

# National Testing Agency

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## Nanoelectronics Material Sciences

<b>Group Number :</b>	1
<b>Group Id :</b>	878270533
<b>Group Maximum Duration :</b>	0
<b>Group Minimum Duration :</b>	105
<b>Show Attended Group? :</b>	No
<b>Edit Attended Group? :</b>	No
<b>Break time :</b>	0
<b>Group Marks :</b>	300
<b>Is this Group for Examiner? :</b>	No
<b>Examiner permission :</b>	Cant View
<b>Show Progress Bar? :</b>	No

## Nanoelectronics Material Sciences

<b>Section Id :</b>	878270990
<b>Section Number :</b>	1

<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	75
<b>Number of Questions to be attempted :</b>	75
<b>Section Marks :</b>	300
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	8782701811
<b>Question Shuffling Allowed :</b>	Yes
<b>Is Section Default? :</b>	null

**Question Number : 1 Question Id : 87827044699 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 4 Wrong Marks : 1**

A silicon bar 0.1 cm long and  $100 \mu\text{m}^2$  in cross sectional area is doped with  $10^{17} \text{ cm}^{-3}$  phosphorous. Find the current at 300 K with applied voltage of 10 V. Consider  $\mu_n = 700 \text{ cm}^2/\text{V-sec}$ .

1. 1.12 mA
2. 0.089 A
3. 2.11 mA
4. 5.12 mA

**Options :**

878270175641. 1
878270175642. 2
878270175643. 3
878270175644. 4

**Question Number : 2 Question Id : 87827044700 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

A silicon bar is doped with acceptor impurities  $N_A=2.25 \times 10^{15}$  atoms/cm<sup>3</sup>. Given the intrinsic carrier concentration ( $n_i$ ) of silicon at  $T = 300$  K to be  $1.5 \times 10^{10}$  atoms/cm<sup>3</sup>. Assuming the complete impurity ionization, the equilibrium electron and hole concentrations are:

1.  $n_0 = 1.5 \times 10^{16}$  /cm<sup>3</sup>,  $p_0 = 1.5 \times 10^5$  /cm<sup>3</sup>
2.  $n_0 = 1 \times 10^5$  /cm<sup>3</sup>,  $p_0 = 2.25 \times 10^{15}$  /cm<sup>3</sup>
3.  $n_0 = 2.25 \times 10^{15}$  /cm<sup>3</sup>,  $p_0 = 1 \times 10^5$  /cm<sup>3</sup>
4.  $n_0 = 2.25 \times 10^{15}$  /cm<sup>3</sup>,  $p_0 = 1.5 \times 10^{10}$  /cm<sup>3</sup>

**Options :**

878270175645. 1

878270175646. 2

878270175647. 3

878270175648. 4

**Question Number : 3 Question Id : 87827044701 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Photodiodes operate at

1. Forward bias region
2. Reverse bias region
3. Breakdown region
4. Saturation region

**Options :**

878270175649. 1

878270175650. 2

878270175651. 3

878270175652. 4

**Question Number : 4 Question Id : 87827044702 Question Type : MCQ Option Shuffling : No Is  
Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A  
Minimum Instruction Time : 0  
Correct Marks : 4 Wrong Marks : 1**

An increase in the collector to base bias voltage ( $V_{CB}$ ) in BJT, results in \_\_\_\_\_ in the recombination current and \_\_\_\_\_ in the collector current.

1. increases, decreases
2. decreases, increases
3. remains constant, decreases
4. increases, remains constant

**Options :**

- 878270175653. 1
- 878270175654. 2
- 878270175655. 3
- 878270175656. 4

**Question Number : 5 Question Id : 87827044703 Question Type : MCQ Option Shuffling : No Is  
Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A  
Minimum Instruction Time : 0  
Correct Marks : 4 Wrong Marks : 1**

Match List-I with List-II

List-I	List-II
(A). Emitter injection efficiency in BJT can be increased	(I). Increase with early voltage
(B). Increase in collector to base ( $V_{CB}$ ) bias voltage of BJT	(II). Reducing collector region doping concentration
(C). Breakdown voltage of BJT can be increased	(III). Punch through may occur
(D). Output resistance of BJT	(IV). Increasing doping concentration of emitter region

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

1. (A) - (II), (B) - (III), (C) - (IV), (D) - (I)
2. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
3. (A) - (III), (B) - (II), (C) - (IV), (D) - (I)
4. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)

**Options :**

878270175657. 1

878270175658. 2

878270175659. 3

878270175660. 4

**Question Number : 6 Question Id : 87827044704 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Increase in temperature \_\_\_\_\_ collector current of BJT and \_\_\_\_\_ drain current of MOSFET.

