ $\frac{1}{1-2z^{-1}}, |z| < 2$

2. ✔ $\frac{1}{1-2z^{-1}}, |z| > 2$

3. ✖ $\frac{-1}{1-2z^{-1}}, |z| < 2$

4. ✖ $\frac{-1}{1-2z^{-1}}, |z| > 2$

Question Number : 69 Question Id : 587587429 Display Question Number : Yes Is Question

Mandatory : No

The Laplace transform of the two sided exponential decay $\exp(-|t|)$ is given by

Options :

1. ✔ $\frac{2}{1-s^2}, -1 < \text{Re}(s) < 1$

2. ✖ $\frac{2}{1+s^2}, -1 < \text{Re}(s) < 1$

3. ✖ $\frac{1}{1-s^2}, -1 < \text{Re}(s) < 1$

4. ✖ $\frac{1}{1+s^2}, -1 < \text{Re}(s) < 1$

Question Number : 70 Question Id : 587587430 Display Question Number : Yes Is Question

Mandatory : No

Consider the impulse responses $h_1(t) = \delta(t - 0.5)$ and $h_2(t) = \delta(t + 0.5)$ of two systems. Suppose that the systems are connected in cascade. The impulse response of the overall system is given by -----.

Options :

1. ✖ $h_{eq}(t) = \delta(t + 1)$

2. ✖ $h_{eq}(t) = \delta(t - 0.5)$

3. ✔ $h_{eq}(t) = \delta(t)$

4. ✖ $h_{eq}(t) = \delta(t - 1)$

Question Number : 71 Question Id : 587587431 Display Question Number : Yes Is Question Mandatory : No

Integrating a unit step function twice results in a -----.

Options :

1. ✖ unit ramp function

2. ✖ unit delta function

3. ✔ unit parabolic function

4. ✖ unit doublet function

Question Number : 72 Question Id : 587587432 Display Question Number : Yes Is Question Mandatory : No

A unity feedback system has transfer function $G(s) = 16/(s(s + 4))$. Its undamped natural frequency of oscillations is -----.

Options :

1. ✖ 16

2. ✔ 4

3. ✖ 2

4. ✖ 64

Question Number : 73 Question Id : 587587433 Display Question Number : Yes Is Question

Mandatory : No

The unit impulse response of a system is given by $0.25 \exp(-0.25t)$. Its transfer function is given by -----.

Options :

1. ✖ $1/(s+4)$

2. ✔ $1/(1+4s)$

3. ✖ $4/(4+s)$

4. ✖ $4/(1+4s)$

Question Number : 74 Question Id : 587587434 Display Question Number : Yes Is Question

Mandatory : No

The transfer function of a system is $9/(1+s)$. When operated as a unity feedback control system, the steady state error to a unit step input is equal to -----.

Options :

1. ✖ 0

2. ✖ Infinity

3. ✔ 0.1

4. ✖ $1/9$

Question Number : 75 Question Id : 587587435 Display Question Number : Yes Is Question Mandatory : No

Consider the transfer function $GH = \frac{k(s+2)}{s^2(s+4)(s+9)}$. The bode gain is equal to -----.

Options :

1. ✖ k

2. ✔ k/18

3. ✖ 2 k

4. ✖ 18k

Question Number : 76 Question Id : 587587436 Display Question Number : Yes Is Question Mandatory : No

Consider $GH = \frac{K}{s(s+2)^2}$. What value of K satisfies $|GH(j2)| = 2$?

Options :

1. ✔ $|K| = 32$

2. ✖ $|K| = 16$

3. ✖ $|K| = 8$

4. ✖ $|K| = 4$

Question Number : 77 Question Id : 587587437 Display Question Number : Yes Is Question Mandatory : No

Suppose that $GH(j\omega) = \frac{2}{(j\omega+1)^3}$. The gain margin of the system is equal to -----.

Options :

1. ✖ 8

2. ✔ 4

3. ✖ 2

4. ✖ 16

Question Number : 78 Question Id : 587587438 Display Question Number : Yes Is Question

Mandatory : No

Suppose that $GH(j\omega) = \frac{1}{(j\omega+1)^3}$. The phase margin of the system is equal to -----.

