

Telangana State Council Higher Education

Notations :

- 1.Options shown in green color and with ✓ icon are correct.
- 2.Options shown in red color and with ✘ icon are incorrect.

Question Paper Name :	Nano Technology 5th Aug 2022 Shift 2
Subject Name :	Nano Technology
Creation Date :	2022-08-05 17:10:53
Duration :	120
Total Marks :	120
Display Marks:	Yes
Calculator :	None
Magnifying Glass Required? :	No
Ruler Required? :	No
Eraser Required? :	No
Scratch Pad Required? :	No
Rough Sketch/Notepad Required? :	No
Protractor Required? :	No
Show Watermark on Console? :	Yes
Highlighter :	No
Auto Save on Console?	Yes
Change Font Color :	No
Change Background Color :	No
Change Theme :	No
Help Button :	No
Show Reports :	No
Show Progress Bar :	No

Nano Technology

Group Number :	1
Group Id :	34058057
Group Maximum Duration :	0
Group Minimum Duration :	120
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	120
Is this Group for Examiner? :	No
Examiner permission :	Cant View
Show Progress Bar? :	No

Nano Technology

Section Id :	340580105
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	120
Number of Questions to be attempted :	120
Section Marks :	120
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	340580105
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 3405806721 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

The striction between two contacting rough surfaces scales as the

Options :

34058026881. ✓ Contact area

34058026882. ✗ Square of the contact area

34058026883. ✗ Contact volume

34058026884. ✗ Square of the contact volume

Question Number : 2 Question Id : 3405806722 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

What is the ratio between the surface area to volume of a spherical particle with a diameter of $2R$

Options :

34058026885. ✓ $3/R$

34058026886. ✗ R^3

34058026887. ✗ $3R$

34058026888. ✗ $\sqrt[3]{R}$

Question Number : 3 Question Id : 3405806723 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

From the Entropy (S) versus Temperature (T) diagram, the heat (Q) received by a system is calculated using the expression

Options :

34058026889. ✖ $Q = T(S_2 - S_1)$

34058026890. ✖ $Q = S(T_2 - T_1)$

34058026891. ✔ $Q = \int_{S_1}^{S_2} T dS$

34058026892. ✖ $Q = \int_{T_1}^{T_2} S dT$

Question Number : 4 Question Id : 3405806724 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Vertical forces of 100N and 110N are acting at the ends of the mass less slender rod of 1m. What is the moment generated

Options :

34058026893. ✖ Zero

34058026894. ✖ 20 Nm

34058026895. ✖ 5 Nm

34058026896. ✔ 10 Nm

Question Number : 5 Question Id : 3405806725 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Which of the following is correct when the size of a thermodynamic system decreases and tends to go into the nano-regime

Options :

34058026897. ✖ Proportionality between the system's thermodynamic properties and its size is strictly maintained

34058026898. ✔ Proportionality between the system's thermodynamic properties and its size is not strictly maintained

34058026899. ✖ The system's thermodynamic properties start following a square law

34058026900. ✖ The system's thermodynamic properties start following an inverse square law

Question Number : 6 Question Id : 3405806726 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

The fluid flow is considered molecular flow when the Knudsen number is

Options :

34058026901. ✖ < 1

34058026902. ✔ > 1

34058026903. ✖ 0

34058026904. ✖ ∞

**Question Number : 7 Question Id : 3405806727 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

In the macroscopic regime

Options :

34058026905. ✔ The density of two identical objects is the same as that of either one

34058026906. ✖ The density of two identical objects is not the same as that of either one

34058026907. ✖ The temperature of two identical objects is not the same as that of either one

34058026908. ✖ The inverse of the temperature of two identical objects is not the same as that
of either one

**Question Number : 8 Question Id : 3405806728 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following is not a point function

Options :

34058026909. ✖ Density

34058026910. ✔ Work

34058026911. ✖ Enthalpy

34058026912. ✖ Entropy

Question Number : 9 Question Id : 3405806729 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

If L is a typical linear dimension in a body and if any other linear dimension in the body varies proportionally to L , then the mass of the body scales as

Options :

34058026913. ✖ $1/L^2$

34058026914. ✖ L^2

34058026915. ✔ L^3

34058026916. ✖ $1/L$

Question Number : 10 Question Id : 3405806730 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

People standing in a bus moving at a constant speed are thrown backward in the direction when the bus accelerates. In this context, which of the following laws can explain the phenomenon of “thrown backward in the direction”

Options :

34058026917. ✘ Newton’s gravitational law

34058026918. ✘ Newton’s third law of motion

34058026919. ✘ Newton’s second law of motion

34058026920. ✔ Newton’s first law of motion

Question Number : 11 Question Id : 3405806731 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Which of the following is an electrical insulator

Options :

34058026921. ✘ Graphite

34058026922. ✘ Graphene

34058026923. ✔ Diamond

34058026924. ✘ Fullerene cage with an alkali metal trapped in it

Question Number : 12 Question Id : 3405806732 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

What are metallic glasses

Options :

34058026925. ✖ Window glasses doped with metallic impurities

34058026926. ✖ Window glasses that exhibit mechanical strength similar to that of metals

34058026927. ✔ Rapidly quenched metals which are amorphous

34058026928. ✖ Rapidly quenched metals which are crystalline

Question Number : 13 Question Id : 3405806733 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

In which of the following processes, the mass of the workpiece is unaltered

Options :

34058026929. ✖ Sawing

34058026930. ✖ Milling

34058026931. ✔ Forging

34058026932. ✖ Drilling

Question Number : 14 Question Id : 3405806734 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

A thick cylinder has to be made of cast iron. Which of the following equations has to be used to determine the thickness of the cylinder for its safe operation under the influence of the internal pressure

Options :

34058026933. ✘ von Mises's equation

34058026934. ✔ Lamé's equation

34058026935. ✘ Birnie's equation

34058026936. ✘ Clavarino's equation

Question Number : 15 Question Id : 3405806735 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

