Telangana State Council Higher Education

Notations :

I.Options shown m green color and with icon are correct.

2.0ptions shown in red color and with icon are incorrect.

Question Paper Name : Electronics and Commumcation Englneerlng 12th Aug 2021 Shift I

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Electronics and Communication Engineering

Group Number :	1
Group Id :	63643124
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Mathematics

Section Id :   63643144
Section Number :   1
Section type :   Online
Mandatory or Optional :   Mandatory
Number of Questions :   10
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Sub-Section Number :   1
Sub-Section Id :   63643144
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Question Number : 1 Question Id : 6364312761 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : O

If 2x — y + z = 0, 4x — 2y + 2z = 0 and 6x — 3y + 3z = 0, then (x, y, z) =

Options :

1. ✔ (1, 2, 0)

 (1, 1, –1)
 (0, 1, 1)

4. ✖ (3, 2, –4)

Which of the following is a repeated Eigen value of the matlix $\begin{bmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{bmatrix}$

Options :

3

—3

4

—4

$\frac{\sin z}{d}$
7
5 =
14=2 z Options :

0

iti

—m

2m

If z = coe $(x + y) + \sin^2 (x — y)$, then —6^2 z $\underline{\ddot{o}2z}$ =
$\ddot{o}x2$

Options :

1. ✖ $\dfrac{6^2 z}{\partial x \partial y}$

$\dfrac{\ddot{o}2z}{\ddot{o}x\ddot{o}y}$

$\underline{6^2 z}$

If C is the curve $x^2 + \underline{\quad} 1$, then $\left(x^2 + 3xy^2 \right) dx + \left(3x^2 y + y^4 \right) dy \underline{\quad}$

Options :

27t

The particular integral of $y'' + 4y = x \cos x$ is $a \sin x + b x \cos x$, where $(a, b) =$

Options :

1 2

2. ✔ $\left(\dfrac{2}{9}, \dfrac{1}{3} \right)$

$\left(\dfrac{-2}{9}, \dfrac{1}{3} \right)$

4. ✘ $\left(\dfrac{2}{3}, \dfrac{1}{9} \right)$

The solution of $Y' + Y = xe^x$ satisfying $y(0) = 0$ and $y'(0) = 1$ is $y = k (\cos x + 2\sin x)$, where k =

Options :

1

1

1
2

1
4

In a nonnal distlibution, the ratio between quanile deviation, mean deviation and standard deviation is

Options :

1. ✖ 3 : 4 : 5

7 : 8 : 10

Question Number : 9 Question Id : 6364312769 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A variate X has the probability distribution

x	-1	o	1	2
P(X = x)	3	4	6	4

Then E(X) =

Options :

4

4

3

8

3

Question Number : 10 Question Id : 6364312770 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : O

The largest positive root of the equation $x^3 - 5x^2 + 6x - 1 = 0$ lies in the interval

Options : (2. 3)

2. ✔ (3, 4)

3. ✘ (4, 5)

4. ✘ (5, 6)

Electronics and Communication Engineering

Section Id :	63643145
Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
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Question Number : 11 Question Id : 6364312771 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The unit of $\dfrac{R}{L}$ is 2 c

Options :

No unit

OH rad

4. ✔ Ω^2

Question Number : 12 Question Id : 6364312772 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : O

The initial value of z(t), z(s) $\underline{\hspace{2cm}}$ is $\frac{s2+3}{s3+4s2+6}$

Options :

2.4 1

$\frac{2}{s}$

Question Number : 13 Question Id : 6364312773 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

For a two port reciprocal bilateral network the tmnsmission parameters are

A = 1, B = 5, and D = 1, the parameter C will be

Options :

0.8

1.4

0.7

1.2

A typical two port network is charactefized by 2171 + ⬜ = 11 and

$6V_1$+ = 812. The value ofh21 is

Options :

1. * 0.235

2. * 0.325

3.4 0.375

✖ 0.525

WTen detennming Thevenm's resistance of a circuit

Options :

All sources must be open circuited

All sources must be sh01t circuited

All voltage sources must be open circuited and all current sources must be
3. short circuited

All sources must be replaced by their intemal resistances

Three resistance of 15Q each are connected in delta. The resistance of equivalent
star will have a value of

Options :