Options :

1. ✖ 0 degree

2. ✔ 180 degrees

3. ✖ 90 degrees

4. ✖ 45 degrees

Question Number : 79 Question Id : 587587439 Display Question Number : Yes Is Question

Mandatory : No

Consider the transfer function $\frac{4}{5+2s+s^2}$. The resonant peak is equal to -----

Options :

1. ✔ 1

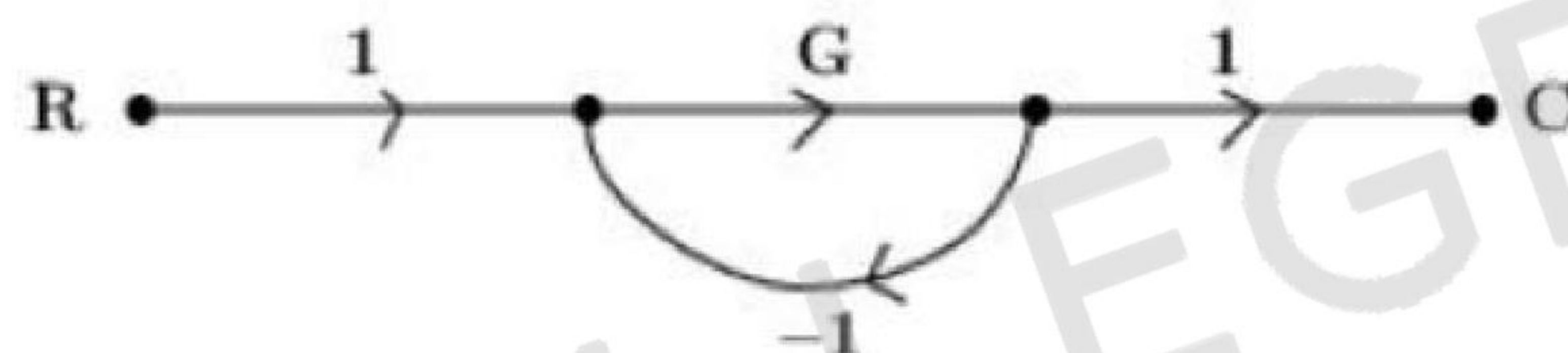
2. ✖ 1.25

3. ✖ 0.8

4. ✖ 0.25

Question Number : 80 Question Id : 587587440 Display Question Number : Yes Is Question Mandatory : No

Refer to the signal flow graph show. The transfer function is -----.



Options :

1. ✖ $1+G$

2. ✔ $\frac{1}{1+G}$

3. ✖ $1-G$

4. ✖ $\frac{1}{1-G}$

Question Number : 81 Question Id : 587587441 Display Question Number : Yes Is Question Mandatory : No

The unit of amplitude sensitivity K_a in amplitude modulation (AM) is -----.

Options :

1. ✖ volt

2. ✖ volt square

3. ✔ volt⁻¹

4. ✖ volt-ampere

Question Number : 82 Question Id : 587587442 Display Question Number : Yes Is Question

Mandatory : No

Consider amplitude modulation (AM). In an AM system, the maximum amplitude of the modulated signal is four times to its minimum amplitude. Then, the modulation index, is equal to -----.

Options :

1. ✖ 0.3

2. ✔ 0.6

3. ✖ 0.4

4. ✖ 0.5

Question Number : 83 Question Id : 587587443 Display Question Number : Yes Is Question

Mandatory : No

The range of carrier frequency in frequency modulation (FM) based radio broadcasting is -----

Options :

1. ✖ 535—1635 KHz

2. ✔ 88—108 MHz

3. ✖ 824—849 MHz

4. ✖ 2.4 — 5.8 GHz

Question Number : 84 Question Id : 587587444 Display Question Number : Yes Is Question

Mandatory : No

A superheterodyne receiver (SHRX) with an IF of 450 KHz is tuned to an incoming signal frequency 1200 KHz. The image frequency is -----.

Options :

1. ✖ 900 KHz

2. ✖ 750 KHz

3. ✖ 1650 KHz

4. ✔ 2100 KHz

Question Number : 85 Question Id : 587587445 Display Question Number : Yes Is Question

Mandatory : No

A tuned circuit resonates at 1 MHz. It has a quality factor of 100. Bandwidth between half-power points is -----.

