

# Andhra Pradesh State Council of Higher Education

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|------------------------------------------------|------------------------------------------|
| <b>Question Paper Name :</b>                   | Nano Technology NT 30th Sep 2020 Shift 2 |
| <b>Subject Name :</b>                          | Nano Technology (NT)                     |
| <b>Creation Date :</b>                         | 2020-09-30 17:27:26                      |
| <b>Duration :</b>                              | 120                                      |
| <b>Total Marks :</b>                           | 120                                      |
| <b>Display Marks:</b>                          | No                                       |
| <b>Share Answer Key With Delivery Engine :</b> | Yes                                      |
| <b>Actual Answer Key :</b>                     | Yes                                      |

## Nano Technology (NT)

|                                                  |          |
|--------------------------------------------------|----------|
| <b>Group Number :</b>                            | 1        |
| <b>Group Id :</b>                                | 29996541 |
| <b>Group Maximum Duration :</b>                  | 0        |
| <b>Group Minimum Duration :</b>                  | 120      |
| <b>Show Attended Group? :</b>                    | No       |
| <b>Edit Attended Group? :</b>                    | No       |
| <b>Break time :</b>                              | 0        |
| <b>Group Marks :</b>                             | 120      |
| <b>Is this Group for Examiner? :</b>             | No       |
| <b>Revisit allowed for group Instructions? :</b> | Yes      |
| <b>Maximum Instruction Time :</b>                | 0        |
| <b>Minimum Instruction Time :</b>                | 0        |

## Nano Technology (NT)

|                                     |           |
|-------------------------------------|-----------|
| <b>Section Id :</b>                 | 29996541  |
| <b>Section Number :</b>             | 1         |
| <b>Mandatory or Optional :</b>      | Mandatory |
| <b>Number of Questions :</b>        | 120       |
| <b>Section Marks :</b>              | 120       |
| <b>Display Number Panel :</b>       | Yes       |
| <b>Group All Questions :</b>        | Yes       |
| <b>Mark As Answered Required? :</b> | Yes       |
| <b>Sub-Section Number :</b>         | 1         |
| <b>Sub-Section Id :</b>             | 29996541  |
| <b>Question Shuffling Allowed :</b> | Yes       |

**Question Number : 1 Question Id : 2999654801 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The rank of the matrix  $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$  is \_\_\_\_\_.

Options :

1. 0
2. 1
3. 2
4. 3

Question Number : 2 Question Id : 2999654802 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let  $A = \begin{pmatrix} 5 & 2 \\ 2 & 2 \end{pmatrix}$ . Which of the following matrix is similar to  $A$ ?

Options :

1.  $\begin{pmatrix} 5 & 0 \\ 0 & 2 \end{pmatrix}$
2.  $\begin{pmatrix} 1 & 0 \\ 0 & 6 \end{pmatrix}$
3.  $\begin{pmatrix} 2 & 0 \\ 0 & 5 \end{pmatrix}$
4.  $\begin{pmatrix} -1 & 0 \\ 0 & 6 \end{pmatrix}$

Question Number : 3 Question Id : 2999654803 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

$$\lim_{x \rightarrow 0} \left( \frac{1}{\sin x} - \frac{1}{x} \right) = ?$$

Options :

1. 1

2. 0

3. 2

4.  $\infty$

Question Number : 4 Question Id : 2999654804 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The function  $f(x) = \frac{1}{3}x^3 - x^2 - 15x + 10$  has local maximum value at  $x =$

Options :

1. 5

2. -3

3. 0

4. 3

Question Number : 5 Question Id : 2999654805 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following is the differential equation whose set of independent solutions are  $\{e^x, xe^x\}$ .

Options :

1.  $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$

2. 
$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} - y = 0$$

3. 
$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 0$$

4. 
$$\frac{d^2y}{dx^2} + 2y = 0$$

**Question Number : 6 Question Id : 2999654806 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The inverse Laplace transform of  $F(s) = \frac{e^{-3s}}{s+2}$  is

**Options :**

1.  $e^{-2(t-3)}$

2.  $e^{-2(t+3)}$

3.  $e^{-2(t-3)}u(t-3)$

4.  $e^{-2(t+3)}u(t-3)$

**Question Number : 7 Question Id : 2999654807 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

If X is a random variable and variance  $V(X) = 3$  then  $V(4X + 3) = \underline{\hspace{2cm}}$ .

**Options :**

1. 12

2. 24

3. 48

4. 96

**Question Number : 8 Question Id : 2999654808 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The equations of regression lines are  $y = 0.5x + a$  and  $x = 0.4y + b$ . Then the correlation coefficient is \_\_\_\_\_.