The lengths of the three edges of a unit cell a , b , and c are 10.2 \AA , 9.5 \AA , and 5.1 \AA , respectively, and the angles α , β , and γ between the unit cell edges are 42° , 80° and 94° respectively. To which crystal system the unit cell belongs

Options :

34058026937. ✔ Triclinic crystal system

34058026938. ✘ Hexagonal crystal system

34058026939. ✘ Face-centered cubic crystal system

34058026940. ✖ Tetragonal crystal system

Question Number : 16 Question Id : 3405806736 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Which of the following ranges of wavelengths are representative of X-rays

Options :

34058026941. ✖ 500-2500 nm

34058026942. ✖ 50-250 nm

34058026943. ✖ 5-25 nm

34058026944. ✔ 0.05-0.25 nm

Question Number : 17 Question Id : 3405806737 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

According to von Mises yield criterion, the shear yield stress of a ductile material under pure shear stress is lower than the uniaxial (tensile) yield stress by

Options :

34058026945. ✔ $\sqrt{3}$ times

34058026946. ✖ $\sqrt{2}$ times

34058026947. ✖ $\sqrt{5}$ times

34058026948. ✖ $\sqrt{\frac{3}{2}}$ times

**Question Number : 18 Question Id : 3405806738 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following tests gives the 'endurance limit' of a ductile material

Options :

34058026949. ✖ Charpy test

34058026950. ✖ Hardness test

34058026951. ✔ Fatigue test

34058026952. ✖ Impact test

**Question Number : 19 Question Id : 3405806739 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following processes is considered 'case hardening'

Options :

34058026953. ✖ Sputtering

34058026954. ✖ Thermal spraying

34058026955. ✖ Electroplating

34058026956. ✔ Nitriding

**Question Number : 20 Question Id : 3405806740 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following are incorrect w.r.t nanoparticles compared to their bulk counterparts

Options :

34058026957. ✖ Bandgap broadening

34058026958. ✔ Bandgap narrowing

34058026959. ✖ Reduced lattice constants

34058026960. ✖ Lower melting temperatures

**Question Number : 21 Question Id : 3405806741 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Theoretically, what is the equilibrium concentration of vacancies in metal at its melting temperature

Options :

34058026961. ✔ 10^{-4}

34058026962. ✖ 10^{-3}

34058026963. ✖ 10^{-2}

34058026964. ✖ 10^{-1}

**Question Number : 22 Question Id : 3405806742 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

If N is the number of primitive cells in a specimen, then what is the number of orbitals in an energy band of the specimen

Options :

34058026965. ✖ 4N

34058026966. ✖ 3N

34058026967. ✔ 2N

34058026968. ✖ N

**Question Number : 23 Question Id : 3405806743 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following crystals in their pure forms is an insulator at absolute zero

Options :

34058026969. ✖ Rhodium

34058026970. ✔ Germanium

34058026971. ✖ Osmium

34058026972. ✖ Palladium

**Question Number : 24 Question Id : 3405806744 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

The hardness of a material increases with an increase in its

Options :

34058026973. ✖ Elastic modulus

34058026974. ✖ Shear modulus

34058026975. ✔ Bulk modulus

34058026976. ✖ Density

**Question Number : 25 Question Id : 3405806745 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What are the crystal defects that are largest in size

Options :

34058026977. ✖ Point defects

34058026978. ✖ Line defects

34058026979. ✖ Surface defects

34058026980. ✔ Volume defects

**Question Number : 26 Question Id : 3405806746 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Empirical Euler's theory of buckling of columns primarily assumes that

Options :

34058026981. ✔ The stress due to direct loads on the very long column is less than the stress due to buckling failure

34058026982. ✖ The stress due to direct loads on the very short column is greater than the stress due to buckling failure

34058026983. ✖ The stress due to direct loads on the very long column is greater than the stress due to buckling failure

34058026984. ✖ The stress due to direct loads on the very short column is less than the stress due to buckling failure

**Question Number : 27 Question Id : 3405806747 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

The dimensions of the elastic stiffness constants are the same as that of

Options :

34058026985. ✖ [area]/[force]

34058026986. ✖ [volume]/[energy]

34058026987. ✔ [energy]/[volume]

34058026988. ✖ [energy][volume]

**Question Number : 28 Question Id : 3405806748 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What are units of absolute permittivity of a dielectric material

Options :

34058026989. ✖ Coulomb per square metre

34058026990. ✔ Farad per metre

34058026991. ✖ Siemens per metre

34058026992. ✖ Volt per metre

**Question Number : 29 Question Id : 3405806749 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following metal forming processes does not involve severe plastic deformation

Options :

34058026993. ✖ Equal channel angular pressing

34058026994. ✖ Accumulative roll-bonding

34058026995. ✖ High-pressure torsion

34058026996. ✔ Closed-die forging

**Question Number : 30 Question Id : 3405806750 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What is the magnetic susceptibility of all bulk superconductors at fields lower than the critical magnetic field

Options :

34058026997. ✔ -1

34058026998. ✖ 1

34058026999. ✖ 0.5

34058027000. ✖ 0

**Question Number : 31 Question Id : 3405806751 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What is the electron concentration for an alloy $\text{Cu}_{1-x}\text{Zn}_x$

Options :

34058027001. ✘ $1 - x$

34058027002. ✔ $1 + x$

34058027003. ✘ x

34058027004. ✘ $\frac{1}{1-x}$

**Question Number : 32 Question Id : 3405806752 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What is the aspect ratio of a tube having a diameter of 1 nm and a length of 10 μm

Options :

34058027005. ✘ 1000000

34058027006. ✘ 0.1

34058027007. ✔ 10000

34058027008. ✘ 10

**Question Number : 33 Question Id : 3405806753 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time**

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Magnetic resonance experiments are helpful in

Options :

34058027009. ✖ Studying only electronic states within a solid irrespective of the type of magnetic resonance experiment