Options :

1. ✔ 10 KHz

2. ✖ 100 KHz

3. ✖ 100 Hz

4. ✖ 1 MHz

Question Number : 86 Question Id : 587587446 Display Question Number : Yes Is Question

Mandatory : No

Which one of the following subsystem is NOT common in both FM and AM superheterodyne receivers?

Options :

1. ✗ RF amplifier
2. ✗ Mixer
3. ✗ IF amplifier
4. ✓ Slope detector

Question Number : 87 Question Id : 587587447 Display Question Number : Yes Is Question

Mandatory : No

A random variable (RV) Y has probability density function (pdf) given by $p_Y(y) = a \exp(-by), y \geq 0$, where a and b are constants. The relationship between a and b is -----.

Options :

1. ✗ $a = 2b$
2. ✓ $a = b$
3. ✗ $a = 0.5b$
4. ✗ $b = 0.25a$

Question Number : 88 Question Id : 587587448 Display Question Number : Yes Is Question

Mandatory : No

A WSS random process $X(t)$ whose mean value is 1, is applied to the input of an LTI system with impulse response $h(t) = \exp(-\pi t^2), t \in R$. The mean value of output $Y(t)$ of the system is equal to -----.

Options :

1. ✓ 1

2. ✗ 0.5

3. ✗ 2

4. ✗ 0.25

Question Number : 89 Question Id : 587587449 Display Question Number : Yes Is Question

Mandatory : No

Suppose that $R = 10^4 \Omega$, $T = 20^\circ C$, and the bandwidth of observation is 1 MHz. What is the approximate value of root mean square (RMS) noise voltage?

(Note: Boltzmann's constant $K = 1.38 \times 10^{-23}$ joules per degree Kelvin.)

Options :

1. ✗ 127 microvolts

2. ✗ 12.7 millivolt

3. ✓ 12.7 microvolt

4. ✗ 12.7 nanovolt

Question Number : 90 Question Id : 587587450 Display Question Number : Yes Is Question

Mandatory : No

In a PCM system, uniform quantization is used. In it, each quantization level is encoded into 9 bits. The signal to quantization noise ratio is approximately equal to -----.

Options :

1. ✗ 24 dB

2. ✓ 56 dB

3. ✗ 48 dB

4. ✗ 512 dB

Question Number : 91 Question Id : 587587451 Display Question Number : Yes Is Question

Mandatory : No

Let $m(t) = bt$, where 'b' is a positive constant. The signal $m(t)$ is applied to a delta modulator with sampling duration T_s and step size δ . Slope-overload distortion occurs when -----.

Options :

1. ✓ $\delta < b T_s$

2. ✗ $\delta < b$

3. ✗ $\delta > b T_s$

4. ✗ $\delta > b$

Question Number : 92 Question Id : 587587452 Display Question Number : Yes Is Question

Mandatory : No

Four message signals each band-limited to 2.5 KHz are sampled at Nyquist rate. The resulting PAM samples are pulse code modulated and transmitted over a single channel after TDM. The number of quantization levels used is 512. The bit rate of the system is equal to -----.

Options :

1. ✗ 90 Kbps

2. ✓ 180 Kbps

3. ✖ 1 Mbps

4. ✖ 1.8 Mbps

Question Number : 93 Question Id : 587587453 Display Question Number : Yes Is Question

Mandatory : No

A continuous-time signal has voltage range -2 V to 2 V. The signal is sampled uniformly at Nyquist rate and uniformly quantized. If each quantization level is encoded to 8 bits per sample, the resulting signal have -----.

Options :

1. ✖ 256 levels of step size 1/128

2. ✖ 128 levels of step size 1/64

3. ✔ 256 levels of step size 1/64

4. ✖ 256 levels of step size 1/256

Question Number : 94 Question Id : 587587454 Display Question Number : Yes Is Question

Mandatory : No

Consider the transmission of binary PAM data over a baseband channel. The transmission bandwidth requirement is 72.0 KHz. Suppose that the transmitter uses raised cosine pulse shaping filter with roll-off factor β . Furthermore, the Nyquist bandwidth is equal to $\frac{1}{2T_b}$, where T_b denotes the bit duration. If the bit duration is 10 microseconds, β will be equal to -----.