1. increase, decreases
2. decreases, increase
3. decreases, does not affect
4. does not affect, increases

**Options :**

878270175661. 1

878270175662. 2

878270175663. 3

878270175664. 4

**Question Number : 7 Question Id : 87827044705 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

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

<b>List-I</b>	<b>List-II</b>
<b>(Configurations)</b>	<b>(Applications)</b>
(A). Common Emitter	(I). Radio-frequency amplifier
(B). Common Base	(II). High-gain voltage amplifier
(C). Common Collector	(III). Voltage amplifier
(D). Operational Amplifier	(IV). Buffer

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

**Options :**

878270175665. 1

878270175666. 2

878270175667. 3

878270175668. 4

**Question Number : 8 Question Id : 87827044706 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

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

<b>List-I</b>	<b>List-II</b>
(A). Tuned Circuits	(I). Zener diode
(B). Voltage regulator	(II). Varactor diode
(C). Tunnel diode	(III). BJT
(D). Current controlled current source	(IV). Negative differential resistance

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

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (II), (B) - (I), (C) - (IV), (D) - (III)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

**Options :**

878270175669. 1

878270175670. 2

878270175671. 3

878270175672. 4

**Question Number : 9 Question Id : 87827044707 Question Type : MCQ Option Shuffling : No Is**

**Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Cascode pair is a combination of \_\_\_\_\_ and \_\_\_\_\_ configurations.

1. Common collector, common base
2. Common collector, common emitter
3. Common emitter, common base
4. Common base, common emitter

**Options :**

878270175673. 1

878270175674. 2

878270175675. 3

878270175676. 4

**Question Number : 10 Question Id : 87827044708 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Minimized expression for the given Boolean function

$$f(A,B,C,D) = \sum m(5,7,8,10,13,15) + \sum d(0,1,2,3)$$

1.  $BD+B'D'$
2.  $B'D+BD'$
3.  $BD+A'B'+B'D'$
4.  $BD+A'B'+AB'D'$

**Options :**

878270175677. 1

878270175678. 2

878270175679. 3

878270175680. 4

**Question Number : 11 Question Id : 87827044709 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**



The overall lower cutoff frequency of n-stage non-interacting amplifier, with individual stage having lower cutoff frequency of  $f_L$ , is given by

1.  $f_L/\sqrt{2^n-1}$
2.  $f_L\sqrt{2^n-1}$
3.  $f_L/n$
4.  $f_L n$

**Options :**

878270175681. 1
878270175682. 2
878270175683. 3
878270175684. 4

**Question Number : 12 Question Id : 87827044710 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 4 Wrong Marks : 1**

The impact of current-series feedback in an amplifier is to

1. Increase the input and output resistance
2. Decrease the input and output resistance
3. Increase the input resistance and decrease output resistance
4. Decrease the input resistance and increase output resistance

**Options :**

878270175685. 1
878270175686. 2
878270175687. 3
878270175688. 4

**Question Number : 13 Question Id : 87827044711 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The overall frequency response of RC-coupled common emitter amplifier is

1. band pass
2. high pass
3. low pass
4. band reject

**Options :**

878270175689. 1

878270175690. 2

878270175691. 3

878270175692. 4

**Question Number : 14 Question Id : 87827044712 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The fundamental frequency of 5-stage ring oscillator circuit based on inverter is \_\_\_\_\_ where the propagation delay of each inverter is 100 pico-second.

1. 1 MHz
2. 1 GHz
3. 10 GHz
4. 100 MHz

**Options :**

878270175693. 1

878270175694. 2

878270175695. 3

878270175696. 4

**Question Number : 15 Question Id : 87827044713 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

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

List-I	List-II
(A).Counter	(I).Addressing in memory chips
(B).Decoder	(II).Universal gates
(C).NAND and NOR gate	(III).Frequency divider
(D).Shift register	(IV).Serial to parallel data conversion

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

**Options :**

878270175697. 1

878270175698. 2

878270175699. 3

878270175700. 4

**Question Number : 16 Question Id : 87827044714 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The minimum number of NAND gates required to implement the following function:

$$f(x,y,z) = xy+z'$$

1. 3
2. 4
3. 2
4. 1

**Options :**

878270175701. 1  
878270175702. 2  
878270175703. 3  
878270175704. 4

**Question Number : 17 Question Id : 87827044715 Question Type : MCQ Option Shuffling : No  
Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A  
Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

A de-multiplexer is a

- (A). Sequential circuit
- (B). Combinational circuit
- (C). Parallel to serial data convertor
- (D). Routes the data from single input to one of many output.

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

1. (B) and (D) only.
2. (A) and (C) only.
3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

**Options :**

878270175705. 1  
878270175706. 2

878270175707. 3

878270175708. 4

**Question Number : 18 Question Id : 87827044716 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Implement the function given below using 8:1 multiplexer (B, C, and D as select lines)

$$f(A,B,C,D) = \sum m(0, 1, 3, 4, 9, 15)$$

1.  $I_0 = I_1 = 1, I_2 = I_5 = I_6 = 0, I_3 = I_4 = A', I_7 = A$
2.  $I_0 = I_1 = 0, I_2 = I_5 = I_6 = 1, I_3 = I_4 = A', I_7 = A$
3.  $I_0 = I_1 = 1, I_2 = I_5 = I_6 = A, I_3 = I_4 = A', I_7 = 1$
4.  $I_0 = I_1 = A', I_2 = I_5 = I_6 = 0, I_3 = I_4 = 1, I_7 = A$

**Options :**

878270175709. 1

878270175710. 2

878270175711. 3

878270175712. 4

**Question Number : 19 Question Id : 87827044717 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The maximum frequency required to operate a 4 stage ripple counter is \_\_\_\_\_, when the propagation delay of each flip flop is 20 ns and pulse width of strobe is 20 ns.

