National Testing Agency

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Nanoelectronics Material Sciences

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Nanoelectronics Material Sciences

Section Id :	432449269
Section Number :	1
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Sub-Section Id :	432449644
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 1 Question Id : 43244920351 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Calculate the output voltage of an op-amp for input voltages of $V_{i1} = 150\mu V$ and $V_{i2} = 140\mu V$. The amplifier has a differential gain of $A_d = 4000$ and the value of CMRR is 100 :

(1) 145 mV

(2) 14.5 mV

(3) 45.8 mV

(4) 40.006 mV

Options :

43244979901. 1

43244979902. 2

43244979903. 3

43244979904. 4

Question Number : 2 Question Id : 43244920352 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For an op-amp having a slew rate of 4 V/μs, what is the maximum closed-loop voltage gain that can be used when input signal varies by 0.1V in 10 μs ?

(1) 40

(2) 4

(3) 400

(4) 4000

Options :

43244979905. 1

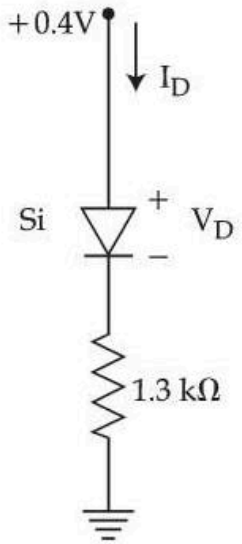
43244979906. 2

43244979907. 3

43244979908. 4

Question Number : 3 Question Id : 43244920353 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For the series diode configuration of the given figure, determine V_D and I_D.



(1) 0.4 V and 0 A.

(2) 0.7 V and 0.85 A.

(3) −0.7 V and 0.23 A.

(4) 0 V and 0.31 A.

Options :

43244979909. 1

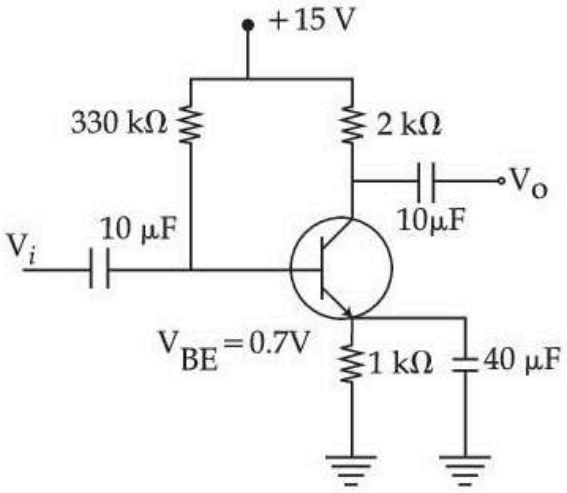
43244979910. 2

43244979911. 3

43244979912. 4

Question Number : 4 Question Id : 43244920354 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For the given emitter-bias network, determine the values of I_C and V_{CE}. Assume $\beta = 100$.



(1) 2.30 mA and 4.32 V
(2) 3.32 mA and 5.04 V
(3) 2.01 mA and 13.97 V
(4) 4.33 mA and 6.34 V

Options :

43244979913. 1

43244979914. 2

43244979915. 3

43244979916. 4

Question Number : 5 Question Id : 43244920355 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : The gate of a MOSFET is insulated from body of FET by deposition of a very thin fragile layer of SiO_2 over the substrate.

Reason (R) : The device is therefore called an insulated gate field-effect transistor (IGFET).

In the light of the above statements, choose the **most appropriate answer** from the options given below :

(1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**
(2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**
(3) **(A)** is correct but **(R)** is not correct
(4) **(A)** is not correct but **(R)** is correct

Options :

43244979917. 1

43244979918. 2

43244979919. 3

43244979920. 4

Question Number : 6 Question Id : 43244920356 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : The body effect in MOSFET causes the threshold voltage V_{th} to increase as source-body voltage V_{SB} increases.

Reason (R) : Increasing V_{SB} raises the surface potential and therefore reduces the barrier for inversion.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

(1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

(2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**

(3) **(A)** is correct but **(R)** is not correct

(4) **(A)** is not correct but **(R)** is correct

Options :

43244979921. 1

43244979922. 2

43244979923. 3

43244979924. 4

Question Number : 7 Question Id : 43244920357 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Sequence for standard n-well fabrication process is :

A. Passivation

B. n-well implant

C. Metallization

D. Source/drain diffusion

Choose the **correct** answer from the options given below :

(1) A, B, C, D

(2) B, D, C, A

(3) C, A, D, B

(4) D, C, B, A

Options :

43244979925. 1

43244979926. 2

43244979927. 3

43244979928. 4

Question Number : 8 Question Id : 43244920358 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

What is the typical efficiency of half-wave rectifier:

(1) 40.6%

(2) 81.2%

(3) 21.3%

(4) 50.0%

Options :

43244979929. 1

43244979930. 2

43244979931. 3

43244979932. 4

Question Number : 9 Question Id : 43244920359 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The sequence of physical events when forward bias is applied to PN junction:

A. Barrier potential reduces

B. Majority carriers injected across junction

C. Recombination in neutral regions increases

D. Diffusion current established across quasi-neutral regions

E. Net forward current increases

Choose the **correct** answer from the options given below :

(1) A, E, B, D, C

(2) A, B, D, C, E

(3) A, B, C, D, E

(4) A, C, B, E, D

Options :

43244979933. 1

43244979934. 2

43244979935. 3

43244979936. 4

Question Number : 10 Question Id : 43244920360 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In an op-amp which of the following parameters depend on frequency.