Options :

1. ✖ 0.11

2. ✔ 0.44

3. ✖ 0.22

4. ✖ 0.88

Question Number : 95 Question Id : 587587455 Display Question Number : Yes Is Question

Mandatory : No

Consider a wideband FM receiver. When the modulation index is 5, the figure of merit of the FM receiver is equal to -----.

Options :

1. ✖ 3.75

2. ✔ 37.5

3. ✖ 1.5

4. ✖ 75

Question Number : 96 Question Id : 587587456 Display Question Number : Yes Is Question

Mandatory : No

Which of the following modulation scheme was used in the second generation narrowband digital cellular standard GSM?

Options :

1. ✖ Frequency shift keying

2. ✖ Phase shift keying

3. ✖ On-off keying

4. ✔ Gaussian minimum shift keying

Question Number : 97 Question Id : 587587457 Display Question Number : Yes Is Question

Mandatory : No

What is the approximate information capacity of the telephone channel when the received SNR is 30 dB and the channel bandwidth equal to 20 KHz? Assume AWGN channel.

Options :

1. ✓ 199 Kbps

2. ✗ 19.9 Kbps

3. ✗ 9.9 Kbps

4. ✗ 100 Kbps

Question Number : 98 Question Id : 587587458 Display Question Number : Yes Is Question

Mandatory : No

A communication system uses FSK transmitter (Tx) and coherent FSK receiver. The Tx transmits binary data at 2.5 Mbps using a sinusoidal carrier having amplitude 1 microvolt. Assuming AWGN channel with two-sided PSD equal to 10^{-20} W/Hz, the average probability of bit error is equal to ----- . (Note: $\text{erfc}(\cdot)$ denotes the complementary function.)

Options :

1. ✓ $\frac{\text{erfc}(\sqrt{5})}{2}$

2. ✗ $\frac{\text{erfc}(\sqrt{10})}{2}$

3. ✗ $\frac{\text{erfc}(\sqrt{20})}{2}$

4. ✗ $\frac{\text{erfc}(5)}{2}$

Question Number : 99 Question Id : 587587459 Display Question Number : Yes Is Question

Mandatory : No

Suppose that a Direct sequence CDMA system has information bit rate of 1.8 Kbps and chip rate of 360 kbps. The processing gain in dB is approximately equal to -----.

(Use: $\log_{10}(2) = 0.3010$.)

Options :

1. ✖ 13 dB

2. ✔ 23 dB

3. ✖ 33 dB

4. ✖ 26 dB

Question Number : 100 Question Id : 587587460 Display Question Number : Yes Is Question

Mandatory : No

Consider the figure of merit (FoM) of single tone AM and wideband FM receivers. If the FoM of wideband FM is 72 times to the FoM of AM with 100% modulation, the modulation index of FM is -----.

Options :

1. ✖ 2

2. ✖ 4

3. ✖ 6

4. ✔ 8

Question Number : 101 Question Id : 587587461 Display Question Number : Yes Is Question

Mandatory : No

Consider a z- polarized electromagnetic wave propagation in vacuum, which is characterized by the following:

$$E = E_0 \exp\{j (\omega t - 30 x + 40 y)\} \hat{z}.$$

The wavelength of the wave is ----- . (Assume SI units)

Options :

1. ✖ $\frac{\pi}{5}$

2. ✔ $\frac{\pi}{25}$

3. ✖ $\frac{\pi}{125}$

4. ✖ $\frac{\pi}{50}$

Question Number : 102 Question Id : 587587462 Display Question Number : Yes Is Question

Mandatory : No

Consider a 90 watt lamp. The intensity (in watt/m²) at a distance 1 meter is approximately ----- ,
(use: $\frac{1}{2\pi} \approx 0.16$.)

Options :

1. ✖ 72 watt/m²

2. ✖ 0.72 watt/m²

3. ✔ 7.2 watt/m²

4. ✖ 720 watt/m²

Question Number : 103 Question Id : 587587463 Display Question Number :

Mandatory : No

For copper, assume conductivity of 60×10^6 mho/m and $\mu \approx \mu_0$. The skin depth at 0.1 GHz is approximately -----, (use: $\frac{1}{2\pi} \approx 0.16$ and $\frac{1}{\sqrt{6}} \approx 0.4$.)