120

2   50

3   5/3Q

45Q

Correct Marks : 1 Wrong Marks : 0

If a two-polt network is reciprocal, then the usual relationship is

Options :

hi2   —h21

h   h21

$$h_{11} = h_{22}$$
11 22 ¯ 12 21 — 1—

Correct Marks : 1 Wrong Marks : 0

A non-ideal voltage source Vs has an intemal impedance of zs. If a purely resistive load is to be chosen that maximizes the power transfened to the load, its values must be

Options :

Magnitude of zs

0

Real pan of zs

Complex conjugate of zs

The graph of an electrical network has N nodes and B branches. The number of links L, with respect to the choice of a tree is given by

Options :

N-B+I

2. ✖ B + N

B-N+I

✖ N-2B-1

A unit step voltage is applied at t = 0 to a selies RL circuit with zero initial conditions

Options :

✖ It is possible for the cun•ent to be oscillatory.

The voltage across the resistor at t = 0+ is zero.

The energy stored in inductor in the steady state is zero.

The resistor cunent eventually falls to zero.

For a voltage source

Options :

✖ Terminal voltage is equal to the source e.m.f.

Terminal voltage cannot exceed source e.m.f.

✖ Tenninal voltage is always lower than source e.m.f.

Terminal voltage is higher than source e.m.f.

The theorem that enables a number of voltage (or cunent) sources to be combined directly into a single voltage (or cunent) source is the

Options :

✖ Compensation   theorem   ✖

Reciprocity theorem

Milliman's theorem

Maxwell's theorem

Correct Marks : 1 Wrong Marks :

O Nodal analysis is based on

Options :

KCL

2. ✖ KVL

3 KCL and KVL

4. Law of conselvation of energy

Correct Marks : 1 Wrong Marks : O

A network consists only of independent cun•ent sources and resistors. If the values
of all the cunent sources are doubled, then values of node voltages

Options :
Remains same

Will be doubled

Will be halved

Changes in some other way

Correct Marks : 1 Wrong Marks : O The type of systems which are characterized by the input and output quantized at celtain levels are called as

Options :

1. ✔ Analog

   Discrete

3. Continuous

   ✘ Digital

Correct Marks : 1 Wrong Marks : 0 An example of a discrete set of infonnation/system is

Options :

✘ The trajectory of the Sun

   Data on a CD

   Universe time scale

   Movement ofwater through a pipe

A system which is linear is said to obey the rules of

Options :

1 Scaling

✖ Additivity

Both scaling and additivity

Homogeneity

A time invariant system is a system whose output

Options :

Increases with a delay in input

✖ Decreases with a delay in input

Remains same with a delay in input

Vanishes with a delay in input

All real time systems concemed with the concept of causality are

Non causal

Causal

Neither causal nor non causal

✖ Memowless

Question Number : 30 Question Id : 6364312790 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

A system is said to be defined as non-causal, when

Options :

✖ The output at the present depends on the input at an earlier time

✖ The output at the present does not depend on the factor of thne at all

The output at the present depends on the input at the cun•ent time

The output at the present depends on the input at a time instant in the future

Question Number : 31 Question Id : 6364312791 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

If $F(s) = L\{f(t)\} = (2s+1)/s^2+4s+1$ then the initial and final values of $f(t)$ are respectively

Options :

1. ✖ 0, 2

2. ✔ 2, 0

o, 2/7

2/7, o

Question Number : 32 Question Id : 6364312792 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A system with transfer function H(z) has impulse response h(.) defined as $h(2) = 1$, $h(3) = -1$ and $h(k) = 0$ otherwise. Consider the following statements

Sl: H(z) is a low pass filter s:
H(z) is an FIR filter Which of the following is correct

Options :

1. y Sl is tme

✖ Both Sl and S2 are false

✖ Both Sl and S2 are tme and S2 is a reaction for Sl

✖ Both Sl and S2 are tme and S2 is not a reaction for Sl

Question Number : 33 Question Id : 6364312793 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The 3-dB bandwidth of the low pass signal e-t u(t) where u(t) is the unit step ftnction is given by

Options :

1 2pi Hz

$\frac{\sqrt{\sqrt{2}-1}}{2\pi}$ Hz ✖

✖ Infilllty

Question Number : 34 Question Id : 6364312794 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The Laplace transfonn of a continuous time signal x(t) is X(s)=(5-s)/s^2-s-2. If the Foufier transfonn of this signal exists, then x(t) is

