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 μF 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 9Ω 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 ------------.
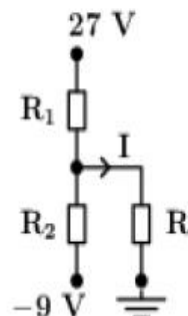
Options :

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, $R_1 = R_2 = 10^6$ Ω and $I = 9$ μA. The resistance R is equal to --------------.

27 V

R₁

I

R₂   R

−9 V

Options :

1. ✗ 100 KΩ

2. ✗ 200 KΩ

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 μC. The capacitance is given by ------------.

Options :

1. ✖ 1 μF

2. ✖ 2 μF

3. ✔ 0.5 μF

4. ✖ 10 μF

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 $i(t) = cos\ (\omega t)$ A, is 9 watt. The resistor is of ------------.

Options :

1. ✖ 9 Ω

2. ✔ 18 Ω

3. ✖ 3 Ω

4. ✖ $81 \, \Omega$

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 ----------.
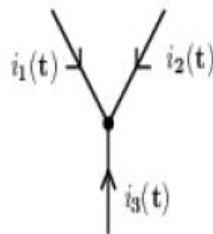
Options :

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 Ω, inductance of 1 H, and capacitance of 1 μF. Let the supply voltage is 29.7 V. The current flowing through the circuit at resonance is ----------------.
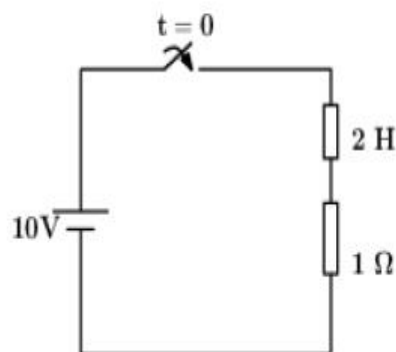
Options :

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---------.
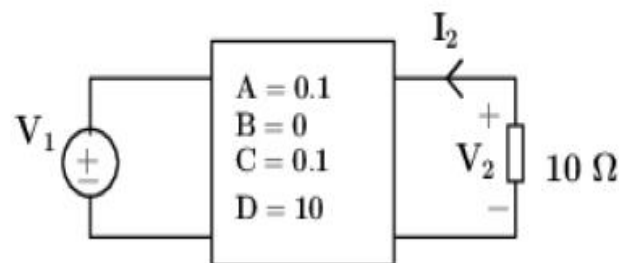

Options :

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. ✖ $10 \ cm^2/V\text{-sec.}$

2. ✖ $100 \ cm^2/V\text{-sec.}$

3. ✖ $0.1 \ cm^2/V\text{-sec.}$

4. ✔ $1000 \ cm^2/V\text{-sec.}$

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. ✖ SiO_2

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/cm^3. The equilibrium hole concentration at room temperature is ----------.
(Note: Intrinsic concentration for Si at room temperature = 1.5×10^{10} cm^{-3}.)

Options :

1. ✖ 1.5×10^2 cm^{-3}

2. ✖ 0.15×10^2 cm^{-3}

3. ✔ 2.25×10^2 cm^{-3}

4. ✖ 22.5×10^2 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 2.7μm in pure Si at an electric field of 100 V/cm is ------------------. (Given: μ_n = 1350 cm²/V-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 ----------.

Band 3

-------------- E_F

Band 2

Band 1
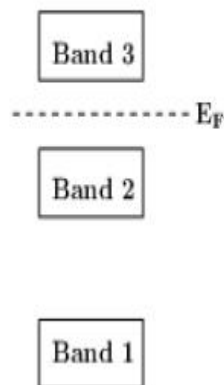
Options :

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 100μm. 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 $\mu_p = 500\ cm^2/V\text{-sec}$. at room temperature. For the minority carrier the diffusion constant (for holes) is approximately --------------.