A. Voltage gain

B. Noise current

C. CMRR

D. Output voltage swing

E. Gain bandwidth product

Choose the **correct** answer from the options given below :

(1) A, B, C, D only

(2) A, B, C, E only

(3) A, B, D, E only

(4) B, C, D, E only

Options :

43244979937. 1

43244979938. 2

43244979939. 3

43244979940. 4

Question Number : 11 Question Id : 43244920361 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following statements are correct:

A. A negative feedback can increase linearity and reduce distortion.

B. Positive feedback always improves stability of the amplifier.

C. Series-shunt (Voltage) negative feedback tends to reduce output impedance.

D. Closed-loop bandwidth typically increased when negative feedback is applied.

Choose the **correct** answer from the options given below :

(1) A, B, C only

(2) A, C, D only

(3) A and C only

(4) A and D only

Options :

43244979941. 1

43244979942. 2

43244979943. 3

43244979944. 4

Question Number : 12 Question Id : 43244920362 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I		**List - II**
A.	Drift current	I.	Law of conservation of charge
B.	Einstein's equation	II.	Electric field
C.	Diffusion current	III.	Thermal voltage
D.	Continuity equation	IV.	Concentration gradient

Choose the **correct** answer from the options given below :

(1) A-IV, B-III, C-I, D-II

(2) A-IV, B-III, C-II, D-I

(3) A-II, B-I, C-IV, D-III

(4) A-II, B-III, C-IV, D-I

Options :

43244979945. 1

43244979946. 2

43244979947. 3

43244979948. 4

Question Number : 13 Question Id : 43244920363 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I		List - II
A.	BJT	I.	Voltage controlled negative resistance
B.	MOSFET	II.	High current gain
C.	Tunnel diode	III.	Voltage regulation
D.	Zener diode	IV.	High input impedance

Choose the **correct** answer from the options given below :

(1) A-I, B-IV, C-II, D-III

(2) A-II, B-IV, C-I, D-III

(3) A-II, B-III, C-I, D-IV

(4) A-IV, B-II, C-I, D-III

Options :

43244979949. 1

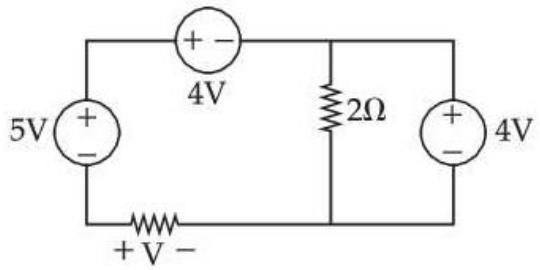
43244979950. 2

43244979951. 3

43244979952. 4

Question Number : 14 Question Id : 43244920364 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The voltage V in the given figure is equal to :



(1) 3 V

(2) −3 V

(3) 5 V

(4) −5 V

Options :

43244979953. 1

43244979954. 2

43244979955. 3

43244979956. 4

Question Number : 15 Question Id : 43244920365 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

DSB-SC signals are generated using :

(1) Diode detector

(2) Balanced modulator

(3) Envelope detector

(4) Mixer

Options :

43244979957. 1

43244979958. 2

43244979959. 3

43244979960. 4

Question Number : 16 Question Id : 43244920366 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A signal $x(t)$ is given below :

$$x(t)=\left(\frac{3}{2}\right)\cos\left(190\times10^3\pi t\right)+5\cos\left(200\times10^3\pi t\right)+\left(\frac{3}{2}\right)\cos\left(210\times10^3\pi t\right)$$

What is the power efficiency in the AM signal ?

(1) 25.4%

(2) 15.3%

(3) 18.0%

(4) 11.1%

Options :

43244979961. 1

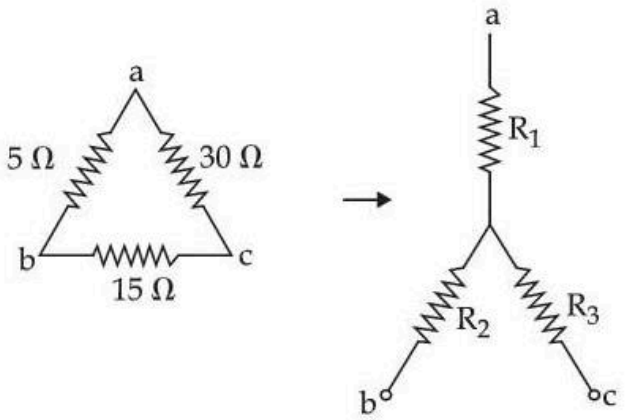
43244979962. 2

43244979963. 3

43244979964. 4

Question Number : 17 Question Id : 43244920367 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A Delta-connected network with its Wye-equivalent is shown in the figure. The values of resistances R_1, R_2 and R_3 (in Ω) are respectively.