1. 1 MHz
2. 1 GHz
3. 100 MHz
4. 10 MHz

**Options :**

878270175713. 1

878270175714. 2

878270175715. 3

878270175716. 4

**Question Number : 20 Question Id : 87827044718 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

\_\_\_\_\_ theorem is only applicable to any linear/non linear, active/passive, and time variant/invariant network.

1. Tellegen theorem
2. Superposition theorem
3. Thevenin theorem
4. Norton theorem

**Options :**

878270175717. 1

878270175718. 2

878270175719. 3

878270175720. 4

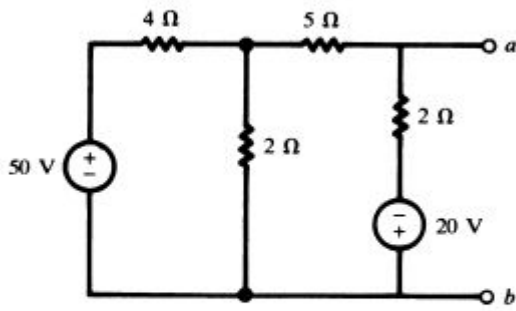
**Question Number : 21 Question Id : 87827044719 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Find the voltage difference between node  $a$  and  $b$  i.e.  $V_{ab}$



1. 10.8 V
2. -11.2 V
3. -10.8 V
4. -8.52 V

**Options :**

878270175721. 1  
878270175722. 2  
878270175723. 3  
878270175724. 4

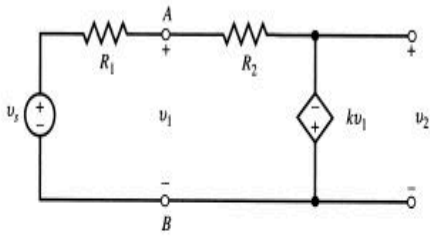
**Question Number : 22 Question Id : 87827044720 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Calculate  $v_2/v_s$  as a function of open loop gain  $k$  for the circuit shown below, where  $R_1 = 1 \text{ K}\Omega$  and  $R_2 = 5 \text{ K}\Omega$ .



1.  $\frac{-5k}{6+k}$
2.  $\frac{-6k}{6+k}$
3.  $\frac{-k}{6+k}$
4.  $\frac{-6k}{5+k}$

**Options :**

878270175725. 1

878270175726. 2

878270175727. 3

878270175728. 4

**Question Number : 23 Question Id : 87827044721 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Calculate the power efficiency of an amplitude modulated wave for a modulation index ( $\mu$ ) of 0.5.

1. 11.1 %
2. 22.2%
3. 12.5%
4. 25%

**Options :**

878270175729. 1

878270175730. 2

878270175731. 3



**Question Number : 24 Question Id : 87827044722 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Generalized expressions of different modulation schemes are given in the table.

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

<b>List-I</b> <b>(Mathematical Expression)</b>	<b>List-II</b> <b>(Modulation Type)</b>
(A). $x_1(t) = [A + m(t)]\cos w_c t$	(I). DSB-SC Modulation
(B). $x_2(t) = m(t)\cos w_c t$	(II). Frequency Modulation
(C). $x_3(t) = A\cos [w_c t + k_p m(t)]$	(III). Amplitude Modulation
(D). $x_4(t) = A\cos [w_c t + k_f \int m(\tau) d\tau]$	(IV). Phase Modulation

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

1. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)
2. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (I), (C) - (IV), (D) - (II)

**Options :**

878270175733. 1

878270175734. 2

878270175735. 3

878270175736. 4

**Question Number : 25 Question Id : 87827044723 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

A message signal  $m(t) = \cos 2000\pi t + 4\cos 4000\pi t$  modulates the carrier  $c(t) = \cos 2\pi f_c t$ , where  $f_c = 1$  MHz to produce AM. For demodulating the generated AM signal using an envelop detector, the time constant RC of the detector should satisfy.

1.  $0.5 < RC < 0.1$  ms
2.  $RC \ll 1\mu\text{sec}$
3.  $1\mu\text{s} \ll RC < 0.5$  ms
4.  $RC > 0.5$  ms

**Options :**

878270175737. 1

878270175738. 2

878270175739. 3

878270175740. 4

**Question Number : 26 Question Id : 87827044724 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Determine the instantaneous frequency in Hertz at time  $(t) = 0$ , for the following signal:

$$x(t) = 10 \cos(20\pi t + \pi t^2)$$

1. 10 Hz
2.  $20\pi$  Hz
3. 20 Hz
4.  $10\pi$  Hz

**Options :**

878270175741. 1

878270175742. 2

878270175743. 3

878270175744. 4

**Question Number : 27 Question Id : 87827044725 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

What is the bandwidth of the given angle modulated signal  $x(t) = 10 \cos(2\pi 10^8 t + 200 \cos 2\pi 10^3 t)$ ?