34058027010. ✖ Studying only nuclear states within a solid irrespective of the type of magnetic resonance experiment

34058027011. ✔ Studying both electronic and nuclear states within a solid depending on the type of magnetic resonance experiment

34058027012. ✖ Recording very precise magnetization curves even at very low applied magnetic fields

Question Number : 34 Question Id : 3405806754 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

If σ is the electrical conductivity, K is the thermal conductivity, and L is the Lorentz number, then the relation between σ and K at a temperature T above the Debye temperature is given by

Options :

34058027013. ✔ $\frac{K}{\sigma T} = L$

34058027014. ✖ $\frac{\sigma T}{K} = L$

34058027015. ✖

$$\frac{K\sigma}{T} = L$$

34058027016. ✖ $\frac{K\sigma}{T} = L^{-1}$

**Question Number : 35 Question Id : 3405806755 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

In a quantum dot, if the mean free path (X) of an electron with an energy equal to the spacing between lower energy levels of the quantum dot, then the diameter of the quantum dot is approximately equal to

Options :

34058027017. ✖ $X/4$

34058027018. ✖ $X/3$

34058027019. ✖ $X/2$

34058027020. ✔ X

**Question Number : 36 Question Id : 3405806756 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following methods is used to study the rate of change of mass with time as a function of temperature

Options :

34058027021. ✔ Derivative thermogravimetry

34058027022. ✖ Thermogravimetry

34058027023. ✖ Differential thermal analysis

34058027024. ✖ Differential scanning calorimetry

**Question Number : 37 Question Id : 3405806757 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Consider the precipitation of a solid particle within a pure liquid that is cooled below the equilibrium freezing temperature. If β is the change in free energy per unit volume when the solid particle is formed, and γ is the solid-liquid surface energy per unit area, then the critical radius of the solid particle is given by

Options :

34058027025. ✔ $2\gamma/\beta$

34058027026. ✖ $\beta/2\gamma$

34058027027. ✖ $2\gamma\beta$

34058027028. ✖ $\gamma\beta/2$

**Question Number : 38 Question Id : 3405806758 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following alloying elements is a ferrite former in austenitic stainless steels?

Options :

34058027029. ✘ Ni

34058027030. ✔ Mo

34058027031. ✘ Mn

34058027032. ✘ Cu

Question Number : 39 Question Id : 3405806759 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

α -particle penetrates into the nucleus of Al, it results in

Options :

34058027033. ✘ Silicon

34058027034. ✘ Germanium

34058027035. ✔ Phosphorous

34058027036. ✘ Boron

Question Number : 40 Question Id : 3405806760 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Which of the following phenomena (which is uncommon in metals) hinders the use of structural polymers under loading conditions

Options :

34058027037. ✘ Aging

34058027038. ✘ Fatigue

34058027039. ✘ Creep

34058027040. ✔ Thermal degradation

Question Number : 41 Question Id : 3405806761 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

What is the spring constant of a system constructed by joining two springs (having spring constants k_1 and k_2) in series

Options :

34058027041. ✘ $k_1 k_2$

34058027042. ✘ $k_1 + k_2$

34058027043. ✔ $\frac{k_1 k_2}{k_1 + k_2}$

34058027044. ✘ $\frac{k_1 + k_2}{k_1 k_2}$

Question Number : 42 Question Id : 3405806762 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

What is the controlling parameter in induction hardening to control the depth of hardening

Options :

34058027045. ✓ Frequency of the alternating magnetic field

34058027046. ✘ Induction current value

34058027047. ✘ The voltage of the alternating magnetic field

34058027048. ✘ The phase angle of the alternating magnetic field

Question Number : 43 Question Id : 3405806763 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

The steam temperature in a boiler is 600 °C, and the pressure is 200 atm. The steam is ejected from a Laval nozzle. As the steam leaves the nozzle, its temperature should be

Options :

34058027049. ✘ < 100 °C

34058027050. ✓ > 100 °C

34058027051. ✘ Exactly 60 °C

34058027052. ✖ Close to 0 °C

**Question Number : 44 Question Id : 3405806764 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0
Correct Marks : 1 Wrong Marks : 0**

A jet plane is flying at an altitude of 1 km at speed twice that of sound. What is the distance of the plane from an observer on the ground when the observer first hears the plane coming

Options :

34058027053. ✖ 1 km

34058027054. ✔ 2 km

34058027055. ✖ 0.5 km

34058027056. ✖ 3 km

**Question Number : 45 Question Id : 3405806765 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0
Correct Marks : 1 Wrong Marks : 0**

What is the hole concentration in an intrinsic semiconductor with an electron concentration of '1+n'

Options :

34058027057. ✖ n

34058027058. ✖ n - 1

34058027059. ✓ $n + 1$

34058027060. ✗ $\frac{n}{n+1}$

Question Number : 46 Question Id : 3405806766 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

If the original length of a feature is 1 nm while its length on a micrograph is 1 cm, then what is the resolution at which the micrograph was recorded

Options :

34058027061. ✗ Micron-level resolution

34058027062. ✗ Sub-micron resolution

34058027063. ✗ Nuclear resolution

34058027064. ✓ Atomic resolution

Question Number : 47 Question Id : 3405806767 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

A gas undergoes shock compression, quasi-static adiabatic expansion, and isochoric cooling sequentially to complete a cycle. Entropy change is zero during the quasi-static adiabatic expansion, and entropy decreased during isochoric cooling. Therefore

Options :

34058027065. ✖ Entropy should have increased twice the magnitude of the entropy change during the isochoric cooling

34058027066. ✖ Entropy change during shock compression is zero

34058027067. ✖ Entropy should have equally decreased during the shock compression

34058027068. ✔ Entropy should have equally increased during the shock compression

Question Number : 48 Question Id : 3405806768 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

High dielectric constant materials are known as

Options :

34058027069. ✔ Insulators

34058027070. ✖ Conductors

34058027071. ✖ Semi conductors

34058027072. ✖ Paramagnetic

Question Number : 49 Question Id : 3405806769 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Which of the following equations is not derived for an ideal fluid