(1) 1.5 Ω, 3 Ω and 9 Ω

(2) 3 Ω, 9 Ω and 1.5 Ω

(3) 9 Ω, 3 Ω and 1.5 Ω

(4) 3 Ω, 1.5 Ω and 9 Ω

Options :

43244979965. 1

43244979966. 2

43244979967. 3

43244979968. 4

Question Number : 18 Question Id : 43244920368 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Master-slave J-K flip-flop is free from race around condition.

Reason (R) : Master-slave uses two J-K flip-flops.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

(1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

(2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**

(3) **(A)** is correct but **(R)** is not correct

(4) **(A)** is not correct but **(R)** is correct

Options :

43244979969. 1

43244979970. 2

43244979971. 3

43244979972. 4

Question Number : 19 Question Id : 43244920369 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : The Kirchhoff's current law states that sum of currents entering at any node is equal to the sum of currents leaving that node.

Reason (R) : The Kirchhoff's current law is based on the law of conservation of charge.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

(1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

(2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**

(3) **(A)** is correct but **(R)** is not correct

(4) **(A)** is not correct but **(R)** is correct

Options :

43244979973. 1

43244979974. 2

43244979975. 3

43244979976. 4

Question Number : 20 Question Id : 43244920370 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Sequence of steps for Boolean function simplification using K-map :

A. Write truth table

B. Plot minterms on K-map

C. Group adjacent 1's

D. Write simplified equation

Choose the **correct** answer from the options given below :

(1) B, C, A, D

(2) A, B, C, D

(3) C, A, B, D

(4) A, B, D, C

Options :

43244979977. 1
43244979978. 2
43244979979. 3
43244979980. 4

Question Number : 21 Question Id : 43244920371 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Choose the correct sequence of steps in state variable method.

A. Choose state variables
B. Write state equations
C. Write matrix model
D. Form output equations

Choose the **correct** answer from the options given below :

(1) A, B, D, C
(2) A, B, C, D
(3) A, C, B, D
(4) C, A, B, D

Options :

43244979981. 1
43244979982. 2
43244979983. 3
43244979984. 4

Question Number : 22 Question Id : 43244920372 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Arrange the following logic families in the order of increasing power dissipation :

A. CMOS
B. RTL
C. TTL
D. ECL

Choose the **correct** answer from the options given below :

(1) D, B, C, A
(2) A, C, B, D
(3) D, C, B, A
(4) A, D, B, C

Options :

43244979985. 1
43244979986. 2
43244979987. 3
43244979988. 4

Question Number : 23 Question Id : 43244920373 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the Boolean function : $F = A + \overline{B}C$. Choose the correct minterm of given function :

A. 1, 4 and 6

B. 5 and 7

C. 2, 3 and 7

D. 1, 2, 3 and 4

Choose the **correct** answer from the options given below :

(1) A only

(2) A and B only

(3) A and C only

(4) B and D only

Options :

43244979989. 1

43244979990. 2

43244979991. 3

43244979992. 4

Question Number : 24 Question Id : 43244920374 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the following statements associated with two-port reciprocal networks :

A. $Z_{12} = Z_{21}$

B. $Y_{12} = Y_{21}$

C. $h_{12} = h_{21}$

D. $AD - BC = 1$

Choose the **correct** answer from the options given below :

(1) A, B, C only

(2) B, C, D only

(3) A, C, D only

(4) A, B, D only

Options :

43244979993. 1

43244979994. 2

43244979995. 3

43244979996. 4

Question Number : 25 Question Id : 43244920375 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I		**List - II**
A.	Z - parameters	I.	Short circuit admittance
B.	Y - parameters	II.	Open circuit impedance
C.	h- parameters	III.	Hybrid parameters
D.	ABCD - parameters	IV.	Transmission parameters

Choose the **correct** answer from the options given below :

(1) A-II, B-III, C-I, D-IV

(2) A-II, B-I, C-III, D-IV

(3) A-IV, B-I, C-III, D-II

(4) A-II, B-I, C-IV, D-III

Options :

43244979997. 1

43244979998. 2

43244979999. 3

43244980000. 4

Question Number : 26 Question Id : 43244920376 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I (Attributes)		**List - II (Modulation System)**
A.	Power-efficient transmission of signals	I.	Conventional AM
B.	Most band-width efficient transmission of voice signals	II.	FM
C.	Simplest receiver structure	III.	VSB
D.	Bandwidth efficient transmission of signals with significant DC component	IV.	SSB-SC

Choose the **correct** answer from the options given below :

(1) A-IV, B-II, C-I, D-III

(2) A-II, B-IV, C-I, D-III

(3) A-III, B-II, C-I, D-IV

(4) A-II, B-IV, C-III, D-I

Options :

43244980001. 1

43244980002. 2

43244980003. 3

43244980004. 4

Question Number : 27 Question Id : 43244920377 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

As frequency increases, the surface resistance of a metal :

(1) Decreases

(2) Increases

(3) Remains Unchanged

(4) Varies in an unpredictable manner

Options :

43244980005. 1

43244980006. 2

43244980007. 3

43244980008. 4

Question Number : 28 Question Id : 43244920378 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The VSWR can have any value between :