Options :

1. ✖ 1.3 cm²/sec

2. ✖ 130 cm²/sec

3. ✔ 13 cm²/sec

4. ✖ 26 cm²/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 ------------------.
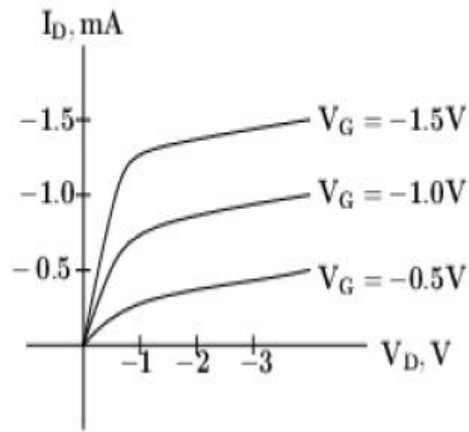
Options :

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: $ln\ 9 \approx 2.3, V_T = 0.026\ V$.)

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 (η = 2) operating in the conducting region at room temperature. The approximate change in voltage for a tenfold increase in current is --------------.

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

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: $\ln 2 \approx 0.693, V_T = 0.026\ V.$)

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 KΩ resistor and 10 V power supply. If the diode is forward biased, the approximate current in the circuit is ----------------.

(Assume $V_\gamma = 0.6\ V.$)

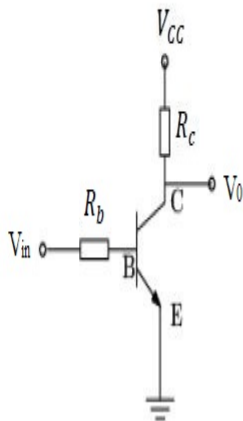**Options :**

1. ✖ 0.35 mA

2. ✖ 5.65 mA

3. ✖ 0 mA

4. ✔ 4.65 mA

Question Number : 35 Question Id : 587587395 Display Question Number : Yes Is Question

Mandatory : No

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

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

Options :

1. ✓ 210 KΩ

2. ✗ 21 KΩ

3. ✗ 2.1 KΩ

4. ✗ 2.1 MΩ

Question Number : 36 Question Id : 587587396 Display Question Number : Yes Is Question Mandatory : No

Suppose that A BJT has $\alpha = 0.99, I_B = 10\,\mu A$, $I_{CBO} = 100\,nA$. 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 Ω. This diode is to supply power to a 900 Ω load from a $\frac{100}{\sqrt{2}}$ (rms) power supply. The dc load current is approximately -------.

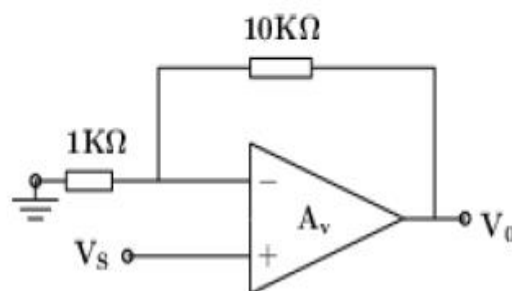**Options :**

1. ✖ 320 mA

2. ✔ 32 mA

3. ✖ 16 mA

4. ✖ 0.32 μA

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 $v_1 = 10\,V$, $v_2 = 0\,V$. 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---------------.
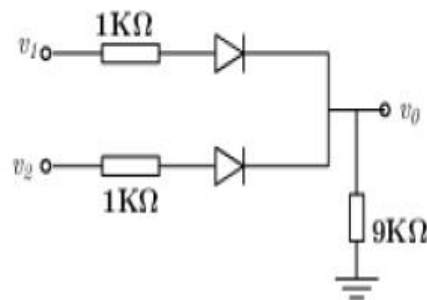
Options :

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 $V_{CC} = 9\,V, R_C = x\,K\Omega, h_{FE} = 100, V_{\{CE,sat\}} = 0.3V$ The collector current at saturation is 17.4 mA. The resistance R_C is -----

Options :

1. ✖ $1\,K\Omega$

2. ✖ $2\,K\Omega$

3. ✔ $0.5\,K\Omega$

4. ✖ $3\,K\Omega$

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 $C = 250\ pF$, $L_{eq} = 4\ mH$. 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 $V_{GS} = 0\ V$. Suppose that a JFET has $I_{DSS} = 12\ mA$, $V_p = -4\ V$. 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 $I_{DSS} = 9\,mA,$, $V_p = -4\,V, V_{GS} = -2\,V$. 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. ✗ 0.6µs