Options :

34058027073. ✓ The continuity equation

34058027074. ✘ The equation of momenta

34058027075. ✘ Bernoulli's equation

34058027076. ✘ Xin-Jiang equation

**Question Number : 50 Question Id : 3405806770 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

If the work done in converting 1 kg of water into steam at 100 °C is 40 kcal/kg, 499 kcal/kg is the specific heat of evaporation of water, and the energy spent to break the bonds between the water molecules is 459 kcal/kg. Which law of thermodynamics is applicable here

Options :

34058027077. ✘ Zeroth law of thermodynamics

34058027078. ✓ First law of thermodynamics

34058027079. ✘ Second law of thermodynamics

34058027080. ✘ Third law of thermodynamics

Question Number : 51 Question Id : 3405806771 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

What is the ratio of surface energy to the total energy in the case of nanoparticles

Options :

34058027081. ✓ ~1

34058027082. ✗ ~0.5

34058027083. ✗ zero

34058027084. ✗ ∞

Question Number : 52 Question Id : 3405806772 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

A vessel has He gas, which expands at a constant pressure when 20 kJ of heat is given. What is the work done in the expansion

Options :

34058027085. ✗ 28 kJ

34058027086. ✗ 32 kJ

34058027087. ✓ 8 kJ

34058027088. ✗ 12 kJ

Question Number : 53 Question Id : 3405806773 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0
Correct Marks : 1 Wrong Marks : 0

When connected between two conductive ports, a long (5 nm) tube with an extremely small diameter (~1 nm) exhibited unusual electron transport behavior. The tube was found to be made by a regular arrangement of atoms of the same kind. The electron mean free path in any other material made of the same kind of atoms is 10 nm. Such tubes were made in large numbers and stored in a bottle. The bottle is said to contain which class of material

Options :

34058027089. ✖ 1D amorphous nanomaterial
34058027090. ✖ 2D crystalline nanomaterial
34058027091. ✖ 3D crystalline nanomaterial
34058027092. ✔ 1D crystalline nanomaterial

Question Number : 54 Question Id : 3405806774 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0
Correct Marks : 1 Wrong Marks : 0

Which of the following discoveries won the Nobel prize

Options :

34058027093. ✖ Carbon nanotubes
34058027094. ✔ Graphene
34058027095. ✖ Carbon nanofibers

34058027096. ✖ Diamond

**Question Number : 55 Question Id : 3405806775 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0
Correct Marks : 1 Wrong Marks : 0**

As per quantum mechanics, which of the following statements is incorrect

Options :

34058027097. ✖ Energy of a system is quantized

34058027098. ✔ Wave-particle duality is just a hypothesis

34058027099. ✖ A system has a minimum energy

34058027100. ✖ A system is not allowed to have zero energy

**Question Number : 56 Question Id : 3405806776 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0
Correct Marks : 1 Wrong Marks : 0**

In intrinsic Si at 300 K

Options :

34058027101. ✖ Hole mobility = 0, anomalous behavior of Si

34058027102. ✖ Electron mobility = 0, anomalous behavior of Si

34058027103. ✖ The hole mobility > the electron mobility

34058027104. ✓ The electron mobility $>$ the hole mobility

**Question Number : 57 Question Id : 3405806777 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following is an island thin film growth mode

Options :

34058027105. ✘ Volmer–Weber growth mode

34058027106. ✓ Stranski–Krastanov growth mode

34058027107. ✘ Thornton growth mode

34058027108. ✘ Frank–van der Merwe growth mode

**Question Number : 58 Question Id : 3405806778 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What happens to the effective mass of an electron near the energy bandgap as the energy bandgap becomes smaller

Options :

34058027109. ✓ The effective mass of the electron also becomes smaller in comparison to the mass of a free electron

34058027110. ✘ The effective mass of the electron becomes bigger in comparison to the mass of a free electron

34058027111. ✖ The effective mass of the electron becomes equal to the mass of a free electron

34058027112. ✖ The effective mass of the electron becomes zero

Question Number : 59 Question Id : 3405806779 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Nanomaterials are characterized by

Options :

34058027113. ✖ High surface area

34058027114. ✖ Low specific surface area

34058027115. ✔ High specific surface area

34058027116. ✖ Low surface area to volume ratio

Question Number : 60 Question Id : 3405806780 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

The diameter of C_{60} is

Options :

34058027117. ✖ 100 nm

34058027118. ✖ 100 \AA

34058027119. ✔ 1 nm

34058027120. ✖ 1 \AA

**Question Number : 61 Question Id : 3405806781 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Fluctuations relative to the mean property of a system constituted by N particles scales as

Options :

34058027121. ✖ N

34058027122. ✔ $\frac{1}{\sqrt{N}}$

34058027123. ✖ N^{-2}

34058027124. ✖ $\frac{1}{N}$

**Question Number : 62 Question Id : 3405806782 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Let L be a linear dimension in a focusing optical element. The focal length of the optical element scales as L while the minimum spot diameter at focus is independent of L . What is the condition under which the above statement is valid

Options :

34058027125. ✖ The physical dimensions of the optical element are exactly matching with the wavelength of the light it is focusing

34058027126. ✖ The physical dimensions of the optical element are much smaller (but not tending to zero) than the wavelength of the light it is focusing

34058027127. ✔ The physical dimensions of the optical element are much larger than the wavelength of the light it is focusing

34058027128. ✖ The physical dimensions of the optical element tend to zero

Question Number : 63 Question Id : 3405806783 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

How many cubes of side (each 2.0 \AA) can be put side by side (without any gap) on a straight line of length 2 nm .