(1) 0 to 1

(2) -1 to $+1$

(3) 0 to ∞

(4) 1 to ∞

Options :

43244980009. 1

43244980010. 2

43244980011. 3

43244980012. 4

Question Number : 29 Question Id : 43244920379 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A TEM wave impinges obliquely on a dielectric-dielectric boundary with $\epsilon_{r1}=2$ and $\epsilon_{r2}=1$. The angle of incidence for total reflection is :

(1) 30°

(2) 60°

(3) 45°

(4) 90°

Options :

43244980013. 1

43244980014. 2

43244980015. 3

43244980016. 4

Question Number : 30 Question Id : 43244920380 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The electric field of an electromagnetic wave propagating in the positive z-direction is given by -

$$E=\hat{a}_x \sin(\omega t-\beta z)+\hat{a}_y \sin\left(\omega t-\beta z+\frac{\pi}{2}\right)$$

The wave is :

(1) Linearly polarized in z direction

(2) Elliptically polarized

(3) Left-hand circularly polarized

(4) Right-hand circularly polarized

Options :

43244980017. 1

43244980018. 2

43244980019. 3

43244980020. 4

Question Number : 31 Question Id : 43244920381 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Medium 1 has the electrical permittivity $\epsilon_1=1.5\ \epsilon_0$ farad/m and occupies the region to the left of $x=0$ plane. Medium 2 has the electrical permittivity $\epsilon_2=2.5\ \epsilon_0$ farad/m and occupies the region to the right of $x=0$ plane. If E_1 in medium 1 is $E_1=(2\ u_x-3\ u_y+1\ u_z)$ Volt/m, then E_2 in medium 2 is :

(1) $(2.0\ u_x-7.5\ u_y+2.5\ u_z)$ Volt/m

(2) $(2.0\ u_x-2.0\ u_y+0.6\ u_z)$ Volt/m

(3) $(1.2\ u_x-3.0\ u_y+1.0\ u_z)$ Volt/m

(4) $(1.2\ u_x-2.0\ u_y+0.6\ u_z)$ Volt/m

Options :

43244980021. 1

43244980022. 2

43244980023. 3

43244980024. 4

Question Number : 32 Question Id : 43244920382 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Net charge within a conductor is always zero.

Reason (R) : The conductor has a very large number of free electrons.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

(1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

(2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**

(3) **(A)** is correct but **(R)** is not correct

(4) **(A)** is not correct but **(R)** is correct

Options :

43244980025. 1

43244980026. 2

43244980027. 3

43244980028. 4

Question Number : 33 Question Id : 43244920383 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Time varying electric field produces magnetic fields.

Reason (R) : Time varying magnetic field produces electric fields.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

(1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

(2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**

(3) **(A)** is correct but **(R)** is not correct

(4) **(A)** is not correct but **(R)** is correct

Options :

43244980029. 1

43244980030. 2

43244980031. 3

43244980032. 4

Question Number : 34 Question Id : 43244920384 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct sequence of electromagnetic radiation in order of increasing frequency.

A. Microwave

B. Radio wave

C. Visible light

D. X-ray

E. Gamma rays

Choose the **correct** answer from the options given below :

(1) E, D, C, A, B

(2) B, A, C, D, E

(3) A, C, D, E, B

(4) A, B, C, D, E

Options :

43244980033. 1

43244980034. 2

43244980035. 3

43244980036. 4

Question Number : 35 Question Id : 43244920385 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the following statements regarding a plane wave propagating through free space. The direction of field :

A. 'E' is perpendicular to the direction of propagation.

B. 'H' is perpendicular to the direction of propagation.

C. 'E' is perpendicular to the direction of field 'H'.

Choose the **correct** answer from the options given below :

(1) A and B Only

(2) B and C Only

(3) A and C Only

(4) A, B and C Only

Options :

43244980037. 1

43244980038. 2

43244980039. 3

43244980040. 4

Question Number : 36 Question Id : 43244920386 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Coulomb's law states that the force between two point charges Q_1 and Q_2 is :

A. Along the line joining them.

B. Directly proportional to the product of charges $Q_1$and Q_2.

C. Inversely proportional to the distance R between them.

D. Inversely proportional to the square of distance R between them.

Choose the **correct** answer from the options given below :

(1) A, B, C Only

(2) A, B, D Only

(3) B, C Only

(4) B, D Only

Options :

43244980041. 1

43244980042. 2

43244980043. 3

43244980044. 4

Question Number : 37 Question Id : 43244920387 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I (Maxwell's equation)		**List - II (Physical law)**
A.	$\nabla\cdot\vec{D}=\rho$	I.	Faraday's law of electromagnetic induction
B.	$\nabla\cdot\vec{B}=0$	II.	Ampere-Maxwell law
C.	$\nabla\times\vec{E}=-\frac{\partial\vec{B}}{\partial t}$	III.	Absence of magnetic monopoles
D.	$\nabla\times\vec{H}=\vec{J}+\frac{\partial\vec{D}}{\partial t}$	IV.	Gauss's law of electricity

Choose the **correct** answer from the options given below :