2. ✓ 6µs

3. ✗ 60µs

4. ✗ 600µs

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.
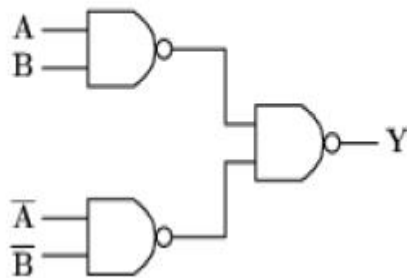
Options :

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-flip 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 $256 \times 8 - bit$ 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:

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

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 :

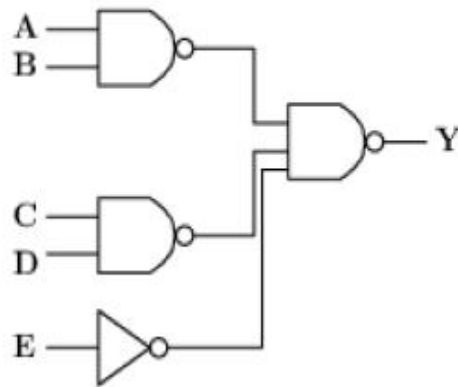1. ✖ noise margin and power dissipation

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. ✔ $A\,B + CD + E$

2. ✖ $A\,B + C\,D\,\bar{E}$

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 sgn(f) where 'sgn' denotes the signum function. Its impulse response is given by --------------.

Options :

1. ✖ $\dfrac{2}{t}$

2. ✔ $\dfrac{2}{\pi t}$

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. ✔ sinc(t-0.5)

2. ✖ sinc(t+0.5)

3. ✖ sinc(t-1)

4. ✖ 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. ✖ $\delta(t) + j(\frac{1}{t})$

2. ✔ $\delta(t) + j(\frac{1}{\pi t})$

3. ✖ $\delta(t) - j(\frac{1}{\pi t})$

4. ✖ $\delta(t) - j(\frac{1}{t})$

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. ✓ $\frac{2}{1-s^2}, -1 < Re(s) < 1$

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

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

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

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 $GH = \dfrac{k(s+2)}{s^2(s+4)(s+9)}$. 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 $GH = \dfrac{K}{s\,(s+2)^2}$. 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 $GH(j\omega) = \dfrac{2}{(j\omega+1)^3}$. 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 $GH(j\omega) = \dfrac{1}{(j\omega+1)^3}$. 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 $\dfrac{4}{5+2s+s^2}$. 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 ------------.
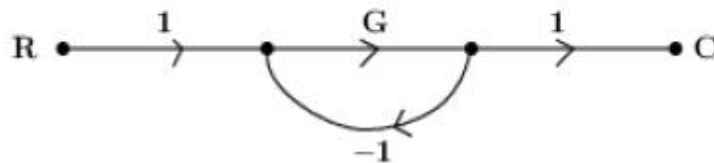
Options :

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 $R = 10^4 \, \Omega$, $T = 20^0 \, C$, 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: $erfc(.)$ denotes the complementary function.)

Options :

1. ✔ $\dfrac{erfc(\sqrt{5})}{2}$

2. ✖ $\dfrac{erfc(\sqrt{10})}{2}$

3. ✖ $\dfrac{erfc(\sqrt{20})}{2}$

4. ✖ $\dfrac{erfc(5)}{2}$

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. ✖ $\dfrac{\pi}{5}$

2. ✔ $\dfrac{\pi}{25}$

3. ✖ $\dfrac{\pi}{125}$

4. ✖ $\dfrac{\pi}{50}$

Question Number : 102 Question Id : 587587462 Display Question Number : Yes Is Question Mandatory : No

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

Options :

1. ✖ 72 watt/m^2

2. ✖ 0.72 watt/m^2

3. ✔ 7.2 watt/m^2

4. ✖ 720 watt/m^2

Question Number : 103 Question Id : 587587463 Display Question Number : Yes Is Question

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 150 Ω. If the quarter-wave transformer is matching a Z_{in} Ω source with a 300 Ω 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 $\varepsilon_r = 4.5$, $\mu_r = 2$, 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 $F = 4xz\, i - y^2\, j + yz\, k$ 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 $4\dfrac{d^2y}{dx^2} - 8\dfrac{dy}{dx} + 3y = 0; y(0) = 2, \dfrac{dy}{dx}(0) = \dfrac{1}{2}$ is

Options :

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

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

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

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 $\dfrac{dy}{dx} + \dfrac{2x+1}{x}y = e^{-2x}$ 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