Options :

- 1. ✗ $64 \mu m$
- 2. ✓ $6.4 \mu m$
- 3. ✗ $0.64 \mu m$
- 4. ✗ $0.064 \mu m$

Question Number : 104 Question Id : 587587464 Display Question Number : Yes Is Question

Mandatory : No

Suppose that for the glass-air interface, $n_1 = 1.5$, $n_2 = 1$. The critical angle (in degrees) is approximately-----.

Options :

- 1. ✗ 62°
- 2. ✗ 72°
- 3. ✗ 82°
- 4. ✓ 42°

Question Number : 105 Question Id : 587587465 Display Question Number : Yes Is Question

Mandatory : No

Suppose that a quarter-wave transformer has input impedance, denoted by Z_{in} . It has characteristic impedance of 150Ω . If the quarter-wave transformer is matching a $Z_{in} \Omega$ source with a 300Ω load, Z_{in} is -----.

Options :

1. ✖ $50\ \Omega$

2. ✔ $75\ \Omega$

3. ✖ $100\ \Omega$

4. ✖ $300\ \Omega$

Question Number : 106 Question Id : 587587466 Display Question Number : Yes Is Question

Mandatory : No

Suppose that the velocity of an electromagnetic wave in free space is 3×10^8 m/s. Further, the velocity in a medium with $\mu_r = 4$ is 3×10^8 m/s. The relative permittivity ϵ_r is equal to -----

Options :

1. ✖ 4.5

2. ✖ 4

3. ✔ 2.25

4. ✖ 2.5

Question Number : 107 Question Id : 587587467 Display Question Number : Yes Is Question

Mandatory : No

Suppose that VSWR is 1.25. Then, the magnitude of the reflection coefficient is -----.

Options :

1. ✖ $1/3$

2. ✔ $1/9$

3. ✖ $2/3$

4. ✖ $2/9$

Question Number : 108 Question Id : 587587468 Display Question Number : Yes Is Question

Mandatory : No

Suppose that the cutoff frequency of a rectangular waveguide in dominant mode is 4.5 GHz.
The width of the waveguide is approximately -----.

Options :

1. ✖ 33.3 cm

2. ✔ 3.33 cm

3. ✖ 6.6 m

4. ✖ 0.66 m

Question Number : 109 Question Id : 587587469 Display Question Number : Yes Is Question

Mandatory : No

Consider the boundary between free space and glass. If a uniform plane wave with $E_m = 0.9$ volt/m and frequency 180 MHz is incident from free space normal to the glass ($\eta_2 \approx 0.5 \eta_1$), the reflection and transmission coefficients, respectively, are ----- . (Assume $\eta_1 = 120\pi \Omega$.)

Options :

1. ✖ $-1/9, 8/9$

2. ✖ $-1/6, 5/6$

3. ✔ $-1/3, 2/3$

4. ✖ -2/3, 1/3

Question Number : 110 Question Id : 587587470 Display Question Number : Yes Is Question Mandatory : No

Consider a uniform plane wave of frequency 270 MHz travelling in an infinite, lossless medium having $\epsilon_r = 4.5$, $\mu_r = 2$, and $\sigma = 0$. The intrinsic impedance is -----.

Options :

1. ✖ 8π

2. ✔ 80π

3. ✖ 240π

4. ✖ 60π

Question Number : 111 Question Id : 587587471 Display Question Number : Yes Is Question Mandatory : No

Let $A = \begin{bmatrix} -2 & 6 \\ -2 & 5 \end{bmatrix}$. The eigen values of $A^{-5} = (A^{-1})^5$ are

Options :

1. ✔ 1/32, 1

2. ✖ 1/2, 2

3. ✖ 32, 1

4. ✖ 16, 4

Question Number : 112 Question Id : 587587472 Display Question Number : Yes Is Question Mandatory : No

The function $f(x, y) = x + y$ has absolute maximum on curve $x^2 + y^2 = 4, y \geq 0$ at

Options :

1. ✖ (2,0)
2. ✖ (-2,0)
3. ✖ (0,2)
4. ✔ $(\sqrt{2}, \sqrt{2})$

Question Number : 113 Question Id : 587587473 Display Question Number : Yes Is Question Mandatory : No

Flux of $F = 4xz \mathbf{i} - y^2 \mathbf{j} + yz \mathbf{k}$ outward through the surface of the cube from the first octant by the planes $x = 1, y = 1, z = 1$ is

