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 23rd Sept 2020 Shift 2
Subject Name :	Nano Technology
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Actual Answer Key :	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
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Nano Technology

Group Number :	1
Group Id :	88039692
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

Nano Technology

Section Id :	880396168
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	120
Number of Questions to be attempted :	120
Section Marks :	120
Display Number Panel :	Yes
Group All Questions :	Yes
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	880396168
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 88039610921 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the semi-empirical relationship that gives the grain size dependence of the flow stress at any plastic strain, up to the fracture of ductile polycrystalline materials?

Options :

88039643681. ✖ Stranski-Krastanov equation

88039643682. ✖ Volmer-Weber equation

88039643683. ✔ Hall-Petch equation

88039643684. ✖ Murty-Hedge equation

Question Number : 2 Question Id : 88039610922 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Calculate the major Poisson's ratio of a uni-directional composite having 30% (by volume) of fibres with a Poisson's ratio of 0.20 and a matrix with Poisson's ratio of 0.35.

Options :

88039643685. ✔ 0.305

88039643686. ✖ 0.571

88039643687. ✖ 0.150

88039643688. ✖ 0.550

Question Number : 3 Question Id : 88039610923 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The time required to homogenize the temperature in a system of given shape is proportional to

Options :

88039643689. ✖ any linear dimension in the system

88039643690. ✔ the square of any linear dimension in the system

88039643691. ✖ the square-root of any linear dimension in the system

88039643692. ✖ the cube of any linear dimension in the system

Question Number : 4 Question Id : 88039610924 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

At nanometre length scale, which among the following is correct:

Options :

88039643693. ✖ gravitational force dominates the adhesion force

88039643694. ✖ gravitational force is equal to the adhesion force

88039643695. ✖ gravitational force is slightly greater than the adhesion force

88039643696. ✔ adhesion force is far greater than the gravitational force

Question Number : 5 Question Id : 88039610925 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the contribution of any hole that extends outside a compound shape in calculating the centroid using geometric decomposition technique?

Options :

88039643697. ✖ Any hole extended outside a compound shape contributes positively with a multiplicity factor of 0.25 to the centroid calculation

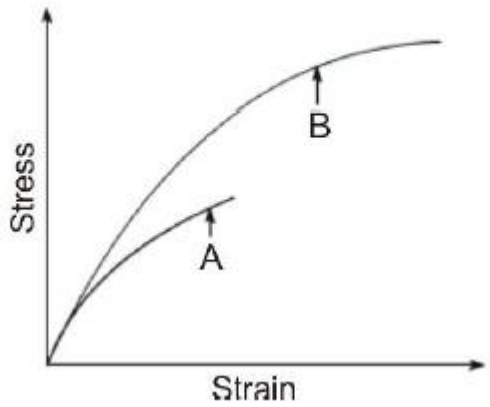
88039643698. ✖ Any hole extended outside a compound shape contributes positively with a multiplicity factor of 0.5 to the centroid calculation

88039643699. ✔ Any hole extended outside a compound shape contributes negatively to the centroid Calculation

88039643700. ✖ Any hole extended outside a compound shape is omitted in the centroid calculation

Question Number : 6 Question Id : 88039610926 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

For a given brittle material (for example: Cast iron), identify A and B in the following diagram:



Options :

88039643701. ✖ A = under compression; B = under tension

88039643702. ✔ A = under tension; B = under compression

88039643703. ✖ A = under tension; B = under torsion

88039643704. ✖ A = under compression; B = under torsion

Question Number : 7 Question Id : 88039610927 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The phenomenon of adiabatic demagnetization is explained by applying

Options :

88039643705. ✖ Zeroth law of thermodynamics

88039643706. ✖ First law of thermodynamics

88039643707. ✔ Second law of thermodynamics

88039643708. ✖ Third law of thermodynamics

Question Number : 8 Question Id : 88039610928 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