**Options :**

1.  $\sqrt{0.3}$

2.  $\sqrt{0.2}$

3. 0.45

4.  $\sqrt{2}$

**Question Number : 9 Question Id : 2999654809 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

What is the first iterative root of the equation  $x^3 - 2x - 5 = 0$ ? If root lies between 2 and 3, using False position method.

**Options :**

1.  $32/17$

2.  $35/17$

3.  $33/17$

4.  $37/17$

**Question Number : 10 Question Id : 2999654810 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The solution  $y(1.1)$  of the initial value problem

$$\frac{dy}{dx} = x + 2y, \quad y(1) = 1, \quad h = 0.1$$

using the 2<sup>nd</sup> order Runge – Kutta method.

Options :

1. 1.335
2. 1.336
3. 1.330
4. 1.341

Question Number : 11 Question Id : 2999654811 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Varignon's theorem is used to find \_\_\_\_\_.

Options :

1. direction of resultant force
2. location of resultant force
3. magnitude of resultant force
4. nature of resultant force

Question Number : 12 Question Id : 2999654812 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If diameter of a shaft is doubled the power transmitted capacity will be

Options :

1. Either twice or half
2. Four times
3. Eight times

4. Same

Question Number : 13 Question Id : 2999654813 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Moment of inertia of a rectangular section having width (b) and depth (d) about an axis passing through its C.G. and parallel to the width (b), is

Options :

1.  $\frac{db^3}{12}$

2.  $\frac{bd^3}{12}$

3.  $\frac{db^3}{36}$

4.  $\frac{bd^3}{36}$

Question Number : 14 Question Id : 2999654814 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Limiting force of friction is the

Options :

1. Tangent of angle between normal reaction and the resultant of normal reaction and limiting friction

2. Ratio of limiting friction and normal reaction

3. The friction force acting when the body is just about to move

4. The friction force acting when the body is in motion

Question Number : 15 Question Id : 2999654815 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The temperature distribution in a large thin plate with uniform surface temperature will be \_\_\_\_\_ as per steady state condition.

Options :

1. Logarithmic
2. Hyperbolic
3. Parabolic
4. Linear

Question Number : 16 Question Id : 2999654816 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which one of the following forms of water have the highest value of thermal conductivity?

Options :

1. Boiling water
2. Steam
3. Solid ice
4. Melting ice

Question Number : 17 Question Id : 2999654817 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The angle between normal stress and tangential stress is known as angle of \_\_\_\_\_.

Options :

1. declination
2. orientation
3. obliquity



#### 4. ROTATION

Question Number : 18 Question Id : 2999654818 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A stone of mass ' $m$ ' at the end of a string of length ' $\ell$ ' is whirled in a vertical circle at a constant speed. The tension in the string will be maximum when the stone is

Options :

1. at the top of the circle
2. half way down from the top
3. quarter-way down from the top
4. at the bottom of the circle

Question Number : 19 Question Id : 2999654819 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

During transverse vibrations, shaft is subjected to \_\_\_\_\_ type of stresses.

Options :

1. Tensile stresses
2. Torsional shear stress
3. Bending stresses
4. Shear stress

Question Number : 20 Question Id : 2999654820 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The magnitude of buoyancy force can be explained by \_\_\_\_\_.

Options :

1. Newton's Second law of motion
2. Archimedes' principle

3. Principle of Moments

4. Newton's First law of motion

Question Number : 21 Question Id : 2999654821 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Factor of safety is defined as the ratio of \_\_\_\_\_.

Options :

1. ultimate stress to working stress
2. working stress to ultimate stress
3. breaking stress to ultimate stress
4. ultimate stress to breaking stress

Question Number : 22 Question Id : 2999654822 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If  $\mu$  is the Poisson's ratio then the ratio of Young's modulus E to shear modulus G of elastic material is \_\_\_\_\_.

Options :

1.  $2(1 + \mu)$
2.  $2(1 - \mu)$
3.  $\frac{1}{2(1 + \mu)}$
4.  $\frac{1}{2(1 - \mu)}$

Question Number : 23 Question Id : 2999654823 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The magnitude of two forces, which when acting right angle produce resultant force of  $\sqrt{10}$  kg. Then these forces are \_\_\_\_\_ kg.

Options :

1. 2 and  $\sqrt{6}$
2. 3 and 1
3.  $\sqrt{5}$  and  $\sqrt{5}$
4. 2 and 5

Question Number : 24 Question Id : 2999654824 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following equations applies to the fluid flow through a packed bed for very large Reynolds number?