Options :

e^{2t} u(t) -2 u(t)

-e^{2t} u(-t) +2 e-t u(t)

-e^{2t} u(-t) -2 e-t u(t)

$e^{2t} u(-t) -2 e-t u(t)$

If the impulse response of a discrete-time system is h[n] -5-n u[-n-l] then the system

function H(z) is equal to

Options :

$\dfrac{-z}{5}$ — and the system is stable z—

$\dfrac{z}{5}$ — and the system is stable z—

$\dfrac{-z}{5}$ — and the system is unstable z—

$\dfrac{z}{5}$ — and the system is unstable z—

The impulse response functions of four linear systems are Sl, S2, S3, and S4 are given respectively by

Ill(t) = l,   h2(t) = t.u(t), h3(t) = u(t)/t+l,   lu(t) = hi(t)

where u(t) is the unit step function. NMIich of these systems is time invafiant, causal and stable

Options :

The Fourier transfonn of a conjugate symmetric function is always

Options :

Imagina1Y

Conjugate anti-symmetlic

3.9 Real

✖ Conjugate symmetric

For a BJT the common base ct11Tent gain u = 0.98 and the collector base junction reverse bias saturation current Ico = 0.611A. This BJT is connected in the common emitter mode and operated in the active region with a base dlive cunent 1B = 20 PA. The collector current Ic for this mode of operation is

Options :

0.98 mA

0.99mA

1.0 mA

1.01 mA

At room temperature. a possible value for the mobility of electrons in the inversion layer of silicon n-channel MOSFET is

Options :

450 cm^2/V-s

1350c

1800 cm^{2}N-s

3600   -

In a uniformly doped BJT, assume that NE, NB and Nc are the emitter, base and collector dopmgs in atoms/cm , respectively. If the emitter injection efficiency of the BJT is close to unity, which one of the following conditions is tme

Options :

1. ✖ $N_E = N_B = N_C$

NE   andNB>Nc

NE = andNB<Nc

4. ✖ $N_E < N_B < N_C$

Consider the following two statements about the internal conditions in an nchannel MOSFET operating in the active region

Sl : The inversion charge decreases from source to drain

S2: The channel potential increases from source to drain

Options :

Only S2 is tme

Both Sl and S2 false

Both Sl and S are tme but S2 is not a reason of Sl

Both Sl and S2 are tme but S2 is a reason of Sl

Thin gate oxide in a CMOS process is preferably grown using

Options :

Wet oxidation

2. v DIY oxidation

Epitaxial deposition

✖ Ion implantation

In an Il-type silicon crystal at room temperature, which of the following can have a concentration of 4×10^{19} cm-3

Options :

Silicon atom

Holes

✔ Dopant atoms

Valence electrons

NMIich of the following is not associated with a p-njunction

Options :

Junction capacitance

Charge storage capacitance

Depletion capacitance

Channel length modulation

A p+n junction has a built-in potential of 0.8 V. The depletion layer width at a reverse bias of 1.2 V is 2μm. For a reverse bias of 7.2 V, the depletion layer width will be

Options :

4 pm

2. ✖ 4.9 μm

4. ✖ 12 μm

Under low level injection assumption, the injected minority camer cunent for an extrinsic semiconductor is essentially, the

Options :

Diffusion current

Drift cunent

Recombination cunent

Induced cunent

A Silicon PN junction at a temperature of 200 C has a reverse saturation cun•ent of 10 pico-Amperes (PA). The reverse saturation cunent at 400 C for the same bias is approximately

Options :

30 PA

40 PA

50 PA

60 PA

The drain of an n-channel MOSFET is shorted to the gate so that $V_{GS} = V_{DS}$. The threshold voltage (V_T) of MOSFET is IV. If the drain current (ID) is ImA for V_{Gs}= 2V, then for V_{Gs} = 3V, ID is

Options :

2 mA

3 mA

9 IILA

4 mA

4. ✔

Consider an abmpt p-junction. Let Vbi be the built-in potential of this junction and VR be the applied reverse bias. If the junction capacitance (Cj) is IpF for Vbi+VR= IV, then for Vbi+VR=4V, q will be

Options :