If the spring force (F_{spring}) is given by $F_{spring} = -k\delta L$, where k is a spring constant and δL is the elongation from the equilibrium position, then the period of oscillation scales as:

Options :

88039643709. ✖ L

88039643710. ✖ L^2

88039643711. ✖ $L^{2/3}$

88039643712. ✔ $L^{3/2}$

Question Number : 9 Question Id : 88039610929 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Two groups are playing "Tug of War" (rope pulling game). The first group is applying a force M and the second group is applying a force N, then the resultant force in the opposite direction of pull of the first group is

Options :

88039643713. ✖ Collinear and M-N

88039643714. ✔ Collinear and N-N

88039643715. ✖ Coplanar and M-N

88039643716. ✖ Coplanar and N-M

Question Number : 10 Question Id : 88039610930 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which imaging technique is governed by the principle of electron tunnelling?

Options :

88039643717. ✖ electron microscopy

88039643718. ✔ scanning tunnelling microscopy

88039643719. ✖ Raman microscopy

88039643720. ✖ magnetic resonance imaging

Question Number : 11 Question Id : 88039610931 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which salt is used in a salt bath furnace to alter the physical properties of a work piece without changing its surface?

Options :

88039643721. ✖ acidic salt

88039643722. ✖ basic salt

88039643723. ✔ neutral salt

88039643724. ✖ mixture of basic salts

Question Number : 12 Question Id : 88039610932 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which equation is used to estimate vapor pressure as a function of temperature?

Options :

88039643725. ✔ Clausius-Clapeyron equation

88039643726. ✖ Clausius–Mossotti equation

88039643727. ✖ Avrami equation

88039643728. ✖ Clarke's equation

Question Number : 13 Question Id : 88039610933 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The capacity of a cross-section to resist bending is known as

Options :

88039643729. ✖ centre of mass

88039643730. ✔ moment of inertia

88039643731. ✖ centre of gravity

88039643732. ✖ centre of percussion

Question Number : 14 Question Id : 88039610934 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If the deflection length of a cantilever beam loaded by its own weight scales as square of any linear dimension in the cantilever beam, then, if the beam is made a thousand time smaller, how much does it bends?

Options :

88039643733. ✖ 100 times less due to its own weight

88039643734. ✖ 1000 times less due to its own weight

88039643735. ✖ 10000 times less due to its own weight

88039643736. ✔ 10^6 times less due to its own weight

Question Number : 15 Question Id : 88039610935 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the modulus of elasticity of an alloy specimen displaying limit of proportionality stress, elongation length at the proportionality limit and gauge length as 50 MN/m^2, 0.05 mm and 100 mm, respectively?

Options :

88039643737. ✖ 10 GN/m^2

88039643738. ✔ 100 GN/m^2

88039643739. ✖ 110 GN/m^2

88039643740. ✖ 90 GN/m^2

Question Number : 16 Question Id : 88039610936 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

With which of the following, D'Alembert's principle has a close association?

Options :

88039643741. ✖ Newton's first law

88039643742. ✔ Newton's second law

88039643743. ✖ Newton's third law

88039643744. ✖ Noether's theorem

Question Number : 17 Question Id : 88039610937 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In the face centred cubic (FCC) materials, in which family of crystallographic planes are the densest crystallographic directions <110> observed?

Options :

88039643745. ✖ {141} planes

88039643746. ✖ {101} planes

88039643747. ✔ {111} planes

88039643748. ✖ {121} planes

Question Number : 18 Question Id : 88039610938 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If G is the shear modulus of a given material, what are the material's theoretical and calculated shear strengths approximately?