Options :

1. Fanning equation
2. Blake-Plummer equation
3. Hagen-Poiseuille equation
4. Kozney-Carman equation

Question Number : 25 Question Id : 2999654825 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Ratio of the square root of inertia force to the elastic force is \_\_\_\_\_.

Options :

1. Euler Number
2. Froude Number
3. Weber Number

4. Mach Number

Question Number : 26 Question Id : 2999654826 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Dynamic head in a fully developed flow can be measured by \_\_\_\_\_.

Options :

1. Venturimeter

2. Pitot tube

3. Pitot tube and piezometer

4. Dynamometer

Question Number : 27 Question Id : 2999654827 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A cable with a uniformly distributed load per horizontal meter run will take the \_\_\_\_\_ shape.

Options :

1. Straight line

2. Parabola

3. Hyperbola

4. Elliptical

Question Number : 28 Question Id : 2999654828 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Navier Stoke's equation represents the conservation of \_\_\_\_\_.

Options :

1. energy

2. mass
3. pressure
4. momentum

Question Number : 29 Question Id : 2999654829 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

When is the arithmetic mean temperature difference of heat exchanger used instead of LMTD?

Options :

1. When the temperature profiles of two fluids of heat exchanger are sloping downward with curve
2. When the temperature profiles of two fluids of heat exchanger are sloping upward with curve
3. When the temperature profiles of two fluids of heat exchanger are straight
4. When the temperature profiles of two fluids of heat exchanger are curve

Question Number : 30 Question Id : 2999654830 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two flows are specified as

$$A) u = 2y, v = -(1/2)x \quad B) u = x^2y, v = xy^2$$

Which one of the following can be concluded?

Options :

1. Both flows are rotational
2. Both flows are irrotational
3. Flow A is rotational while flow B is irrotational

4. Flow A is irrotational while flow B is rotational

Question Number : 31 Question Id : 2999654831 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A composite wall consists of two layers of different materials having conductivities  $K_1$  and  $K_2$ . For the equal thickness of the two layers, the equivalent thermal conductivity of the slab is \_\_\_\_\_.

Options :

1.  $K_1 + K_2$

2.  $K_1 K_2$

3.  $\frac{2K_1 K_2}{K_1 + K_2}$

4.  $\frac{K_1 + K_2}{K_1 K_2}$

Question Number : 32 Question Id : 2999654832 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

There is no direct contact of flame and metal in which of the following type of furnaces?

Options :

1. Cupola

2. Crucible

3. Electric arc

4. Induction

Question Number : 33 Question Id : 2999654833 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The continuity equation is the result of application of the following law to the flow field.

Options :

1. First law of thermodynamics
2. Law of conservation of energy
3. Law of conservation of mass
4. Law of conservation of momentum

Question Number : 34 Question Id : 2999654834 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which one of the following has least value of thermal conductivity?

Options :

1. Iron
2. Water
3. Aluminium
4. Air

Question Number : 35 Question Id : 2999654835 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A steam pipe is covered with two layers of insulating materials, with the better insulating material forming the outer part. If the two layers are interchanged, the heat conducted \_\_\_\_\_.

Options :

1. will decrease
2. will increase

3. will remain unaffected
4. may increase or decrease depending upon the thickness of each layer

**Question Number : 36 Question Id : 2999654836 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

No heat exchange from gas to surroundings occurs if gas expands

**Options :**

1. Isothermally
2. In air
3. Adiabatically
4. In inertgas

**Question Number : 37 Question Id : 2999654837 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The net positive suction head (NPSH) of a centrifugal pump is defined as the sum of the velocity head and the pressure head at the \_\_\_\_\_.

**Options :**

1. discharge
2. suction
3. suction minus vapor pressure of the liquid at suction temperature
4. discharge minus vapor pressure of the liquid at the discharge temperature

**Question Number : 38 Question Id : 2999654838 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The processes occurring in an open system which permit the transfer of mass to and from the system, are known as \_\_\_\_\_.

**Options :**



1. flow processes
2. non-flow processes
3. adiabatic processes
4. cyclic process

**Question Number : 39 Question Id : 2999654839 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The point of contra-flexure is the point where

**Options :**

1. Bending moment is minimum
2. Bending moment changes its sign
3. Bending moment is constant
4. Bending moment is maximum

**Question Number : 40 Question Id : 2999654840 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

A chemical reaction is not feasible if

**Options :**

1.  $\Delta H$  is positive and  $\Delta S$  is negative
2.  $\Delta H$  is positive and  $\Delta S$  is positive
3.  $\Delta H$  is negative and  $\Delta S$  is positive
4.  $\Delta H$  is negative and  $\Delta S$  is negative

**Question Number : 41 Question Id : 2999654841 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

In free convection heat transfer, Nusselt number is a function of \_\_\_\_\_.