(1) A-IV, B-III, C-I, D-II

(2) A-IV, B-III, C-II, D-I

(3) A-III, B-IV, C-I, D-II

(4) A-III, B-IV, C-II, D-I

Options :

43244980045. 1

43244980046. 2

43244980047. 3

43244980048. 4

Question Number : 38 Question Id : 43244920388 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I (Load impedance)		**List - II (Value of reflection coefficient)**
A.	Short circuit	I.	0
B.	Open circuit	II.	-1
C.	Line characteristic impedance	III.	$+1$
D.	2 times of line characteristic impedance	IV.	$+\frac{1}{3}$

Choose the **correct** answer from the options given below :

(1) A-II, B-I, C-III, D-IV

(2) A-IV, B-III, C-I, D-II

(3) A-II, B-III, C-I, D-IV

(4) A-IV, B-I, C-III, D-II

Options :

43244980049. 1

43244980050. 2

43244980051. 3

43244980052. 4

Question Number : 39 Question Id : 43244920389 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the 8085 microprocessor, the RST6 instruction transfers the program execution to the following location :

(1) 30H

(2) 24H

(3) 48H

(4) 60H

Options :

43244980053. 1

43244980054. 2

43244980055. 3

43244980056. 4

Question Number : 40 Question Id : 43244920390 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The 8085 uses which techniques for memory and I/O access ?

(1) Separate memory and I/O buses

(2) Multiplexed address/data bus

(3) Harvard architecture

(4) Fully asynchronous bus

Options :

43244980057. 1

43244980058. 2

43244980059. 3

43244980060. 4

Question Number : 41 Question Id : 43244920391 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In a microprocessor, the register which holds the address of the next instruction to be fetched is :

(1) Accumulator

(2) Program counter

(3) Stack pointer

(4) Instruction register

Options :

43244980061. 1

43244980062. 2

43244980063. 3

43244980064. 4

Question Number : 42 Question Id : 43244920392 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If 8085 microprocessor adds 87H and 79H, then :

(1) Both CARRY and ZERO flags will be set to 0

(2) CARRY flag will be set to 0, ZERO flag to 1

(3) CARRY flag will be set to 1, ZERO flag to 0

(4) Both CARRY and ZERO flags will be set to 1

Options :

43244980065. 1

43244980066. 2

43244980067. 3

43244980068. 4

Question Number : 43 Question Id : 43244920393 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The content of register (B) and register (C) of 8085 microprocessor are 0AH and 0BH. It is desired to multiply the content of register B and register C and store the results in accumulator. A part of 8085 program for this purpose is given as :

MVI A, 00H

LOOP ; _ _ _ _ _

_ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _

HLT END

A sequence of instructions to complete the program would be :

(1) JNZ LOOP, ADD B, DCR C

(2) ADD B, JNZ LOOP, DCR C

(3) DCR C, JNZ LOOP, ADD B

(4) ADD B, DCR C, JNZ LOOP

Options :

43244980069. 1

43244980070. 2

43244980071. 3

43244980072. 4

Question Number : 44 Question Id : 43244920394 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The sequence of steps performed by microprocessor to fetch the data byte from memory :

A. The byte is placed in the instruction decoder of the microprocessor.

B. The byte from the memory location is placed on data bus.

C. The control unit sends the control signal $\overline{RD}$ to enable the memory chip.

D. The microprocessor places the 16-bit memory address from program counter on the address bus.

Choose the **correct** answer from the options given below :

(1) A, B, C, D

(2) D, C, B, A

(3) D, B, C, A

(4) A, C, B, D

Options :

43244980073. 1

43244980074. 2

43244980075. 3

43244980076. 4

Question Number : 45 Question Id : 43244920395 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Sequence of steps in 8085 microprocessor interrupt execution :

A. Interrupt acknowledged

B. Program counter content saved

C. Control transfered to ISR

D. Interrupt vector is read

Choose the **correct** answer from the options given below :

(1) D, A, B, C

(2) A, B, D, C

(3) A, B, C, D

(4) D, A, C, B

Options :

43244980077. 1

43244980078. 2

43244980079. 3

43244980080. 4

Question Number : 46 Question Id : 43244920396 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider the following statements regarding the 8085 microprocessor :

A. The 8085 is an 8-bit microprocessor.

B. It has a 16-bit address bus, allowing it to access 64 KB of memory.

C. It has 40 pins.

D. It uses a multiplexed address/data bus.

Choose the **correct** answer from the options given below :

(1) A, B, C Only

(2) A, B, D Only

(3) A, C, D Only

(4) A, B, C, D

Options :

43244980081. 1

43244980082. 2

43244980083. 3

43244980084. 4

Question Number : 47 Question Id : 43244920397 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In 8085 microprocessor, which of the following are 2-byte instructions ?