Options :

34058027129. ✔ 10

34058027130. ✖ 11

34058027131. ✖ 9

34058027132. ✖ 7

**Question Number : 64 Question Id : 3405806784 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Giant Magnetoresistance (GMR) effect was discovered by

Options :

34058027133. ✖ Clifford Skull and Bertram Brockhouse

34058027134. ✔ Peter Grünberg and Albert Fert

34058027135. ✖ Moore

34058027136. ✖ Ijima and Norio Taniguchi

**Question Number : 65 Question Id : 3405806785 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What is the Fermi energy level for all temperatures greater than zero degrees Kelvin

Options :

34058027137. ✔ It is the energy level at which the Fermi function is 0.5

34058027138. ✖ It is the energy level at which the Fermi function is 1

34058027139. ✖ It is the energy level at which the Fermi function is 0.05

34058027140. ✖ It is the energy level at which the Fermi function is 0.38

**Question Number : 66 Question Id : 3405806786 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What is the total area under typical stress versus strain curve

Options :

34058027141. ✖ Endurance limit

34058027142. ✖ Modulus of elasticity

34058027143. ✖ Modulus of resilience

34058027144. ✔ Modulus of toughness

**Question Number : 67 Question Id : 3405806787 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Solid CO₂ is called “dry ice” because

Options :

34058027145. ✖ Its melting point is above 0 °C

At 25 °C and 1 atm, only solid and vapor phases of CO₂ are in

34058027146. ✔ equilibrium

34058027147. ✖ Its boiling point is above 100 °C

34058027148. ✖ Its critical temperature is above 25 °C

**Question Number : 68 Question Id : 3405806788 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

In hydrodynamic lubrication

Options :

34058027149. ✖ If the viscosity of the oil increases, then the thickness of the oil film at the point of minimum clearance increases

34058027150. ✖ If the viscosity of the oil increases, then the thickness of the oil film at the point of minimum clearance decreases

34058027151. ✔ Even if the viscosity of the oil increases, the thickness of the oil film at the point of minimum clearance is unaltered

34058027152. ✖ If the viscosity of the oil decreases, then the thickness of the oil film at the point of minimum clearance increases

**Question Number : 69 Question Id : 3405806789 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

The materials exhibiting the same elastic properties in all crystallographic directions are

Options :

34058027153. ✖ Materials with uniformity in elastic properties

34058027154. ✖ Materials with non-uniformity in elastic properties

34058027155. ✔ Isotropic in elastic properties

34058027156. ✖ Anisotropic in elastic properties

**Question Number : 70 Question Id : 3405806790 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

To have meaningful linear regression analysis, the total number of independent variables (data points) should always be

Options :

34058027157. ✖ Equal to the number of residual sum of squares

34058027158. ✖ Lesser than the total number of parameters involved in the problem

34058027159. ✔ Greater than the total number of parameters involved in the problem

34058027160. ✖ Equal to the total number of parameters involved in the problem

**Question Number : 71 Question Id : 3405806791 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

In a turbulent flow (that follows the Darcy–Weisbach equation), the resistance to flow is proportional to the

Options :

34058027161. ✖ Mean flow velocity

34058027162. ✔ Square of the mean flow velocity

34058027163. ✖ Square root of the mean flow velocity

34058027164. ✖ Cube root of the mean flow velocity

Question Number : 72 Question Id : 3405806792 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

In highly ductile materials

Options :

34058027165. ✔ There is a significant reduction of area in tension in the plastic regime

34058027166. ✖ There is a significant reduction of area in tension only within the elastic limit

34058027167. ✖ There is a negligible reduction of area in tension in the plastic regime

34058027168. ✖ There is an increase of area in tension in the elastic limit

Question Number : 73 Question Id : 3405806793 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0
Correct Marks : 1 Wrong Marks : 0

What is the uncertainty in the velocity of moving particles if the uncertainty in its position is equal to its de Broglie wavelength

Options :

34058027169. ✖ ∞ , non-physical

34058027170. ✖ 0, non-physical

34058027171. ✖ Position

34058027172. ✔ Velocity

Question Number : 74 Question Id : 3405806794 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0
Correct Marks : 1 Wrong Marks : 0

A vector \mathbf{n} has a magnitude of 5 m and points due north. What is the magnitude and direction of the vector $-\mathbf{n}$

Options :

34058027173. ✖ 2.5 m, points due north

34058027174. ✖ 2.5 m, points due south

34058027175. ✖ 0 m, points due south

34058027176. ✔ 5 m, points due south

**Question Number : 75 Question Id : 3405806795 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

A combination turbine receives saturated Hg vapor from a boiler at 740 K and exhausts it to heat a steam boiler at 510 K. The steam turbine exhausts the steam to a condenser at 300 K. What is the maximum efficiency of the combination turbine

Options :

34058027177. ✓ 59%

34058027178. ✗ 39%

34058027179. ✗ 41%

34058027180. ✗ 45%

**Question Number : 76 Question Id : 3405806796 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

In a group of 40 gas molecules, 10 molecules are moving with a speed of 10 m/sec, 8 with a speed of 8 m/sec, 6 with a speed of 5 m/sec, 5 with a speed of 4 m/sec, 7 with a speed of 5 m/sec and 4 with a speed of 12 m/sec. What is the most probable velocity of the group

Options :

34058027181. ✗ 1.1 m/sec

34058027182. ✗ 8 m/sec

34058027183. ✓ 10 m/sec

34058027184. ✘ 12 m/sec

**Question Number : 77 Question Id : 3405806797 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What is the internal pressure for the gas represented by the van der Waals gas equation with 'a' as a constant and 'V' as the volume per mole gas

Options :

34058027185. ✘ aV

34058027186. ✘ $\frac{a}{V}$

34058027187. ✓ $\frac{a}{V^2}$

34058027188. ✘ $\frac{V^2}{a}$

**Question Number : 78 Question Id : 3405806798 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

If 'e' is the efficiency of a reversible heat engine and 'K' is the coefficient of performance of a reversible refrigerator obtained by operating the engine backward, what is the relation between e and K

Options :

34058027189. ✖ $eK = T_1 T_2$; T_1 and T_2 are temperatures of hot and cold reservoirs, respectively