Options :

1. Reynolds's Number
2. Grashoff's Number
3. Reynolds's Number and Grashoff's Number
4. Prandtl Number and Grashoff's Number

Question Number : 42 Question Id : 2999654842 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Gibbs free energy ' $\Delta G$ ' is given by \_\_\_\_\_.

Options :

1.  $RT \ln K$
2.  $-RT \ln K$
3.  $-R \ln K$
4.  $T \ln K$

Question Number : 43 Question Id : 2999654843 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following forced convection heat transfer equation accounts for the liquid viscosity effect for viscous liquids?

Options :

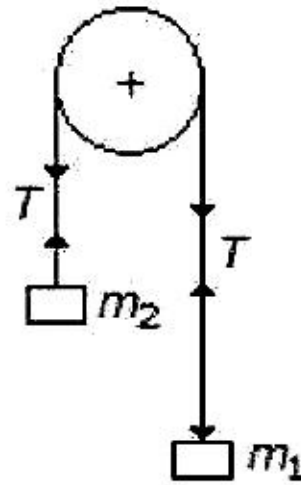
1. Dittus-Boeltier equation
2. Sieder-Tate equation

3. Nusselt equation

4. Dittus-Lucii equation

Question Number : 44 Question Id : 2999654844 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the masses of both the bodies, as shown in the below figure, are reduced to 50%, then tension in the string will be \_\_\_\_\_.



Options :

1. tripled

2. doubled

3. same

4. halved

Question Number : 45 Question Id : 2999654845 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For the same inlet and exit temperatures of two fluids, the LMTD for counter flow is always

Options :

1. smaller than LMTD for parallel flow

2. greater than LMTD for parallel flow

3. same as LMTD for parallel flow
4. do not change in LMTD for parallel flow

**Question Number : 46 Question Id : 2999654846 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Which of the following has the best resolution?

**Options :**

1. SEM
2. TEM
3. Optical Microscope
4. Inverted microscope

**Question Number : 47 Question Id : 2999654847 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Silver nanoparticles can promote wound healing through the modulation of which of the following?

**Options :**

1. Lymphocytes
2. Leukocytes
3. Platelets
4. Cytokines

**Question Number : 48 Question Id : 2999654848 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The energy gap of semiconductors is \_\_\_\_\_.

**Options :**

1. Constant

2. Varies with temperature

3. Varies with voltage

4. Varies with doping concentration

**Question Number : 49 Question Id : 2999654849 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

High stacking - fault energy metal exhibit

**Options :**

1. same work hardening

2. low work hardening

3. do not work hardening

4. high work hardening

**Question Number : 50 Question Id : 2999654850 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Cp of an ideal gas at room temperature is usually \_\_\_\_\_.

**Options :**

1. greater than Cv

2. less than Cv

3. equal to Cv

4. do not effect Cv

**Question Number : 51 Question Id : 2999654851 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

An edge dislocation can move into a different slip plane by \_\_\_\_\_.

Options :

1. glide
2. cross-slip
3. cross-slip and climb
4. climb

Question Number : 52 Question Id : 2999654852 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Gun metal is an alloy of \_\_\_\_\_.

Options :

1. Ni, Sn & Cu
2. Mn, Ni & P
3. Cu, P & Ni
4. Cu, Sn & Zn

Question Number : 53 Question Id : 2999654853 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In face-centered cubic lattice, the most closely packed planes are

Options :

1. (1 0 0)
2. (1 1 2)
3. (1 1 1)
4. (1 1 0)

Question Number : 54 Question Id : 2999654854 Question Type : MCQ Display Question Number : Yes Is

**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The dislocation reaction  $\frac{a}{2} [1\ 1\ 1] + \frac{a}{2} [1\ 1\ 1] \rightarrow a [1\ 0\ 0]$  is

**Options :**

1. energetically favourable
2. energetically unfavourable
3. vectorially unbalanced
4. likely to occur in Tin.

**Question Number : 55 Question Id : 2999654855 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The maximum number of phases that can be in equilibrium in a binary metal system is \_\_\_\_\_.

**Options :**

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

**Question Number : 56 Question Id : 2999654856 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The stacking fault energy of metal A is greater than that of metal B, then

**Options :**

1. width of stacking fault will be greater in metal A
2. width of stacking fault will be greater in metal B
3. cross-slip of screw dislocation will be easier in metal B

4. metal A will work harder than metal B

Question Number : 57 Question Id : 2999654857 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Carbon percentage in Razor blades is in the range of \_\_\_\_\_.