A. MOV C, A

B. MVI A, 32H

C. LDA 2050H

D. JMP 2085H

E. ADD B

Choose the **correct** answer from the options given below :

(1) B and D Only

(2) B, D and E Only

(3) A, B and C Only

(4) B Only

Options :

43244980085. 1

43244980086. 2

43244980087. 3

43244980088. 4

Question Number : 48 Question Id : 43244920398 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I (Addressing Modes)		**List - II (Instruction)**
A.	Immediate Addressing	I.	LDAX B
B.	Register Addressing	II.	OUT 01H
C.	Direct Addressing	III.	MVI B, 37H
D.	Indirect Addressing	IV.	MOV A, B

Choose the **correct** answer from the options given below :

(1) A-II, B-III, C-I, D-IV

(2) A-IV, B-III, C-II, D-I

(3) A-III, B-IV, C-II, D-I

(4) A-III, B-IV, C-I, D-II

Options :

43244980089. 1

43244980090. 2

43244980091. 3

43244980092. 4

Question Number : 49 Question Id : 43244920399 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I (Memory)		**List - II (Characteristic)**
A.	ROM	I.	Volatile, Fast, Expensive
B.	EPROM	II.	UV erasable
C.	EEPROM	III.	Electrically erasable
D.	SRAM	IV.	Non-Volatile, permanent data

Choose the **correct** answer from the options given below :

(1) A-I, B-II, C-III, D-IV

(2) A-I, B-III, C-II, D-IV

(3) A-IV, B-II, C-III, D-I

(4) A-IV, B-III, C-II, D-I

Options :

43244980093. 1

43244980094. 2

43244980095. 3

43244980096. 4

Question Number : 50 Question Id : 43244920400 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I (Bus/Logic)		**List - II (Function/Characteristic)**
A.	Address bus	I.	Carries read/write signals, timing signals, and interrupt signals
B.	Data bus	II.	A three-state output that can be high, low, or high-impedance
C.	Control bus	III.	Unidirectional lines used by CPU to point to a memory location or I/O device
D.	Tristate logic	IV.	Bidirectional lines used for transferring data between the CPU and memory

Choose the **correct** answer from the options given below :

(1) A-I, B-II, C-III, D-IV

(2) A-IV, B-III, C-II, D-I

(3) A-III, B-IV, C-I, D-II

(4) A-II, B-I, C-IV, D-III

Options :

43244980097. 1

43244980098. 2

43244980099. 3

43244980100. 4

Question Number : 51 Question Id : 43244920401 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The most fundamental physical principle that allows light to be transmitted along the optical fiber without significant loss :

(1) The photoelectric effect

(2) Total internal reflection

(3) Bragg's law

(4) The Seebeck effect

Options :

43244980101. 1

43244980102. 2

43244980103. 3

43244980104. 4

Question Number : 52 Question Id : 43244920402 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The energy-momentum (E-K) relationship in a crystalline solid is usually obtained by solving :

(1) Maxwell equation

(2) Laplace equation

(3) Poisson equation

(4) Schrödinger equation

Options :

43244980105. 1

43244980106. 2

43244980107. 3

43244980108. 4

Question Number : 53 Question Id : 43244920403 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which sensor characteristic describes its ability to selectivity detect a specific analyte without interference from other substances in the sample ?

(1) Sensitivity

(2) Resolution

(3) Selectivity

(4) Linearity

Options :

43244980109. 1

43244980110. 2

43244980111. 3

43244980112. 4

Question Number : 54 Question Id : 43244920404 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The process of extension of a single-crystal surface by growing a film in such a way that the added atoms form a continuation of the single-crystal structure is called :

(1) Ion implantation

(2) Chemical vapor deposition

(3) Electroplating

(4) Epitaxy

Options :

43244980113. 1

43244980114. 2
43244980115. 3
43244980116. 4

Question Number : 55 Question Id : 43244920405 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The uses of silicon dioxide in modern integrated circuit fabrication process :

A. To serve as a mark against diffusion of dopants into silicon
B. To provide surface passivation
C. To isolate one device from another device
D. To act as a component in MOS structures
E. To provide electrical isolation of multi-level metallization systems

Choose the **correct** answer from the options given below :

(1) A, B, C, E Only
(2) A, B, C, D, E
(3) A, B, C, D Only
(4) A, B, C Only

Options :

43244980117. 1
43244980118. 2
43244980119. 3
43244980120. 4

Question Number : 56 Question Id : 43244920406 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

When the photoresist coating (during IC fabrication) is exposed to ultraviolet light, the photoresist becomes :

(1) Oxidized
(2) Ionized
(3) Polymerized
(4) Brittle

Options :

43244980121. 1
43244980122. 2
43244980123. 3
43244980124. 4

Question Number : 57 Question Id : 43244920407 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Work function (ϕ) of a metal is 9.53×10^{-19} J, and the frequency of incident light is 3.5×10^{16} Hz. Find the kinetic energy of photoelectron. (Given plank's constant $h = 6.626 \times 10^{-34}$ Js) ?

(1) 2.8×10^{-17} J
(2) 5.2×10^{-17} J
(3) 2.2×10^{-17} J
(4) 9.1×10^{-17} J

Options :

43244980125. 1
43244980126. 2
43244980127. 3

43244980128. 4

Question Number : 58 Question Id : 43244920408 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Instruction cycle is defined as the time required to complete the execution of an instruction.