0.25 PF

0.5 PF

Correct Marks : 1 Wrong Marks : O

If P is passivation, Q is n-well implant, R is metallization, and S is source drain
diffusion, then the order in which they are camed out in a standard n-well CMOS
fabrication process, is

Options :

P-Q-R-S

Q-S-R-P

R-P-S-Q

S-R-Q-P

The input impedance (ZD and output impedance (Zo) of an ideal transconductance
(Voltage Controlled Cunent Source)

Options :

z = o, zo=o

Zi = 00, = 0

3. ✔ $Z_i = \infty, Z_o = \infty$

4. ✘ $Z_i = 0, Z_o = \infty$

As a temperature increased, the voltage across a diode canying a constant cunent

Options :

Decreases

Increases

Remain constant

May increase or decrease depending upon the doping levels in the junction

The use of rectifier filter in a capacitor circuit gives satisfact01Y pelfonnance only when load

Options :

Cun•ent is high

✖ Voltage is high

Cunent is low

Voltage is low

The threshold voltage of an n-channel MOSFET can be increased by

Options :

Reducing gate oxide thickness

Increasing channel doping concentration

Reducing channel length

Decreasing channel doping concentration

If differential amplifier has differential gain of 20,000. CMRR = 80dB then common mode gain is

Options :

1

2

0.5

0

Question Number : 56 Question Id : 6364312816 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : O

Advantage of negative feedback is

Options :

Decreased bandwidth

Increased stability

✖ Reduction in gain

Higher output impedance

Question Number : 57 Question Id : 6364312817 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : O

A two-stage amplifier with negative feedback has an overshoot when damping factor K is

Options :

Negative

Positive

Less than unity

Greater than unity

Silicon diode is less suited for low voltage rectifier operation because

Options :

Its cut-in voltage is high

It cannot withstand with high temperature

✖ Its breakdown voltage is high

Its reverse saturation cun•ent is low

Which of the following power amplifier has maximum efficiency

Options :

Class B

Class AB

Class C

Class A

Vlllat is the drain cunent for a D-MOSFET having the characteristics values of I_{DSS} 10 mA, $V_{GS(off)}$ of-4V and VGs of+2V

Options :

18.5 mA

5.0mA

3   22.511LA

2.2511LA

A Hanley oscillator is used for generating

Options :

Microwave oscillation

VelY low frequency oscillation

Radio-frequency oscillation

Audio frequency oscillation

The maximum power dissipation capacity of a transistor is 50 mW. If the collector emitter voltage is 10 V. 11mat is the safe collector cunent that can be allowed through the transistors

Options :

2mA

1mA

2. ✖

2.5 mA

5 mA

An operational-amplifier possesses

Options :

✖ Very small input resistance and very large output resistance

Very large input resistance and very large output resistance

Very small input resistance and very small output resistance

VelY large Input resistance and velY small output resistance

An RC amplifier stage has bandwidth of 500 KHz. iviemat will be the rise time of the amplifier stage

Options :

0.35ms

0.1ms

0.7 s

2.0ts

An amplifier will generate stable sinusoidal oscillations if we provide feedback such that

Options :

Its poles lie on the negative real axis in the s-plane

It poles lie anywhere in the s-plane

Its poles lie close to jo-axis in the right half of s-plane

Its poles lie close to jo-axis in the left half of s-plane

Question Number : 66 Question Id : 6364312826 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

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

Options :

1. ✖ $Y = Z$

2. ✖ $Y = \bar{Z}$

3. ✖ $Z = 1$

4. ✔ $Z = 0$

Question Number : 67 Question Id : 6364312827 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : O

X = 01110 and Y = 11001 are two 5-bit binary numbers represented in two's complement fonnat. The sum of X and Y represented in two's complement fonnat using 6 bits is

Options :

100111

001000

000111

101001

The Boolean ftmction Y = AB + CD is to be realized using only 2-input NAND gates. The minimum number of gates required is

Options :

2

3

4

5

A new Binary Coded Pentary (BCP) number system is proposed in which every digit of a base-5 number is represented by its conesponding 3-bit binary code. For example, the base-5 number 24 will be represented by its BCP code 010100. In this numbering system, the BCP code 100010011001 conesponds to the following number in base-5 system

Options :