1. 202 KHz
2. 400 KHz
3. 804 KHz
4. 201 KHz

**Options :**

878270175745. 1

878270175746. 2

878270175747. 3

878270175748. 4

**Question Number : 28 Question Id : 87827044726 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Arrange the following amplifiers in increasing order of their input resistance:

- (A). Common Base
- (B). Common Collector
- (C). Operational Amplifier
- (D). Common Emitter

Choose the correct answer from the options given below:

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

**Options :**

878270175749. 1

878270175750. 2

878270175751. 3

878270175752. 4

**Question Number : 29 Question Id : 87827044727 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The ideal characteristics of an operational amplifier are:

(A). Infinite output resistance

(B). Infinite CMRR

(C). Zero output resistance

(D). Infinite input resistance

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

1. (A), (B) and (D) only.

2. (A), (B) and (C) only.

3. (A), (B), (C) and (D).

4. (B), (C) and (D) only.

**Options :**

878270175753. 1

878270175754. 2

878270175755. 3

878270175756. 4

**Question Number : 30 Question Id : 87827044728 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Hole concentration profile for a given Si bar is expressed as:

$$p(x) = p_0 e^{-\frac{x}{L_p}}$$

Determine the hole current density at  $x = 0$  for  $p_0 = 10^{16} / \text{cm}^3$ ,  $L_p = 1 \mu\text{m}$  and  $D_p = 12 \text{ cm}^2/\text{sec}$ .

1.  $-192 \text{ A/cm}^2$
2.  $1920 \text{ A/cm}^2$
3.  $-1920 \text{ A/cm}^2$
4.  $192 \text{ A/cm}^2$

**Options :**

878270175757. 1

878270175758. 2

878270175759. 3

878270175760. 4

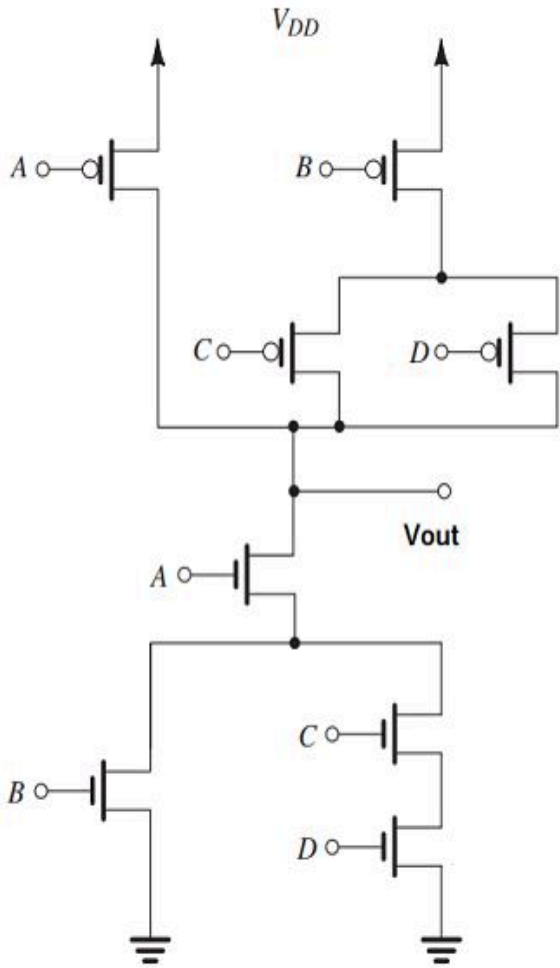
**Question Number : 31 Question Id : 87827044729 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Determine the expression of Boolean function implemented by CMOS logic shown below:



1.  $[A+B(C+D)]'$
2.  $[A+B(C+D)]$
3.  $[A(B+CD)]'$
4.  $[A(B+CD)]$

**Options :**

- 878270175761. 1
- 878270175762. 2
- 878270175763. 3
- 878270175764. 4

**Question Number : 32 Question Id : 87827044730 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 4 Wrong Marks : 1**

For a sample material of conductivity ( $\sigma$ ) =  $6.17 \times 10^7$  S/m and free electron density ( $n$ ) =  $8 \times 10^{28} \text{ m}^{-3}$ , the relaxation time ( $\tau$ ) is \_\_\_\_\_ sec.