Reason (R) : The 8085 instruction cycle consists of three to six machine cycles.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

(1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

(2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**

(3) **(A)** is correct but **(R)** is not correct

(4) **(A)** is not correct but **(R)** is correct

Options :

43244980129. 1

43244980130. 2

43244980131. 3

43244980132. 4

Question Number : 59 Question Id : 43244920409 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The longest wavelength that can be absorbed by silicon, which has the bandgap of 1.12 eV, is 1.1 μm. If the longest wavelength that can be absorbed by another material is 0.78 μm, then the bandgap of this material is :

(1) 1.416 eV

(2) 0.886 eV

(3) 1.59 eV

(4) 3.5 eV

Options :

43244980133. 1

43244980134. 2

43244980135. 3

43244980136. 4

Question Number : 60 Question Id : 43244920410 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Minimum no. of NAND gate required to implement the following Boolean expression :

$$X = AB + CD$$

(1) 2

(2) 3

(3) 4

(4) 5

Options :

43244980137. 1

43244980138. 2

43244980139. 3

43244980140. 4

Question Number : 61 Question Id : 43244920411 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following is a universal flip-flop ?

(1) S-R flip-flop

(2) J-K flip-flop

(3) D flip-flop

(4) T flip-flop

Options :

43244980141. 1

43244980142. 2

43244980143. 3

43244980144. 4

Question Number : 62 Question Id : 43244920412 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Consider a modulating signal $m(t) = 2\sin(2\pi 10^3 t)$ is used to modulate a carrier of frequency 10^6 Hz. Find the bandwidth for phase modulation. Use phase modulation index = 10 units.

(1) 14000 Hz

(2) 24000 Hz

(3) 22000 Hz

(4) 44000 Hz

Options :

43244980145. 1

43244980146. 2

43244980147. 3

43244980148. 4

Question Number : 63 Question Id : 43244920413 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

An angle-modulated signal with carrier frequency $\omega_c = 2\pi \times 10^5$ is described by the equation.

$\phi_{Em}(t) = 10\cos(\omega_c t + 5 \sin 3000t + 10 \sin 2000\pi t)$;

The power of the modulated signal is :

(1) 10

(2) 100

(3) 50

(4) 25

Options :

43244980149. 1

43244980150. 2

43244980151. 3

43244980152. 4

Question Number : 64 Question Id : 43244920414 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Convert the binary number 1101101 to hexadecimal. Which of the following options is correct ?

(1) 3A

(2) 155

(3) 6D

(4) 5C

Options :

43244980153. 1

43244980154. 2

43244980155. 3

43244980156. 4

Question Number : 65 Question Id : 43244920415 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Match **List - I** with **List - II**.

	List - I (2 input logic gates)		**List - II (Functionality)**
A.	NOR gate	I.	High output when both inputs are different
B.	NAND gate	II.	Low output when any of input is high
C.	XOR gate	III.	High output when any of input is low
D.	XNOR gate	IV.	High output when both the inputs are same

Choose the **correct** answer from the options given below :

(1) A-II, B-I, C-III, D-IV

(2) A-II, B-III, C-I, D-IV

(3) A-II, B-III, C-IV, D-I

(4) A-III, B-II, C-I, D-IV

Options :

43244980157. 1

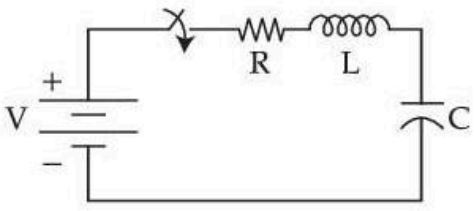
43244980158. 2

43244980159. 3

43244980160. 4

Question Number : 66 Question Id : 43244920416 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the given circuit, $V = 10V$, $R = 10\Omega$, $L = 1H$, $C = 10\mu F$ and $V_c(0) = 0$. Find $\frac{di(0+)}{dt}$



(1) 0 A/s

(2) 10 A/s

(3) −100 A/s

(4) 1 A/s

Options :

43244980161. 1

43244980162. 2

43244980163. 3

43244980164. 4

Question Number : 67 Question Id : 43244920417 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Find the inverse transform of

$$F(S) = \frac{S^2 + 3}{(S^2+2S+5)(S+2)}$$

(1) $\frac{7}{5}e^{-2t} - \frac{2}{\sqrt{5}}e^{-t}\cos\left(2t - \tan^{-1}2\right)$

(2) $\frac{7}{5}e^{-2t} + \frac{2}{\sqrt{5}}e^{-t}\cos\left(2t - \tan^{-1}2\right)$

(3) $\frac{7}{5}e^{-2t} - \frac{2}{\sqrt{5}}e^{-t}\sin\left(2t - \tan^{-1}2\right)$

(4) $\frac{7}{5}e^{-2t} + \frac{2}{\sqrt{5}}e^{-t}\sin\left(2t - \tan^{-1}2\right)$

Options :

43244980165. 1

43244980166. 2

43244980167. 3

43244980168. 4

Question Number : 68 Question Id : 43244920418 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The gates required to build a full adder are :

(1) 2 Ex-OR gate, 2 AND gate and a NOT gate

(2) 2 Ex-OR gate, and 2 AND gate

(3) 2 Ex-OR gate, 2 AND gate and an OR gate

(4) 2 Ex-OR gate

Options :