423

1324

2201

4231

The nünimum number of 2 to I multiplexers required to realize a 4 to I multiplexers is

Options :

1

3

4

11001, 1001 and 111001 conespond to the 2's complement representation of which one of the following sets of number

Options :

25, 9 and 57 respectively

-6, -6 and -6 respectively

-7, -7 and -7 respectively

-25, -9 and -57 respectively

A 0 to 6 counter consists of 3 flip flops and a combination of 2 input gate(s). The combination circuit consists of

Options :

One AND gate

One OR gate One AND gate

and one OR gate

Two AND gates

The output of the 74 sefies of TTL gates is taken from a BJT in

Options :

1. Totem pole and common collector configuration

Either totem pole or open collector configuration

✖ Common base configuration

✖ Common collector configuration

Question Number : 74 Question Id : 6364312834 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : O

After executing the below code, contents of Accumulator (A) and Z, AC, CY flag
bits are_____

MIV A, F9H ANI
83 H

Options :

A=SIH, Z=O, AC= 0, CY‾ 0

A=F3H. $Z = 1, AC = 0,$CY=I

A=F9H, Z= 1, AC= 0, CY = 0

A = 83H, Z = O, AC= 0, CY = 0

Question Number : 75 Question Id : 6364312835 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A digital system is required to amplify a binary-encoded audio signal. The user
should be able to control the gain of the amplifier from a minimum to a maximum

in 100 increments. The minimum number of bits required to encode, in straight bina1Y is

Options :

6

5

7

The Boolean expression AC+BC is equivalent to

Options :

ÄC+B$\bar{C}$+AC

bc +   + BC+ÄCb

AC + BC+bC + ABC

ABC + ABC + ÄBC+AbC

Correct Marks : 1 Wrong Marks : 0

Two D flip-flops are connected as a synchronous counter that goes through the following QB, QA sequence

00+01→11 →10→00→……

The combination to the inputs DA and DB are

Options :

DA-QB; DB-QA m=QA;

DB=QB

D_A=(QA QB + QBQA) ; DB = QA

4. ✔ $D_A = (Q_A Q_B + \bar{Q}_A \bar{Q}_B) ; D_B = \bar{Q}_B$

Question Number : 78 Question Id : 6364312838 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : O

The range of the signed decimal numbers that can be represented by 6-bit 1 's complement number is

Options :

-31 to +31

-63 to +64

-64 to +63

-32 to +31

Correct Marks : 1 Wrong Marks : 0 When a human being tries to

approach an object, his brain acts as

Options :

An actuator

A controller

✖ An amplifier

An enor measuring device

Correct Marks : 1 Wrong Marks : 0
The impulse response of a linear time invariant system is given as
(t) =e-t, t>0
The transfer function of the system is equal to

Options :

$$\frac{1}{S(S+I)}$$

$$1$$

$$1$$

If the characteristics equation of a closed loop system is $2S2 + 6S + 6 = 0$ then system is

Options :

1. Undamped

   Underdamped

   ✖ Overdamped

   Critically damped

Question Number : 82 Question Id : 6364312842 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Given a unity feedback system $G(S) = \dfrac{.1M1}{S(S+4)}$ at is the value of K for a

damping ratio of 0.5

Options :

2

4

3.4 16

1

Question Number : 83 Question Id : 6364312843 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A system has single pole at origin, its impulse response will be

Options :

Rallil)

Oscillatory

Constant

✖ Decaying exponential

The feedback system with the chamctefistics equation $s4 + 20KS3 + 5S2 + IOS + 15 = 0$, system is

Options :

Stable for non-zero value of K

Stable for all value of K

Unstable for all value of K

Stable for n >K>7

If the gain of open loop system is doubled then the gain margin of the system is

Options :

Halved

Doubled

Not effected

One foulth of original value

In the root-locus for open loop transfer function

$$G(S)H(S) = \frac{K(S+6)}{(S+3)(S+5)}$$

The break away points are located respectively at

Options :

2

-4.27

1

4. ✔ -7.73

The frequency where magnitude M has a peak value in frequency response is

Options :

Tuned frequency

Resonant Frequency

✖ Peak frequency

Nonnalized frequency

Considered the following open loop transfer function

$$G(S) = \frac{K(S+2)}{(S+1)(S+4)}$$

Charactefistics equation of the unity negative feedback will be

Options :