34058027190. ✔ $eK = T_2/T_1$; T_1 and T_2 are temperatures of hot and cold reservoirs, respectively

34058027191. ✖ $eK = T_1/T_2$; T_1 and T_2 are temperatures of hot and cold reservoirs, respectively

34058027192. ✖ $eK = 1 - T_1 T_2$; T_1 and T_2 are temperatures of hot and cold reservoirs, respectively

Question Number : 79 Question Id : 3405806799 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

If ' λ ' is the mean free path of a molecule, then the probability that the molecule travels a distance 'x' before its next collision is given by

Options :

34058027193. ✔ $e^{-x/\lambda}$

34058027194. ✖ $e^{-x\lambda}$

34058027195. ✖ $e^{-\lambda/x}$

34058027196. ✖ $e^{-x^{\lambda}}$

**Question Number : 80 Question Id : 3405806800 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Atomic Force Microscope is used to study the microstructure of

Options :

34058027197. ✓ Conductive materials only

34058027198. ✘ Semi conductive materials only

34058027199. ✘ Non-conductive materials only

34058027200. ✘ All materials

**Question Number : 81 Question Id : 3405806801 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What is the ratio of the densities of the lattice points on (111) and (110) planes
in a simple cubic lattice

Options :

34058027201. ✘ $\frac{3}{2}$

34058027202. ✘ $\frac{2}{3}$

34058027203. ✘ $\frac{\sqrt{3}}{\sqrt{2}}$

34058027204. ✓ $\frac{\sqrt{2}}{\sqrt{3}}$

**Question Number : 82 Question Id : 3405806802 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What is the interplanar spacing for a (321) plane in a simple cubic lattice with a lattice constant of 3.74 Å

Options :

34058027205. ✘ 0.2 nm

34058027206. ✔ 0.1 nm

34058027207. ✘ 1 nm

34058027208. ✘ 2 nm

**Question Number : 83 Question Id : 3405806803 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Shear modulus is defined

Options :

34058027209. ✘ For elasto-plastic regime

34058027210. ✘ Only in the plastic regime

34058027211. ✔ Only in the elastic limit

34058027212. ✘ For severe-plastic regime

**Question Number : 84 Question Id : 3405806804 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Free surface of a liquid tends to contract to the smallest possible area due to

Options :

34058027213. ✓ Surface tension

34058027214. ✘ Striction

34058027215. ✘ Adsorption

34058027216. ✘ Viscous forces

**Question Number : 85 Question Id : 3405806805 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What is the centre of buoyancy

Options :

34058027217. ✓ It is the centroid (of the displaced volume of the fluid) through which the line of action of buoyancy force acts

34058027218. ✘ It is the displaced (of the submerged body) through which the line of action of buoyancy force acts

34058027219. ✘ It is the centroid (of the floating body) through which the line of action of buoyancy force acts

34058027220. ✖ It is the centroid (of the fluid vertically above the body) through which the line of action of buoyancy force acts

Question Number : 86 Question Id : 3405806806 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

What is the angle between side cutting edge and end cutting edge

Options :

34058027221. ✔ Nose angle

34058027222. ✖ Side rake angle

34058027223. ✖ Side relief angle

34058027224. ✖ End relief angle

Question Number : 87 Question Id : 3405806807 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Entropy change of Universe is always

Options :

34058027225. ✖ $-\infty$

34058027226. ✖ ∞

34058027227. ✖ < 0

34058027228. ✓ > 0

**Question Number : 88 Question Id : 3405806808 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

A body weighing 10 kN has to be lifted using steel (Yield strength of steel = 250 MPa, Ultimate tensile strength of steel = 450 MPa) rope. What is the required diameter of the steel rope if yielding is considered the failure criterion with a factor of safety as 2

Options :

34058027229. ✘ 6.1 mm

34058027230. ✓ 10.1 mm

34058027231. ✘ 11.1 mm

34058027232. ✘ 12.1 mm

**Question Number : 89 Question Id : 3405806809 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following statements is correct w.r.t the phase diagrams

Options :

34058027233. ✘ Only metallic alloys can have phase diagrams

34058027234. ✘

Metals, alloys, and even ceramics (but not polymers) can have phase diagrams

34058027235. ✓ Metals, alloys, ceramics, and even polymers can have phase diagrams

34058027236. ✘ Pure metals cannot have phase diagrams

Question Number : 90 Question Id : 3405806810 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Magnetic properties of F_e will change at _____ temperature

Options :

34058027237. ✘ $354^{\circ} C$

34058027238. ✘ $1043^{\circ} C$

34058027239. ✓ $770^{\circ} C$

34058027240. ✘ $185^{\circ} C$

Question Number : 91 Question Id : 3405806811 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

If the temperature of a fluid is raised from T_1 to T_2 at a constant volume by heating in one case and by mechanical friction in another case, then

Options :

34058027241. ✓ The internal energy of the fluid at T_2 will be the same in both heating and mechanical friction cases

34058027242. ✘ The internal energy of the fluid at T_2 in the heating case will be slightly more than that in the mechanical friction case

34058027243. ✘ The internal energy of the fluid at T_2 in the mechanical friction case will be slightly more than that in the heating case

34058027244. ✘ The internal energy of the fluid at T_2 in the heating case will be significantly more than that in the mechanical friction case

Question Number : 92 Question Id : 3405806812 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

What is the heat capacity of a body at absolute zero temperature

Options :

34058027245. ✘ ∞

34058027246. ✓ 0

34058027247. ✘ < 0

34058027248. ✘ > 0

Question Number : 93 Question Id : 3405806813 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

How many distinguishable ways can the atoms be distributed among the available vibrational energy levels at temperature 0 K

Options :

34058027249. ✖ 0

34058027250. ✖ 0.5

34058027251. ✔ 1

34058027252. ✖ 2

Question Number : 94 Question Id : 3405806814 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Critical configuration entropy of mixing $\geq 1.5R$ (R being the molar gas constant) is achieved, leading to the formation of a stable multi-component solid solution called high entropy alloy. However, this statement is valid only if the number of elements/components is at least