Options :

1. 0.1 - 0.3

2. 0.3 - 0.5

3. 0.6 - 0.8

4. 1.1 - 1.4

Question Number : 58 Question Id : 2999654858 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Hydrogen bonds are stronger than \_\_\_\_\_.

Options :

1. Vander Walls bonds

2. Ionic bonds

3. Metallic bonds

4. Covalent bonds

Question Number : 59 Question Id : 2999654859 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For soft magnetic materials magnetic coercivity and saturation magnetization should be \_\_\_\_\_.

Options :

1. low and low

2. high and high



3. low and high
4. high and low

**Question Number : 60 Question Id : 2999654860 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Example for a thermosetting polymer is

**Options :**

1. polyethylene
2. polyester
3. cellulose nitrate
4. PVC

**Question Number : 61 Question Id : 2999654861 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

In the PTFE (Teflon) monomer, the four side groups are

**Options :**

1. F F F F
2. H H H H
3. H H H Cl
4. H H H CH<sub>3</sub>

**Question Number : 62 Question Id : 2999654862 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The equation  $PV = nRT$  is valid for

**Options :**

1. Low pressure and High temperature
2. High pressure and Low temperature
3. Low pressure and Low temperature
4. High pressure and High temperature

**Question Number : 63 Question Id : 2999654863 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Unit of fugacity is same as that of the

**Options :**

1. Temperature
2. Volume
3. Pressure
4. Molar Concentration

**Question Number : 64 Question Id : 2999654864 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Corrosion resistance of stainless steel is due to \_\_\_\_\_.

**Options :**

1. presence of Mo
2. addition of Cr
3. presence of C
4. addition of Ni

**Question Number : 65 Question Id : 2999654865 Question Type : MCQ Display Question Number : Yes Is**

**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Joule-Thomson coefficient is the ratio of

**Options :**

1. Pressure change to temperature change during adiabatic compression of gas
2. Temperature change to pressure change during adiabatic throttling of gas
3. Temperature change to pressure change during adiabatic compression of gas
4. Pressure change to temperature change during adiabatic throttling of gas

**Question Number : 66 Question Id : 2999654866 Question Type : MCQ Display Question Number : Yes Is**

**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

For the constant pressure and heat input, the order of air standard efficiency of gas power cycle is \_\_\_\_\_.

**Options :**

1. Dual cycle, Diesel cycle, Otto cycle
2. Otto cycle, Diesel cycle, Dual cycle
3. Dual cycle, Otto cycle, Diesel cycle
4. Diesel cycle, Otto cycle, Dual cycle

**Question Number : 67 Question Id : 2999654867 Question Type : MCQ Display Question Number : Yes Is**

**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

High air-fuel ratio in gas turbines \_\_\_\_\_.

**Options :**

1. increases power output
2. improves thermal efficiency
3. reduces exhaust temperature

4. do not damage turbine blades

Question Number : 68 Question Id : 2999654868 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Erichsen cupping test is known as \_\_\_\_\_.

Options :

1. creep test
2. torsion test
3. fatigue test
4. formability test

Question Number : 69 Question Id : 2999654869 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Overall transformation rate changes with temperature \_\_\_\_\_.

Options :

1. monotonically decreases
2. first increases, then decreases
3. initially slow and then picks-up
4. monotonically increases

Question Number : 70 Question Id : 2999654870 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

What is the relation between brake efficiency, internal efficiency and mechanical efficiency?

Options :

1.  $\eta_{\text{internal}} = \eta_{\text{mech}} * \eta_{\text{brake}}$

2.  $\eta_{\text{mech}} = \eta_{\text{internal}} * \eta_{\text{brake}}$

3.  $\eta_{\text{brake}} = \eta_{\text{internal}} * \eta_{\text{mech}}$

4.  $\eta_{\text{mech}} = \eta_{\text{internal}} - \eta_{\text{brake}}$

**Question Number : 71 Question Id : 2999654871 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Unit of mole fraction is \_\_\_\_\_.

**Options :**

1. Moles/L<sup>3</sup>

2. Moles/L<sup>2</sup>

3. Moles/L

4. Dimensionless

**Question Number : 72 Question Id : 2999654872 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Which one of the following statements regarding a dynamic equilibrium is false?

**Options :**

1. At equilibrium, there is no net change in the system.

2. At equilibrium, the concentration of reactants and products are the same.

3. At equilibrium, the forward and back reactions cease to occur.

4. At equilibrium, the rates of the forward and back reactions are identical.

**Question Number : 73 Question Id : 2999654873 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The vapour pressure is related to the enthalpy of vaporization in

Options :

1. Clausius Clapeyron equation
2. Henry's law
3. Raoult's law
4. Maxwell's equation

Question Number : 74 Question Id : 2999654874 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Surgical instruments are made of \_\_\_\_\_.