S2 + 5S + 14 + +2) = O

S2 + IOS + 4 + K (S + I) = 0

S2 + IOS — 4 -F K(S + 2)⁻ 0

$S^2 + 5S + 4 + K(S + 2) = 0$

4. ✔

The attenuation (magnitude) by a lead compensator at a frequency of maximum phase lead = vGb is

Options :

$$\frac{\sqrt{a+b}}{\sqrt{b-a}}$$
2. ✖

$$\sqrt{\frac{a}{b}}$$
3. ✔

$$\sqrt{\frac{b}{a}}$$
4. ✖

A mity-feedback control system has open loop transfer function

$$G(S) = \frac{4(2S+1)}{S^2(S+2)}$$

If the input to the system is unit ramp, then steady state enor will be

Options :

5

2.4 0

2

Infinite

Which of the following statement is conect

Options :

Phase margin is always negative for stable system

Phase margin is always positive for stable system

Phase margin can be negative or positive for stable system

Phase margin is always zero for stable system

The state space representation of a linear time invariant system is $x(t) = AX(t) + Bu(t)$•, $Y(t) = cx(t)$; What is the transfer function $H(s)$ of the system

Options :

$$c(sl - A)\text{-}IB$$

$$B(sl - A)\text{-}lc$$

$$c(sl - A)B$$

$$B(sl - A)c$$

Question Number : 93 Question Id : 6364312853 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Open loop transfer function of a system having one zero with positive real value is

Options :

Positive phase function

Non-minimum phase function

Negative phase function

Zero phase function

Question Number : 94 Question Id : 6364312854 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : O

The modulation index of an AM wave is changed from 0 to 1. Transmitted power is

Options :

Halved

Quadnll)led

✖ Unchanged

Increased by 50 %

A linear system has the transfer function

$$H(\omega) = \frac{1}{}$$

V\llen it is subjected to an input white noise process with a constant spectral density

'A', the spectral density of the output will be

Options :

$$\frac{1}{}$$

$$\frac{A}{(j\omega+1)^2}$$

3. ✔ $$\frac{A}{(\omega^2+1)}$$

$$\frac{A}{\sqrt{(\omega^2+1)}}$$

Correct Marks : 1 Wrong Marks : O An antenna has 40 ohm antenna resistance and 60 ohm radiation resistance. The efficiency of the antenna is

Options :

60 %

✖ 400 0

Correct Marks : 1 Wrong Marks : 0

A communication channel with AWGN operating at a signal to noise ratio SNR>>I and bandwidth B has capacity Cl. If the SNR is doubled keeping B constant. The resultant capacity C2 is

Options :

cr2 c1

cr Cl+2B

cr Cl+O.3B

C_2=CI+B

If E denotes expectation, the valiance of a random vafiable X is given as

Options :

✖ $E[x2] + E2[X]$

$2 E[X^2] - E2[X]$

✖ $E2[X]$

$E[x2]$

\ivllich of the following analog modulation scheme required mnimum transmitted

power and minimum bandwidth

Options :

Amplitude Modulation

SSB

DSB-SC

DSB-FC

The random vamble

$$Y \equiv \int_{-\infty}^{\infty} W(t)\emptyset(t)dt$$

Where $\emptyset(t) = \begin{cases} 1; & 5 \text{ S ts } 7 \\ 0; & \text{otherwise} \end{cases}$ and W(t) is a real white Gaussian noise process

with two-sided power spectral density Swo=3W/Hz, for all f. The variance of Y is

Options :

2

6

7

9

A single bit, equally likely to be 1 and 0, is to be sent across an AWGN channel with PSD No 2. Bina1Y signaling, with 0 for P(t) and 1 for q(t), is used for transmission, along with an optimal receiver that mnimzes the bit enor probability. Let Vl(t), Y2(t), fonn an 01thogonal signal set.

If we choose P(t) = Vl(t), and q(t) - Yl(t) we would obtain a celtain bit-elTor probability Pb.