1.  $7.20 \times 10^{-16}$
2.  $7.20 \times 10^{-17}$
3.  $19.3 \times 10^{-17}$
4.  $72.0 \times 10^{-16}$

**Options :**

878270175765. 1  
878270175766. 2  
878270175767. 3  
878270175768. 4

**Question Number : 33 Question Id : 87827044731 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The electric field of a uniform plane electromagnetic wave in free space, along the positive x-direction, is given by

$$\vec{E} = 10(a_y + ja_z)e^{-j25x}$$

The frequency and polarization of the wave, respectively, are

1. 1.2 GHz and left circular
2. 4 Hz and left circular
3. 1.2 GHz and right circular
4. 4 GHz and right circular

**Options :**

878270175769. 1  
878270175770. 2  
878270175771. 3  
878270175772. 4

Question Number : 34 Question Id : 87827044732 Question Type : MCQ Option Shuffling : No

Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A

Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Match List-I with List-II

List-I (Equation Name)	List-II (Mathematical Equation)
(A). Laplace equation	(I). $\nabla^2 V = -\frac{\rho}{\epsilon}$
(B). Ohm's law	(II). $J = \sigma E$
(C). Continuity equation	(III). $\nabla^2 V = 0$
(D). Poisson's equation	(IV). $\nabla \cdot J = -\frac{\partial \rho}{\partial t}$

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

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (III), (B) - (II), (C) - (I), (D) - (IV)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (II), (C) - (IV), (D) - (I)

**Options :**

878270175773. 1

878270175774. 2

878270175775. 3

878270175776. 4

Question Number : 35 Question Id : 87827044733 Question Type : MCQ Option Shuffling : No

Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A

Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1



The expression  $\nabla \times \nabla \times \vec{A}$  can also be expressed as \_\_\_\_\_, where A is vector quantity.

1. 0
2.  $\nabla^2 A + \nabla \cdot A$
3.  $\nabla(\nabla \cdot A) - \nabla^2 A$
4.  $(\nabla \times A) + (\nabla A)$

**Options :**

878270175777. 1  
 878270175778. 2  
 878270175779. 3  
 878270175780. 4

**Question Number : 36 Question Id : 87827044734 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

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

<b>List-I</b> <b>(Mathematical Expression)</b>	<b>List-II</b> <b>(Law/Significance)</b>
(A). $\nabla \times H = J_c + \frac{\partial D}{\partial t}$	(I). Non-existence of monopole
(B). $\nabla \times E = -\frac{\partial B}{\partial t}$	(II). Ampere's law
(C). $\nabla \cdot B = 0$	(III). Gauss's law
(D). $\nabla \cdot D = \rho$	(IV). Faraday's law

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

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (II), (B) - (IV), (C) - (I), (D) - (III)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

**Options :**

- 878270175781. 1
- 878270175782. 2
- 878270175783. 3
- 878270175784. 4

**Question Number : 37 Question Id : 87827044735 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The divergence of the vector field

$$\vec{C} = 2x\hat{a}_x + 5y\hat{a}_y - 7z\hat{a}_z$$

- 1. 14
- 2.  $\sqrt{78}$
- 3. 0
- 4. 78

**Options :**

- 878270175785. 1
- 878270175786. 2
- 878270175787. 3
- 878270175788. 4

**Question Number : 38 Question Id : 87827044736 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Consider the following statements regarding nano materials

- (A). They have high surface energy.
- (B). They have a large fraction of surface atoms.
- (C). They have large imperfections as compared to bulk materials.
- (D). They are used in fuel cells.

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

- 1. (A), (B) and (D) only.
- 2. (A), (B) and (C) only.
- 3. (A), (B), (C) and (D).
- 4. (B) and (D) only.

**Options :**

- 878270175789. 1
- 878270175790. 2
- 878270175791. 3
- 878270175792. 4

**Question Number : 39 Question Id : 87827044737 Question Type : MCQ Option Shuffling : No  
Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A  
Minimum Instruction Time : 0  
Correct Marks : 4 Wrong Marks : 1**

Which of the following is not an advantage of nanowires?

- 1. Asymmetric electron-hole characteristic
- 2. Shorter response time
- 3. High sensitivity
- 4. High electron mobility

**Options :**

- 878270175793. 1
- 878270175794. 2

878270175795. 3

878270175796. 4

**Question Number : 40 Question Id : 87827044738 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

What is the process involved in the fabrication of quantum dot photodetectors?

1. Hummers process
2. VLS method
3. Exfoliation
4. Solution processing

**Options :**

878270175797. 1

878270175798. 2

878270175799. 3

878270175800. 4

**Question Number : 41 Question Id : 87827044739 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Single-atom layer of graphene is not sensitive to which of the following materials?

1. High- $\kappa$  dielectrics
2. Superconductors
3. Ferromagnetics
4. Carbon nanotubes (CNTs)

**Options :**

878270175801. 1

878270175802. 2

878270175803. 3

878270175804. 4

**Question Number : 42 Question Id : 87827044740 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Why do fullerenes exhibit lubricating property?

1. High melting point
2. Soluble in organic solvents
3. Spherical shape
4. Purest form of carbon

**Options :**

878270175805. 1

878270175806. 2

878270175807. 3

878270175808. 4

**Question Number : 43 Question Id : 87827044741 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Match List-I with List-II

List-I	List-II
(A). Radioactive decay	(I). is among the central non-trivial quantum effects in quantum biology.
(B). Quantum tunneling	(II). is the process of emission of particles and energy from the unstable nucleus of an atom to form a stable product.
(C). Cold emission	(III). is a simple barrier created by separating two conductors with a very thin insulator.
(D). Tunnel junction	(IV). of electrons is relevant to semiconductors and superconductors physics.