Options :

1. ✖ 1
2. ✖ 0
3. ✔ 1.5
4. ✖ 4

Question Number : 114 Question Id : 587587474 Display Question Number : Yes Is Question Mandatory : No

$\int_0^2 \int_{x^2}^{2x} f(x, y) dy dx$ is equal to

Options :

1. ✓ $\int_0^4 \int_{y/2}^{\sqrt{y}} f(x, y) \, dx \, dy$

2. ✗ $\int_0^4 \int_{\sqrt{y}}^{y/2} f(x, y) \, dx \, dy$

3. ✗ $\int_0^4 \int_{-\sqrt{y}}^{y/2} f(x, y) \, dx \, dy$

4. ✗ $\int_0^4 \int_{-\sqrt{y}}^y f(x, y) \, dx \, dy$

Question Number : 115 Question Id : 587587475 Display Question Number : Yes Is Question Mandatory : No

The solution of the initial value problem $4\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 3y = 0; y(0) = 2, \frac{dy}{dx}(0) = \frac{1}{2}$ is

Options :

1. ✓ $-\frac{1}{2}e^{\frac{3}{2}x} + \frac{5}{2}e^{\frac{1}{2}x}$

2. ✗ $\frac{1}{2}e^{\frac{3}{2}x} + \frac{5}{2}e^{\frac{1}{2}x}$

3. ✗ $\frac{1}{2}e^{\frac{3}{2}x} - \frac{5}{2}e^{\frac{1}{2}x}$

4. ✗ $-e^{\frac{3}{2}x} + e^{\frac{1}{2}x}$

Question Number : 116 Question Id : 587587476 Display Question Number : Yes Is Question Mandatory : No

The general solution of $\frac{dy}{dx} + \frac{2x+1}{x}y = e^{-2x}$ is

Options :

1. ✖ $\frac{1}{2}e^{-2x} + \frac{C}{x}e^{-2x}$

2. ✔ $\frac{1}{2}xe^{-2x} + \frac{C}{x}e^{-2x}$

3. ✖ $\frac{1}{2}e^{-2x}$

4. ✖ $\frac{1}{2} + \frac{C}{x}e^{-2x}$

Question Number : 117 Question Id : 587587477 Display Question Number : Yes Is Question

Mandatory : No

While watching IPL, you observe someone who is clearly supporting CSK (Chennai super kings) in the game. Assume that the probability that a randomly selected person in a typical local environment is born with in 150 km of Chennai is 0.05, and the chance that a person born with in 150 km of Chennai actually supports CSK is 0.7, the probability that a person not born with in 150 km of Chennai supports CSK with probability 0.1. Probability that supporters of CSK were actually born with in 150 km of Chennai is

Options :

1. ✖ $\frac{6}{26}$

2. ✖ $\frac{5}{26}$

3. ✖ $\frac{8}{26}$

4. ✔ $\frac{7}{26}$

Question Number : 118 Question Id : 587587478 Display Question Number : Yes Is Question

Mandatory : No

Let X be normal with $\mu = 5$ and $\sigma = 0.2$. The value of C such that $P[X \leq C] = 0.95$ is (use $\phi(1.645) = 0.95$ from the cumulative distribution table for standard normal variable)

Options :

1. ✖ 4.25

2. ✖ 0.56

3. ✔ 5.329

4. ✖ 8.25

Question Number : 119 Question Id : 587587479 Display Question Number : Yes Is Question Mandatory : No

Let $f(z) = \frac{1}{z(z-2)^4}$ and $C: |z - 2| = 1$. The value of $\int_C f(z) dz$ is

Options :

1. ✖ $\frac{\pi i}{8}$

2. ✖ πi

3. ✖ $\frac{\pi i}{4}$

4. ✔ $-\frac{\pi i}{8}$

Question Number : 120 Question Id : 587587480 Display Question Number : Yes Is Question Mandatory : No

Consider $3\frac{dy}{dx} + \sqrt{y} = e^{0.1x}$; $y(0.3) = 5$. The value of $y(0.6)$ using Euler's method with step size $h = 0.3$ is

Options :

1. ✖ 4.5605

2. ✔ 4.8794

3. ✖ 4.2501

4. ✖ 4.1464

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