If we keep P(t) = VI(t) but take q(t) = N/F (t), for what value of E would we obtain the same bit-enor probability Pb

Options :

1

0

2

3

Let (Xl and X2) be independent random valiables. Xl has mean 0 and valiance 1, while X2 has mean 1 and variance 4. The mutual infonnation I (Xf, X2) between Xland X2 in bits is

Options :

1

0

6

The channel capacity under the gaussian noise for a discrete mem01Y less channel
with bandwidth of 4 MI--lz and SNR of 31 is

Options :

✖ 4 Kbps

✖ 2Kbps

✖ 4Mbps

20Mbps

A bina1Y random variable X takes the value +2 and -2. The probability $P(X = +2) =$

The value of a, for which the entropy of X is maximum

Options :

0.5

1

Question Number : 105 Question Id : 6364312865 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : O

 The bandwidth required in DPCM is less than that of PCM because

Options :

More quantization levels are needed

The difference signal is larger in amplitude than actual signal

✖

The no. of bits per code is reduced resulting in a reduced bit rate

The successive samples of signal often differ in amplitude

Question Number : 106 Question Id : 6364312866 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

 An analog signal is sampled at 36 KHz and quantized in to 256 levels. The time

 duration of a bit of the binaw coded signal is

Options :

5.43ms

3.47!lS

6.47 Its

1.4711B

A source delivers symbols A, B, C, D with probabilities 1/2, 1/4, 1/8 and 1/8.
Entropy of the system is

Options :

1.75 bits per symbol

✖ 1.75 bits per second

✖ 1.25 symbols per bit

1.75 symbols per second

The expression for an electlic field in free space is E Eo = $(x + y + j2z)e^{-j(\omega t - kx + ky)}$
where x, y, z represents the spatial coordinates, t represents time, and o, k are constants.
This electric field

Options :

Represents a linearly polafized plane wave

Does not represent a plane wave

Represents an elliptically polafized plane wave propagating along x-y plane

Represents a circular polarized plane wave propagating nonnal to the z-axis

Radiation resistance of a small dipole current element of length I at a frequency of 3 GHz is 3 ohms. If the length is changed by 1%, then the percentage change in the radiation resistance,

Options :

300

4%

2%

✖ No change

For a vector field A which one of the following is false

Options :

A is inotational if V^2 x A 0

VxA in another vector field

3. A is sinusoidal if V. A = 0

4. a vx $(\nabla \times A) = \nabla$(V. A) - v ^{2} A2

Solutions of Laplace's equation, which are continuous through the second derivative are called

Options :

Odd   functions

Fundamental functions

Bessel ftnctions

Hannonic functions

For electromagnetic wave proportion in free space, the free space is defined as

Options :

1. ✖ $\sigma = 0; \varepsilon = 1; \mu \neq 1; p = 0; J = 0$

$\sigma \neq 0; E > 1; g < 1; p \qquad = 0$

3. ✔ $\sigma = 0; \varepsilon = 1; \mu = 1; p = 0; J = 0$

4. ✖ $\sigma = 0; \varepsilon = 1; \mu = 1; p \neq 0; J \neq 0$

\M1ich ofthe following statement is correct.

On a conducting surface boundary, electric field lines are

Options :

Always nonnal

Always tangential

At an angle depending on the field intensity

Neither nonnal nor tangential

In a field of charge Q at the Oligin. the potentials at and $B(1/2,0,0)$ are VA=15 volt and VB = 0 volt respectively. Illiat will be the potential at C(I,O,O)

Options :

20volt

22volt

17volt

18volt

The value of V. A, where A=3XYax+Xay+XYaz at a point (2, -2, 2) is

Options :

4

5

-6

-10

In a uniform plane wave, the value of IEI/IHI is

Options :

1

$$\sqrt{\frac{\mu}{\varepsilon}}$$

$$\sqrt{\frac{\varepsilon}{\mu}}$$

Poyuting vector is a measure of which of the following

Options :
Average power flow through the surface

✖ Power dissipated by the surface

✖ Maximum power flow tlu•ough a surface sunounding the source

Instantaneous power flow through the surface

A mifonn transmission line of characteristics impedance 100 ohm and feeding a purely resistive load of 500 ohm uses single stub matching. The stub is placed at a distance d from the load. The VSWR on the length d will be

Options :

1

0

5

4

The cut off wavelength Ic for TE20 mode for a standard rectangular waveguide is

Options :

2. ✖ 2/a

a

lillich of the following antenna is obtained by modifying a wave guide

Options :

Helical antenna

Hom antenna

Dipole antenna

Microstrip antenna