43244980169. 1

43244980170. 2

43244980171. 3

43244980172. 4

Question Number : 69 Question Id : 43244920419 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the active region of common-emitter amplifier, which of the following options are correct :

A. Base-emitter junction in forward-biased

B. Base-emitter junction is reverse-biased

C. Collector-base junction is forward-biased

D. Collector-base junction is reverse biased

Choose the **correct** answer from the options given below :

(1) A and C

(2) B and C

(3) A and D

(4) B and D

Options :

43244980173. 1

43244980174. 2

43244980175. 3

43244980176. 4

Question Number : 70 Question Id : 43244920420 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Semiconductor devices have the following advantages over vacuum tubes :

A. Bigger size

B. More efficient

C. Higher operating voltages

D. No warm-up period

E. more rugged

Choose the **correct** answer from the options given below :

(1) A, B, C only

(2) B, D, E only

(3) B, C, D only

(4) A, D, E only

Options :

43244980177. 1

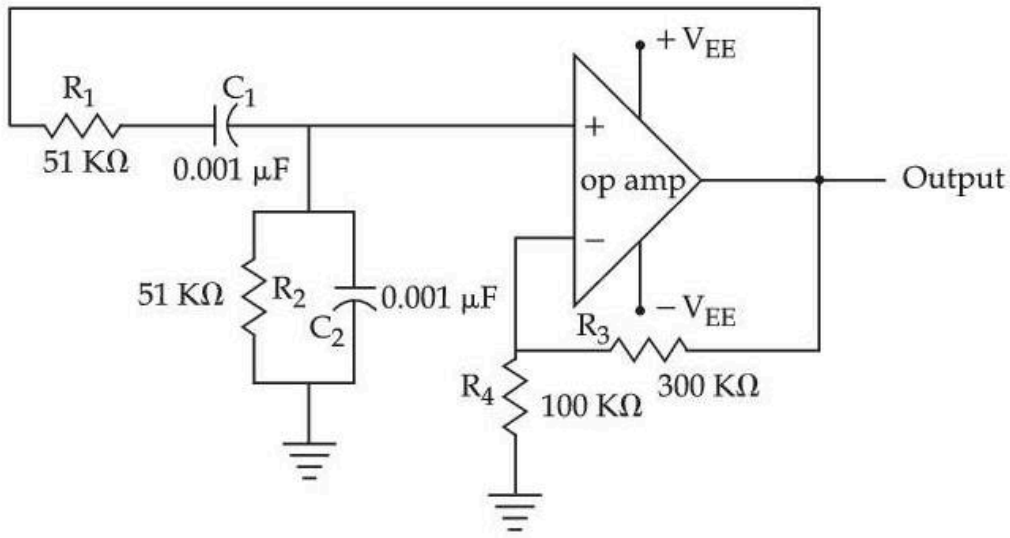
43244980178. 2

43244980179. 3

43244980180. 4

Question Number : 71 Question Id : 43244920421 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Calculate the resonant frequency of the Wien bridge Oscillator given below :



(1) 6241.4 Hz

(2) 1560.3 Hz

(3) 780.2 Hz

(4) 3120.7 Hz

Options :

43244980181. 1

43244980182. 2

43244980183. 3

43244980184. 4

Question Number : 72 Question Id : 43244920422 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Effect of feedback connection on input and output impedance :

A. Input impedance increases in voltage-series configuration

B. Input impedance increases in current-series configuration

C. Input impedance increases in current-shunt configuration

D. output impedance decreases in voltage-shunt configuration

E. output impedance decreases in current-series configuration

Choose the **correct** answer from the options given below :

(1) B, C, D only

(2) A, B, D only

(3) A, B, E only

(4) B, D, E only

Options :

43244980185. 1

43244980186. 2

43244980187. 3

43244980188. 4

Question Number : 73 Question Id : 43244920423 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following are ideal features of an operational amplifier ?

A. Very high input impedance

B. Very high voltage gain

C. High output impedance

D. High slew rate

E. Low CMRR

Choose the **correct** answer from the options given below :

(1) A, B, D only

(2) A, B, E only

(3) A, B, C only

(4) B, D, E only

Options :

43244980189. 1

43244980190. 2

43244980191. 3

43244980192. 4

Question Number : 74 Question Id : 43244920424 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Calculate the depth of penetration of a 1 MHz wave into copper which has a conductivity $\sigma = 5.8 \times 10^7$ mhos per meter and a permeability approximately equal to that of free space.

(1) 0.1334 mm

(2) 0.0044 mm

(3) 0.0667 mm

(4) 0.0333 mm

Options :

43244980193. 1

43244980194. 2

43244980195. 3

43244980196. 4

Question Number : 75 Question Id : 43244920425 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following statements are correct regarding the electric and magnetic fields at any surface of discontinuity ?

A. The tangential component of E is continuous at the surface

B. The tangential component of H is continuous across a surface except at the surface of a perfect conductor

C. The tangential component of B is continuous at the surface of discontinuity

D. The normal component of D is continuous if there is no surface charge density.

Choose the **correct** answer from the options given below :

(1) A, B, D only

(2) A, B, C only

(3) B, C, D only

(4) A, C, D only

Options :

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43244980198. 2

43244980199. 3

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