Options :

1. super alloys
2. martensitic stainless steels
3. high carbon steels
4. austenitic stainless steels

Question Number : 75 Question Id : 2999654875 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

What is the effect of temperature on stiffness of a metal?

Options :

1. Temperature has no effect on stiffness of a metal.
2. As temperature increases stiffness of metal decreases.
3. As temperature increases stiffness of metal increases.
4. As temperature decreases stiffness of metal decreases.

Question Number : 76 Question Id : 2999654876 Question Type : MCQ Display Question Number : Yes Is

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Electrical conductivity of the specimen is a requirement for which of the following microscopic examination techniques?

Options :

1. Optical microscopy
2. Transmission electron microscopy
3. Scanning electron microscopy
4. Scanning probe microscopy

Question Number : 77 Question Id : 2999654877 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

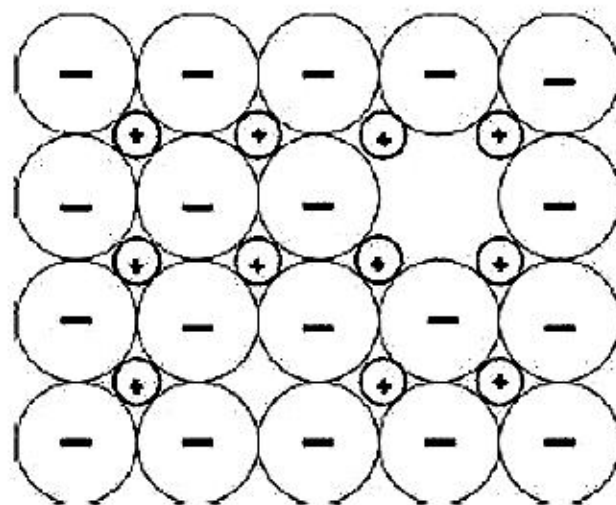
Which type of crystals generally are good optical reflectors?

Options :

1. Metals
2. Ionic crystals
3. Covalent crystals
4. Liquid crystals

Question Number : 78 Question Id : 2999654878 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which defect does the following figure depict?



Options :

1. Vacancy defect
2. Schottky defect
3. Frankel defect
4. Interstitial defect

**Question Number : 79 Question Id : 2999654879 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The stress-strain curve of single crystal undergoing twinning shows \_\_\_\_\_.

**Options :**

1. no irregularity
2. jagged irregularities
3. sudden drop in the curve
4. peaks

**Question Number : 80 Question Id : 2999654880 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Mild steel is an alloy of iron and carbon with percentage of carbon ranging from

**Options :**

1. 0-0.2
2. 0.15-0.3
3. 0.3-0.5
4. 0.5 and above

**Question Number : 81 Question Id : 2999654881 Question Type : MCQ Display Question Number : Yes Is**



**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Nanomaterials are exceptionally strong, hard and ductile at \_\_\_\_\_ temperatures.

**Options :**

1. high
2. low
3. very low
4. melting point

**Question Number : 82 Question Id : 2999654882 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Which of the following type of composite is not classified under the category of number of layers?

**Options :**

1. Unidirectional fibre reinforced
2. Laminar
3. Sandwich panels
4. Glass-fibre reinforced

**Question Number : 83 Question Id : 2999654883 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

In the intrinsic semiconductors, the Fermi level lies \_\_\_\_\_.

**Options :**

1. near conduction band
2. near valence band
3. at the midway of energy gap

4. in the conduction band

Question Number : 84 Question Id : 2999654884 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Carbon nanotubes, often called the strongest material have which of the following properties?

- (i) high electrical and thermal conductivity.
- (ii) very high tensile strength.
- (iii) higher lifetime.

Options :

- 1. (i) only
- 2. (i) and (ii) only
- 3. (i) and (iii) only
- 4. (i), (ii) and (iii)

Question Number : 85 Question Id : 2999654885 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A nanomaterial is a material where some controllable relevant dimensions are of the order of \_\_\_\_\_.

Options :

- 1. 100 nm
- 2. < 100 nm
- 3. > 100 nm
- 4. below 1 nm

Question Number : 86 Question Id : 2999654886 Question Type : MCQ Display Question Number : Yes Is

**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**  
Sol-gel method is a \_\_\_\_\_ approach.

**Options :**

1. bottom up
2. up bottom
3. top down
4. down top

**Question Number : 87 Question Id : 2999654887 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The packing fraction of a hcp unit cell is \_\_\_\_\_.