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

**Options :**

878270175809. 1

878270175810. 2

878270175811. 3

878270175812. 4

**Question Number : 44 Question Id : 87827044742 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The opto-coupler provides \_\_\_\_\_ between the input circuit and the output circuit.

1. Induction
2. Isolation
3. Oscillation
4. Amplification

**Options :**

878270175813. 1

878270175814. 2

878270175815. 3

878270175816. 4

**Question Number : 45 Question Id : 87827044743 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The register that holds the address of next instruction which is to be executed in 8085 microprocessor is

1. Program Counter
2. Stack Pointer
3. Program status word (PSW)
4. Accumulator

**Options :**

878270175817. 1

878270175818. 2

878270175819. 3

878270175820. 4

**Question Number : 46 Question Id : 87827044744 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

A memory chip, having 4 data lines and 11 address lines, is used to implement a memory of size 32 KB. The number of chips required are \_\_\_\_\_

1. 16
2. 32
3. 64
4. 8

**Options :**

878270175821. 1
878270175822. 2
878270175823. 3
878270175824. 4

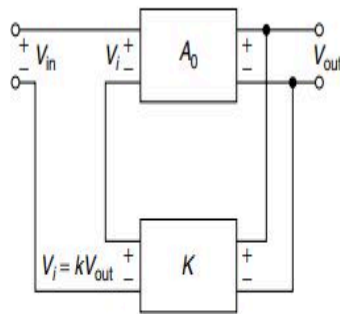
**Question Number : 47 Question Id : 87827044745 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

In a voltage-voltage feedback as shown below, which one of the following statement is TRUE if the gain  $k$  is increased?



1. The input impedance increases and output impedance decreases
2. The input impedance increases and output impedance also increases
3. The input impedance decreases and output impedance also decreases
4. The input impedance decreases and output impedance increases

**Options :**

878270175825. 1
878270175826. 2
878270175827. 3



878270175828. 4

**Question Number : 48 Question Id : 87827044746 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Implicit addressing mode is observed in \_\_\_\_\_ instruction.

1. LDA 2500 H
2. CMA
3. MVI B, 25 H
4. MOV C, D

**Options :**

878270175829. 1

878270175830. 2

878270175831. 3

878270175832. 4

**Question Number : 49 Question Id : 87827044747 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

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

List-I	List-II
<b>(Addressing Modes)</b>	<b>(Instructions)</b>
(A). Immediate	(I). MOV C, D
(B). Register	(II). LDAX B
(C). Indirect	(III). MVI C, 25 H
(D). Direct	(IV). LDA 2500 H

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

**Options :**

878270175833. 1

878270175834. 2

878270175835. 3

878270175836. 4

**Question Number : 50 Question Id : 87827044748 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

\_\_\_\_\_ biosensors are a class of electrochemical biosensors that transduce the biological recognition events caused by electroactive species at the sensing surface into a current signal for the quantification of an analyte within a sample matrix.

1. Matrix
2. Immuno
3. Dielectric
4. Amperometric

**Options :**

878270175837. 1

878270175838. 2

878270175839. 3

878270175840. 4

**Question Number : 51 Question Id : 87827044749 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Which of the following is not true for ion-selective electrode?

1. Increasing the heat output
2. Causing no interference with the reaction
3. Determination of electrical potential at very high impedance
4. Allowing zero current flow effectively

**Options :**

878270175841. 1

878270175842. 2

878270175843. 3

878270175844. 4

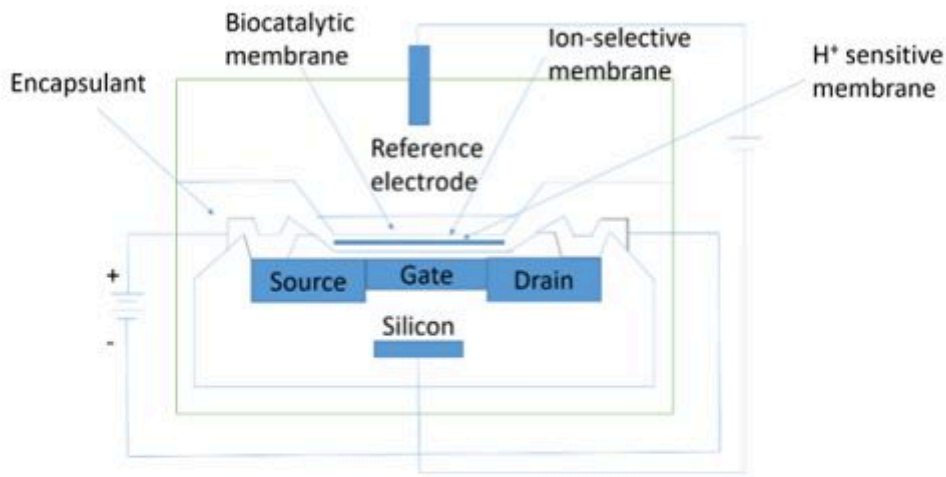
**Question Number : 52 Question Id : 87827044750 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

What does the following diagram represent?