Options :

88039643749. ✔ G/10 and G/1000, respectively

88039643750. ✖ G/1000 and G/10, respectively

88039643751. ✖ G/100 and G/10, respectively

88039643752. ✖ G/100 and G/100, respectively

Question Number : 19 Question Id : 88039610939 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In microelectronics, reduction of size of an electrically conducting component leads to

Options :

88039643753. ✖ high voltage at constant current

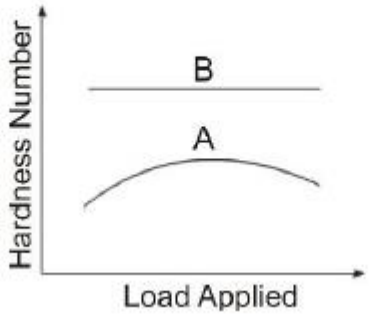
88039643754. ✖ less dissipated electrical power per unit area of the component at a constant voltage

88039643755. ✔ more dissipated electrical power per unit area of the component at a constant voltage

88039643756. ✖ high current and varying voltage

Question Number : 20 Question Id : 88039610940 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

With respect to "*indentation hardness*" measurement, identify A and B in the following diagram:



Options :

88039643757. ✖ A = Mohs; B = Brinell

88039643758. ✖ A = Mohs; B = Shore

88039643759. ✖ A = Vickers; B = Brinell

88039643760. ✔ A = Brinell; B = Vickers

Question Number : 21 Question Id : 88039610941 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In a heat exchanger, the difference between the required outlet temperature of the process fluid and the temperature at which utility is available is known as

Options :

88039643761. ✖ RMS temperature difference

88039643762. ✔ approach temperature

88039643763. ✖ log mean temperature difference

88039643764. ✖ arithmetic mean temperature difference

Question Number : 22 Question Id : 88039610942 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If L is any linear dimension in a spherical solid metallic particle, how does the melting temperature of the particle behave?

Options :

88039643765. ✔ melting temperature decreases as L decreases

88039643766. ✖ melting temperature decreases as L increases

88039643767. ✖ melting temperature increases as L decreases

88039643768. ✖ melting temperature remains the same irrespective of variation in L because it is an intrinsic material property

Question Number : 23 Question Id : 88039610943 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In the case of nano sized grains in a closed system, which of the following statements is correct?

Options :

88039643769. ✔ an additional energy i.e., surface/interface energy term should be added while considering changes in the internal energy of the system

88039643770. ✖ an additional energy i.e., surface/interface energy term should be subtracted while considering changes in the internal energy of the system

88039643771. ✖ an additional energy i.e., surface/interface energy term should be multiplied while considering changes in the internal energy of the system

88039643772. ✖ surface/interface energy is zero and hence neglected while considering changes in the internal energy of the system

Question Number : 24 Question Id : 88039610944 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following relations does the “Diffusion Co-efficient” obey?

Options :

88039643773. ✖ Arrhenius-type relation with inverse of temperature

88039643774. ✔ Arrhenius-type relation with temperature

88039643775. ✖ linear relation with inverse of temperature

88039643776. ✖ linear relation with temperature

Question Number : 25 Question Id : 88039610945 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is sintering process?

Options :

88039643777. ✖ it is a grinding technique to break the powder material particles into smaller sizes at elevated temperatures

88039643778. ✖ it is a thin film deposition process at elevated temperatures

88039643779. ✖ it is a controlled corrosion process at elevated temperatures

88039643780. ✔ it is a consolidation process of powder material particles at elevated temperatures

Question Number : 26 Question Id : 88039610946 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

If X atoms can dissolve in two solid phases α and β in equilibrium, then what is the chemical potential of X atoms?

Options :

88039643781. ✖ 0

88039643782. ✖ ∝

88039643783. ✔ same in both phases α and β

88039643784. ✖ different in both phases α and β

Question Number : 27 Question Id : 88039610947 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following is related to Nabarro-Herring formula?

Options :

88039643785. ✖ fatigue limit

88039643786. ✖ fracture toughness

88039643787. ✔ creep due to lattice diffusion

88039643788. ✖ elastic limit

Question Number : 28 Question Id : 88039610948 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

According to laws of thermodynamics, the state of a simple closed system can be completely specified in terms of

Options :

88039643789. ✔ any two independent thermodynamic parameters

88039643790. ✖ any two dependent thermodynamic parameters

88039643791. ✖ only temperature and pressure

88039643792. ✖ only temperature and volume

Question Number : 29 Question Id : 88039610949 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What will be the mean free path of a residual air molecule under very high vacuum (or in other words very low pressure) conditions?