**Options :**

1. 68%
2. 74%
3. 58%
4. 62%

**Question Number : 88 Question Id : 2999654888 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Which of the following is an example of a soft magnetic material?

**Options :**

1. Permalloy
2. Strontium
3. Alnico

4. Neodymium

Question Number : 89 Question Id : 2999654889 Question Type : MCQ Display Question Number : Yes Is  
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Fugacity is most helpful in \_\_\_\_\_.

Options :

1. representing actual behaviour of real gases
2. representing actual behaviour of ideal gases
3. the study of chemical equilibria involving gases at atmospheric pressure
4. not representing the actual behaviour of ideal gases

Question Number : 90 Question Id : 2999654890 Question Type : MCQ Display Question Number : Yes Is  
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

While driving, a driver suddenly find bug splatters on wind screen of car. Which among the following undergoes greater change in momentum?

Options :

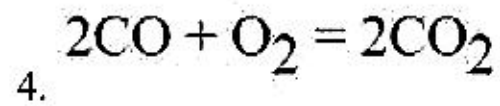
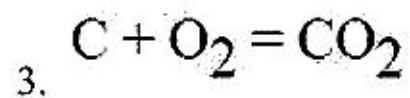
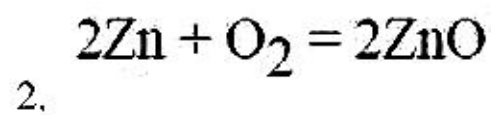
1. Momentum for bug and car is same
2. Car
3. Driver
4. Bug

Question Number : 91 Question Id : 2999654891 Question Type : MCQ Display Question Number : Yes Is  
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the Ellingham diagram of oxides, the reaction that is parallel to the temperature axis is

Options :

1.  $2C + O_2 = 2CO$



**Question Number : 92 Question Id : 2999654892 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

In the lattice of alpha iron, carbon atoms occupy \_\_\_\_\_.

**Options :**

1. substitutional sites

2. interstitial sites

3. tetrahedral sites

4. octahedral sites

**Question Number : 93 Question Id : 2999654893 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The relation between slope and maximum bending moment is \_\_\_\_\_.

**Options :**

1. Directly proportion

2. Inversely proportion

3. Relative proportion

4. Mutual incidence

**Question Number : 94 Question Id : 2999654894 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Ellingham diagram of oxides does not give any idea about

**Options :**

1. Reduction of metal sulphides
2. oxidation of metals
3. Rate of reaction
4. reduction of metal oxides

**Question Number : 95 Question Id : 2999654895 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Lattice frictional stress is known as \_\_\_\_\_ stress.

**Options :**

1. Shear
2. Normal
3. Peierls and Nabarro
4. Isotropic

**Question Number : 96 Question Id : 2999654896 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

What is twinning plane in FCC metals?

**Options :**

1.  $\{1\ 1\ 1\}$
2.  $\{1\ 0\ 0\}$
3.  $\{1\ 1\ 0\}$
4.  $\{2\ 1\ 1\}$

Question Number : 97 Question Id : 2999654897 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

\_\_\_\_\_ process is used to convert larger sections, such as ingots into smaller sections.

Options :

1. Hot rolling
2. Hot forging
3. Hot spinning
4. Hot extrusion

Question Number : 98 Question Id : 2999654898 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

High elastic modulus in materials arises from

Options :

1. High strength of bonds
2. Weak bonds
3. combination of bonds
4. deformation bonds

Question Number : 99 Question Id : 2999654899 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The work done by a closed system in a reversible process is always \_\_\_\_\_ that done in an irreversible process.

Options :

1. less than or more than
2. equal to

3. less than

4. more than

**Question Number : 100 Question Id : 2999654900 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Which of the following is true?

**Options :**

1.  $Q$  for reversible  $>$   $Q$  for irreversible and work for reversible  $<$  work for irreversible

2.  $Q$  for reversible  $<$   $Q$  for irreversible and work for reversible  $>$  work for irreversible

3.  $Q$  for reversible  $<$   $Q$  for irreversible and work for reversible  $<$  work for irreversible

4.  $Q$  for reversible  $>$   $Q$  for irreversible and work for reversible  $>$  work for irreversible

**Question Number : 101 Question Id : 2999654901 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Ternary stage creep is associated with \_\_\_\_\_.

**Options :**

1. Strain hardening

2. Recovery

3. Necking

4. Deformation

**Question Number : 102 Question Id : 2999654902 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Which property of a system is constant in reversible adiabatic process?