Options :

34058027253. ✖ 2

34058027254. ✖ 3

34058027255. ✖ 4

34058027256. ✔ 5

**Question Number : 95 Question Id : 3405806815 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

When a pure solid is heated, the average vibrational energy per atom increases, and the corresponding entropy also increases. Here, the entropy is known as

Options :

34058027257. ✖ Cold entropy

34058027258. ✖ Positional entropy

34058027259. ✔ Thermal entropy

34058027260. ✖ Potential entropy

**Question Number : 96 Question Id : 3405806816 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following metals have the highest ductility

Options :

34058027261. ✖ Pt

34058027262. ✔ Au

34058027263. ✖ Ag

34058027264. ✖ Al

**Question Number : 97 Question Id : 3405806817 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Monazite, which is found in abundance in India, is an ore that contains

Options :

34058027265. ✓ Th

34058027266. ✗ U

34058027267. ✗ Pu

34058027268. ✗ Na

**Question Number : 98 Question Id : 3405806818 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

The recrystallization temperature of alloys is

Options :

34058027269. ✓ At least 50% of the melting temperature of the alloy

34058027270. ✗ At least 20% of the melting temperature of the alloy

34058027271. ✗ At least 30% of the melting temperature of the alloy

34058027272. ✗ At least 41% of the melting temperature of the alloy

**Question Number : 99 Question Id : 3405806819 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

P-type semiconductor is a Germanium doped with element of

Options :

34058027273. ✘ Mono-valent

34058027274. ✘ Divalent

34058027275. ✘ Pentavalent

34058027276. ✔ Trivalent

**Question Number : 100 Question Id : 3405806820 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

The diamond crystal structure is built on

Options :

34058027277. ✘ Body-centered cubic lattice

34058027278. ✘ Face-centered cubic lattice

34058027279. ✘ 2 interpenetrating body-centered cubic lattices

34058027280. ✔ 2 interpenetrating face-centered cubic lattices

Question Number : 101 Question Id : 3405806821 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Which of the following has the highest electronegativity

Options :

34058027281. ✖ Ca

34058027282. ✔ P

34058027283. ✖ Bi

34058027284. ✖ As

Question Number : 102 Question Id : 3405806822 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

In a good electrical conductor operated using AC voltage

Options :

34058027285. ✖ The conduction current is slightly greater than the displacement current

34058027286. ✔ The conduction current is equal to the displacement current

34058027287. ✖ The conduction current is slightly lower than the displacement current

34058027288. ✖ The conduction current is substantially greater than the displacement current

Question Number : 103 Question Id : 3405806823 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

A material sustains a constant load for long periods and continues to deform until its fractures under the same load. This phenomenon is called as

Options :

34058027289. ✖ Fracture

34058027290. ✖ Fatigue

34058027291. ✔ Creep

34058027292. ✖ Elastic fracture

Question Number : 104 Question Id : 3405806824 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

The partial derivative of volume with the temperature at constant pressure is related to experimentally measurable

Options :

34058027293. ✔ Coefficient of thermal expansion

34058027294. ✖ Isothermal compressibility

34058027295. ✖ Thermal conductivity

34058027296. ✖ Specific heat at constant volume

**Question Number : 105 Question Id : 3405806825 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What happens to the crystal structure and magnetic property of Iron's at temperatures above 770 °C and below 912 °C

Options :

34058027297. ✔ Iron retains its body-centered cubic structure, but it becomes paramagnetic

34058027298. ✖ Iron retains its body-centered cubic structure and its ferromagnetic behavior

34058027299. ✖ Iron changes to the face-centered cubic structure and retains its ferromagnetic behavior

34058027300. ✖ Iron changes to the face-centered cubic structure, but it becomes paramagnetic

**Question Number : 106 Question Id : 3405806826 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

What is the entropy change when ice melts? Given, heat of fusion for ice = 333 kJ/kg and the surrounding temperature = 25 °C

Options :

34058027301. ✘ -1.22 kJ/kg-K

34058027302. ✔ +1.22 kJ/kg-K

34058027303. ✘ -1.12 kJ/kg-K

34058027304. ✘ +1.12 kJ/kg-K

Question Number : 107 Question Id : 3405806827 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Triple point of water on Pressure (P)-Volume (V) diagram is a

Options :

34058027305. ✘ Triangle

34058027306. ✘ Point

34058027307. ✔ Line

34058027308. ✘ Exponential curve

Question Number : 108 Question Id : 3405806828 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

The true strain and engineering strain are related as

Options :

34058027309. ✖ True strain = $\ln(1 + \text{engineering strain})$

34058027310. ✖ Engineering strain = $\ln(1 + \text{true strain})$

34058027311. ✖ True strain = $\ln(\text{engineering strain})$

34058027312. ✔ Engineering strain = $\ln(\text{true strain})$

Question Number : 109 Question Id : 3405806829 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Aluminum alloys are used for transportation applications due to their

Options :