1. Enzyme-linked field effect transistors (ENFET)
2. Potentiometric biosensor
3. Glass pH electrode
4. Piezo-electric biosensor

**Options :**

878270175845. 1  
878270175846. 2  
878270175847. 3  
878270175848. 4

**Question Number : 53 Question Id : 87827044751 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The number of T-states required to execute an instruction in 1.8  $\mu$ sec is \_\_\_\_\_, if clock frequency of 8085 microprocessor is 5 MHz.

1. 9
2. 7
3. 18
4. 14

**Options :**

878270175849. 1

878270175850. 2

878270175851. 3

878270175852. 4

**Question Number : 54 Question Id : 87827044752 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Choose the correct statements from the following:

- (A). PROM has programmable AND and fixed OR arrays.
- (B). In DRAM information is stored in capacitor.
- (C). In DRAM information is stored in cross coupled latch.
- (D). PLA has programmable AND array and programmable OR array.

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

1. (A), (B) and (D) only.
2. (A) and (C) only.
3. (A), (C) and (D) only
4. (B) and (D) only.

**Options :**

878270175853. 1

878270175854. 2

878270175855. 3

878270175856. 4

**Question Number : 55 Question Id : 87827044753 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

For an NMOS transistor whose  $V_{T0} = 0.8 \text{ V}$ ,  $2\phi_F = 0.7 \text{ V}$ ,  $\gamma = 0.4 \text{ V}^{1/2}$ , and  $V_{SB} = 3 \text{ V}$ , its threshold voltage ( $V_T$ ) is given by \_\_\_\_\_.

1. 1.084 V
2. 0.8 V
3. 1.23 V
4. 1.5 V

**Options :**

878270175857. 1  
878270175858. 2  
878270175859. 3  
878270175860. 4

**Question Number : 56 Question Id : 87827044754 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

A situation of population inversion can be related to

1. LASER
2. X-ray
3. Y-ray
4. Matter wave

**Options :**

878270175861. 1  
878270175862. 2  
878270175863. 3  
878270175864. 4

**Question Number : 57 Question Id : 87827044755 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Fluorescent fiber-optic sensors

(A). are less sensitive

(B). offer a low limit of detection

(C). are very sensitive

(D). applications are limited due to the photobleaching of the fluorophores.

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

1. (A), (B) and (D) only.
2. (A), (B) and (C) only.
3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

**Options :**

878270175865. 1

878270175866. 2

878270175867. 3

878270175868. 4

**Question Number : 58 Question Id : 87827044756 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Fiber bragg gratings (FBGs)

- (A). function in both transmission and reflection configurations.
- (B). are favorable for temperature detection.
- (C). are ideal for distributed strain monitoring.
- (D). are easier to be manufactured compared to LPFG.

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

1. (A), (B) and (D) only.
2. (A), (B) and (C) only.
3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

**Options :**

- 878270175869. 1
- 878270175870. 2
- 878270175871. 3
- 878270175872. 4

**Question Number : 59 Question Id : 87827044757 Question Type : MCQ Option Shuffling : No  
Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A  
Minimum Instruction Time : 0  
Correct Marks : 4 Wrong Marks : 1**

A sensor is a device

1. that produces a measurable signal in response to a stimulus.
2. that converts one form on energy into another.
3. that indicate the presence of the measurand.
4. that converts the response into an external measurable quantity.

**Options :**

- 878270175873. 1
- 878270175874. 2



878270175875. 3

878270175876. 4

**Question Number : 60 Question Id : 87827044758 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

\_\_\_\_\_ transducers are the most comprehensive and mostly used by research groups in biosensing analysis.

1. Conductive
2. Voltammetric
3. Potentiometric
4. Volumetric

**Options :**

878270175877. 1

878270175878. 2

878270175879. 3

878270175880. 4

**Question Number : 61 Question Id : 87827044759 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

\_\_\_\_\_ refers to the measurement of the charge of electroactive species adsorbed on to an electrode with respect to time.

1. Chronocoulometry
2. Colorimetry
3. Spectroscopy
4. Conductivity

**Options :**

878270175881. 1

878270175882. 2

878270175883. 3

878270175884. 4

**Question Number : 62 Question Id : 87827044760 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The type of biosensors that make use of electrodes that are ion-selective in nature in order to transduce the biological response into an electrical signal is known as \_\_\_\_\_ biosensors.

1. Conductive
2. Transducive
3. Potentiometric
4. Oscillatory

**Options :**

878270175885. 1

878270175886. 2

878270175887. 3

878270175888. 4

**Question Number : 63 Question Id : 87827044761 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

On the basis of application of optical fibre sensor, which of the following does not classify as an optical fibre sensor?