**Options :**

1. pressure
2. volume
3. temperature
4. entropy

**Question Number : 103 Question Id : 2999654903 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The relationship of electric and magnetic field is governed by physical laws, which are known as \_\_\_\_\_.

**Options :**

1. Kirchoff's equations
2. Millman's equations
3. Maxwell's equations
4. Arithmetic equations

**Question Number : 104 Question Id : 2999654904 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Boiling occurs at \_\_\_\_\_ temperature and \_\_\_\_\_ pressure, the process appears as a point in \_\_\_\_\_ diagram.

**Options :**

1. constant, constant, P-T
2. variable, constant, P-T
3. constant, variable, V-T
4. variable, variable, V-T

Question Number : 105 Question Id : 2999654905 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Triple point of a pure substance is a point at which \_\_\_\_\_.

Options :

1. liquid and vapour exit together
2. solid and liquid exit together
3. solid and vapour exit together
4. solid, liquid and vapour exit together

Question Number : 106 Question Id : 2999654906 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A piston-cylinder device initially contains air at 150 kPa and 27°C. At this state, the volume is 400 litres. The mass of the piston is such that a 350 kPa pressure is required to move it. The air is now heated until its volume has doubled. Determine the total heat transferred to the air.

Options :

1. 747 kJ
2. 757 kJ
3. 767 kJ
4. 777 kJ

Question Number : 107 Question Id : 2999654907 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The process of formation of new grains is known as \_\_\_\_\_.

Options :

1. Pre-crystallization

2. Re-crystallization

3. Crystallization

4. Post-crystallization

**Question Number : 108 Question Id : 2999654908 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Where is the necking region?

Options :

1. The area between lower yield point and upper yield point

2. The area between the plastic limit and elastic limit

3. The area between the ultimate point and initial point

4. The area between the ultimate point and rupture

**Question Number : 109 Question Id : 2999654909 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The Increased surface area would \_\_\_\_\_.

Options :

1. increase the rate of evaporation

2. decrease the rate of evaporation

3. not affect the rate of evaporation

4. disturb the rate of evaporation

**Question Number : 110 Question Id : 2999654910 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

An equation in Gibbs energy is be given by

Options :

1.  $dG = Vdp + SdT + \Sigma(\text{molal chemical potential}) * dn$

2.  $dG = Vdp - SdT - \Sigma(\text{molal chemical potential}) * dn$

3.  $dG = Vdp + SdT - \Sigma(\text{molal chemical potential}) * dn$

4.  $dG = Vdp - SdT + \Sigma(\text{molal chemical potential}) * dn$

Question Number : 111 Question Id : 2999654911 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The quantity of effectiveness of the energy emitted known as \_\_\_\_\_.

Options :

1. Refraction

2. Reflectivity

3. Emissivity

4. Luminance

Question Number : 112 Question Id : 2999654912 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which element causes cementite to behave in a stable manner?

Options :

1. Silicon

2. Sulphur

3. Manganese

4. Carbon

**Question Number : 113 Question Id : 2999654913 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Which aluminium alloy is known as aircraft aluminium?

**Options :**

1. 6061
2. 6063
3. 7068
4. 7075

**Question Number : 114 Question Id : 2999654914 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Which one of the following is a chemically neutral refractory?

**Options :**

1. Quartz
2. Sand
3. Silica brick
4. Silicon carbide

**Question Number : 115 Question Id : 2999654915 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The insulating capacity of material against high voltages is known as \_\_\_\_\_.

**Options :**

1. dielectric strength
2. thermoelectricity
3. electromechanical effect

4. electrochemical effect

**Question Number : 116 Question Id : 2999654916 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The ability of a substance to neutralize the acidic nature of the material is known as \_\_\_\_\_.

**Options :**

1. corrosion resistance
2. chemical composition
3. alkalinity
4. chemical equilibrium

**Question Number : 117 Question Id : 2999654917 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Nano sized polymers built from branched units are called \_\_\_\_\_.

**Options :**

1. Dendrimers
2. Composites
3. Carbon-based materials
4. Metal-based materials

**Question Number : 118 Question Id : 2999654918 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The most important element which controls the physical properties of steel is \_\_\_\_\_.

**Options :**

1. silicon

2. manganese
3. carbon
4. tungsten

**Question Number : 119 Question Id : 2999654919 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

Quantum dots can be used in \_\_\_\_\_.

**Options :**

1. Crystallography
2. Optoelectronics
3. Mechanics
4. Quantum physics

**Question Number : 120 Question Id : 2999654920 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

The energy released on dissociation of perfect dislocation into partial dislocations is \_\_\_\_\_.

**Options :**

1. Stacking fault energy
2. Dislocation energy
3. Elastic energy
4. Core energy