34058027313. ✖ Low density

34058027314. ✖ High toughness

34058027315. ✖ High strength

34058027316. ✔ High strength to weight ratio

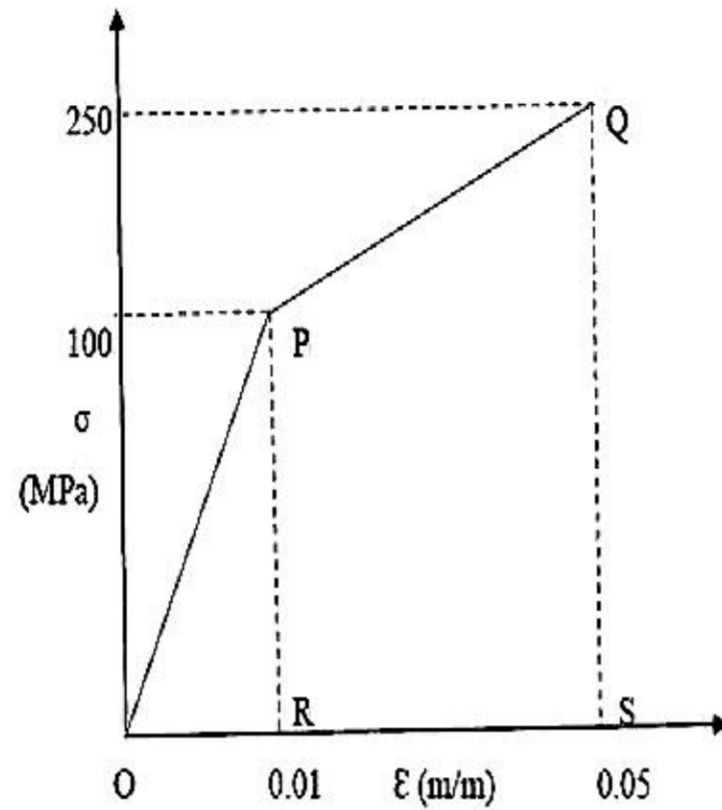
Question Number : 110 Question Id : 3405806830 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

The stress (σ)-strain (ϵ) curve for a material is shown below. Calculate the modulus of resilience of the material



Options :

34058027317. ✓ 500 kJ/m^3

34058027318. ✗ 1000 kJ/m^3

34058027319. ✗ 7000 kJ/m^3

34058027320. ✗ 7500 kJ/m^3

Question Number : 111 Question Id : 3405806831 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Consider the following data recorded when a material underwent tensile testing: Gauge length = 200 mm; Diameter of the specimen = 25 mm; Change in length for load up to proportionality limit = 0.35 mm; load at proportionality limit = 100 kN; maximum load = 150 kN and diameter at neck = 15 mm. Calculate the ultimate tensile strength of the material

Options :

34058027321. ✓ 305.6 MPa

34058027322. ✗ 848.8 MPa

34058027323. ✗ 116.4 MPa

34058027324. ✗ 174.6 MPa

Question Number : 112 Question Id : 3405806832 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

If $\Psi = Ne^{-ikt}$, what is $\Psi\Psi^*$

Options :

34058027325. ✗ 1

34058027326. ✓ N^2

34058027327. ✗ $-N$

34058027328. ✗ $-N^2$

Question Number : 113 Question Id : 3405806833 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

In the case of thermodynamics of small-systems (for example: nano systems), the free energy is

Options :

34058027329. ✖ Continues to be intensive while other properties change
34058027330. ✖ Continues to be extensive while other properties change
34058027331. ✖ No longer an intensive but depends on the size of the system
34058027332. ✔ No longer an extensive but depends on the size of the system

Question Number : 114 Question Id : 3405806834 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Ceramic based cutting tool material is

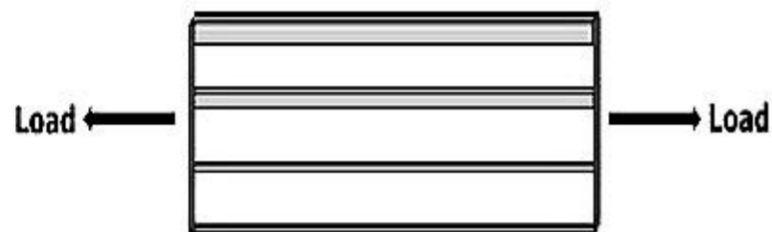
Options :

34058027333. ✖ TiO_2
34058027334. ✔ SiAlON
34058027335. ✖ MgO
34058027336. ✖ Coromite

Question Number : 115 Question Id : 3405806835 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

4 fibers of same material and same length but different diameters are constrained in a composite as shown in the figure. When a load is applied in the direction shown in the figure i.e., along the fibers' length, how can the fibers continue to be constrained



Options :

34058027337. ✘ By breaking into smaller fibers

34058027338. ✘ By buckling and re-adjusting inside the matrix

34058027339. ✔ By transferring the load to the adjacent fibers through the matrix around

34058027340. ✘ By resisting the load as far as possible before failing and resulting in the failure of the composite

Question Number : 116 Question Id : 3405806836 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time

: N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

A material that is constituted by at least 2 macroscopically identifiable/distinguishable materials, which have distinct chemical and physical (including mechanical) properties is called as

Options :

34058027341. ✘ an alloy

34058027342. ✔ A composite

34058027343. ✘ A doped material

34058027344. ✘ A mixture

**Question Number : 117 Question Id : 3405806837 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

The real-world reinforced concrete structures are

Options :

34058027345. ✔ Statistically indeterminate but stable

34058027346. ✘ Statistically determinate and therefore stable

34058027347. ✘ Statistically determinate but unstable

34058027348. ✘ Statistically indeterminate and therefore unstable

Question Number : 118 Question Id : 3405806838 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

When is a 2D truss said to be statistically determinate

Options :

34058027349. ✓ when the total number of truss members = $2(\text{total number of joints})-3$

34058027350. ✗ when the total number of truss members = $2(\text{total number of joints})+3$

34058027351. ✗ when the total number of truss members $< 2(\text{total number of joints})-3$

34058027352. ✗ when the total number of truss members $< 2(\text{total number of joints})+3$

Question Number : 119 Question Id : 3405806839 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

Which of the following bottom- up approach is used to produce nano materials

Options :

34058027353. ✗ Grinding

34058027354. ✗ Etching

34058027355. ✗ Lithography

34058027356. ✓ Sputtering

**Question Number : 120 Question Id : 3405806840 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time
: N.A Think Time : N.A Minimum Instruction Time : 0**

Correct Marks : 1 Wrong Marks : 0

Which of the following is the example of 2D nano- structure

Options :

34058027357. ✖ Nano-particle

34058027358. ✖ Nano-tube

34058027359. ✔ Nano-film

34058027360. ✖ Nano-crystal