1. Thermal sensors
2. Physical sensors
3. Chemical sensors
4. Biomedical sensors

**Options :**

878270175889. 1

878270175890. 2

878270175891. 3

878270175892. 4

**Question Number : 64 Question Id : 87827044762 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Quantum well lasers are known for providing high incoherent advantages over \_\_\_\_\_.

1. Gas lasers
2. Chemical lasers
3. bh devices
4. Conventional dh devices

**Options :**

878270175893. 1

878270175894. 2

878270175895. 3

878270175896. 4

**Question Number : 65 Question Id : 87827044763 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

\_\_\_\_\_ is used as an optical transmitter in optical fiber sensor.

1. LED
2. APD
3. PIN diode
4. LSA diode

**Options :**

878270175897. 1

878270175898. 2

878270175899. 3

878270175900. 4

**Question Number : 66 Question Id : 87827044764 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The nanostructures are broadly categorized into \_\_\_\_\_ types according to their dimensions.

1. One
2. Two
3. Three
4. Four

**Options :**

878270175901. 1

878270175902. 2

878270175903. 3

878270175904. 4

**Question Number : 67 Question Id : 87827044765 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

The range of magneto electrostatic force in the air is around \_\_\_\_\_ meters.

1. 10mm
2. 10nm
3. 100cm
4. 100nm

**Options :**

878270175905. 1

878270175906. 2

878270175907. 3

878270175908. 4

**Question Number : 68 Question Id : 87827044766 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

\_\_\_\_\_ nanosensors are employed to identify change in the absorbance of light by a material.

1. Optical
2. Thermal
3. Magnetic
4. Mechanical

**Options :**

878270175909. 1

878270175910. 2

878270175911. 3

878270175912. 4

**Question Number : 69 Question Id : 87827044767 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

X-rays.....

(A). can be generated by bombarding an Aluminium target by high energy electrons.

(B). have wavelengths  $\sim 1\text{\AA}$

(C). are also used for treatment of certain forms of cancer

(D). Due to their wavelengths being shorter, these can be used for radar system.

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

1. (A), (B) and (D) only.
2. (A), (B) and (C) only.
3. (C) and (D) only
4. (D) only.

**Options :**

878270175913. 1

878270175914. 2

878270175915. 3

878270175916. 4

**Question Number : 70 Question Id : 87827044768 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

X-rays are used to characterize nanomaterials by giving information about their \_\_\_\_\_

1. Crystal structure
2. Optical bandgap
3. Magnetic susceptibility
4. Absorbance

**Options :**

878270175917. 1

878270175918. 2

878270175919. 3

878270175920. 4

**Question Number : 71 Question Id : 87827044769 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Which of these is not an ion-selective electrode?

1. Thermistors
2. Glass electrodes
3. Glass pH electrodes
4. Solid-state electrodes

**Options :**

878270175921. 1

878270175922. 2

878270175923. 3

878270175924. 4

**Question Number : 72 Question Id : 87827044770 Question Type : MCQ Option Shuffling : No**

**Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 4 Wrong Marks : 1**

Which of the following material(s) are known to exhibit piezoelectricity

- (A). Rochelle salts
- (B). Tourmaline
- (C). Quartz
- (D). None of the above

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

1. (A), (B) and (C) only.
2. (B) and (C) only.
3. (A) and (C) only
4. (D) only.

**Options :**

- 878270175925. 1
- 878270175926. 2
- 878270175927. 3
- 878270175928. 4

**Question Number : 73 Question Id : 87827044771 Question Type : MCQ Option Shuffling : No  
Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A  
Minimum Instruction Time : 0  
Correct Marks : 4 Wrong Marks : 1**

Consider sinusoidal modulation in an AM system. The modulation index ( $\mu$ ) when the maximum and minimum values of the envelope, respectively, are 5V and 2V, is \_\_\_\_\_.

(Note: Assume no overmodulation)

1. 0.11
2. 0.22
3. 0.42
4. 0.84

**Options :**

- 878270175929. 1



878270175930. 2

878270175931. 3

878270175932. 4

**Question Number : 74 Question Id : 87827044772 Question Type : MCQ Option Shuffling : No  
Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A  
Minimum Instruction Time : 0  
Correct Marks : 4 Wrong Marks : 1**

Which of the following is not a method of synthesis of nanoparticles?

1. Attrition
2. Spectroscopy
3. Pyrolysis
4. RF Plasma

**Options :**

878270175933. 1

878270175934. 2

878270175935. 3

878270175936. 4

**Question Number : 75 Question Id : 87827044773 Question Type : MCQ Option Shuffling : No  
Is Question Mandatory : No Calculator : Scientific Response Time : N.A Think Time : N.A  
Minimum Instruction Time : 0  
Correct Marks : 4 Wrong Marks : 1**

In how many methods the CNT can be prepared?

1. 1
2. 3
3. 4
4. 2

**Options :**

878270175937. 1

878270175938. 2

878270175939. 3

878270175940. 4