Options :

88039643793. ✖ far lesser than that under atmospheric pressure conditions

88039643794. ✖ only infinitesimally lesser than that under atmospheric pressure conditions

88039643795. ✔ far greater than that under atmospheric pressure conditions and in few tens of km to few hundreds of km

88039643796. ✖ same as that under atmospheric pressure conditions because there is no relation between mean free path and pressure

Question Number : 30 Question Id : 88039610950 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the freezing temperature of water at 1.0 atm, if the unit of the Celsius scale is equal to that of the Kelvin scale?

Options :

88039643797. ✖ -273.15 °C

88039643798. ✖ -273.15 K

88039643799. ✖ 273.15 °C

88039643800. ✔ 273.15 K

Question Number : 31 Question Id : 88039610951 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the crystal structure of Fe (iron) if it is heated between 770 °C and 912 °C?

Options :

88039643801. ✖ face centred cubic

88039643802. ✔ body centred cubic

88039643803. ✖ hexagonal closed pack

88039643804. ✖ simple cubic

Question Number : 32 Question Id : 88039610952 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following statements is correct?

Options :

88039643805. ✔ absolutely pure substance cannot exist under thermodynamic equilibrium

88039643806. ✖ absolutely pure substance can exist under thermodynamic equilibrium

88039643807. ✖ absolutely pure substance can exist under thermodynamic non-equilibrium

88039643808. ✖ absolutely pure substance can exist under thermodynamic equilibrium as well as non-Equilibrium

Question Number : 33 Question Id : 88039610953 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the change in Gibbs energy when a minute amount of solute is added for the very first time to a pure substance?

Options :

88039643809. ✖ always positive

88039643810. ✔ always negative

88039643811. ✖ 0

88039643812. ✖ ∞

Question Number : 34 Question Id : 88039610954 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

How many spheres (each of diameter 1.8 $\mathring{A}$) can be put side by side (without any gap) on a straight line of length 1.98 nm.

Options :

88039643813. ✔ 11

88039643814. ✖ 10

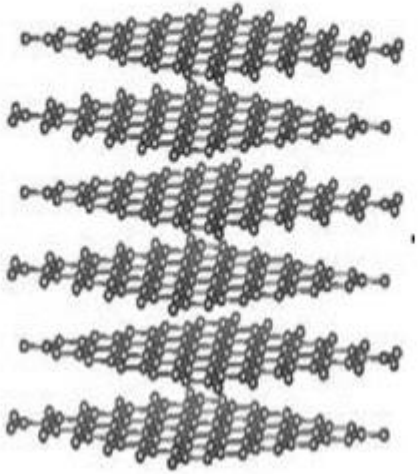
88039643815. ✖ 9

88039643816. ✖ 7

Question Number : 35 Question Id : 88039610955 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Six monolayers of carbon (graphene), each with a maximum lateral dimension of 1.7 μm are stacked together by Van der waals forces as shown below. The distance between the layers is 0.34 nm. What is the aspect ratio (lateral to transverse ratio) of the below given feature?



Options :

88039643817. ✖ 100

88039643818. ✔ 1000

88039643819. ✖ 5000

88039643820. ✖ 10000

Question Number : 36 Question Id : 88039610956 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following statements are correct?

Options :

88039643821. ✖ surface areas of a solid spherical microparticle and a solid spherical nanoparticle made of the same material are the same

88039643822. ✖ surface area of a solid spherical microparticle is smaller than a solid spherical nanoparticle made of the same material

88039643823. ✔ surface area of a solid spherical microparticle is greater than a solid spherical nanoparticle made of the same material

88039643824. ✖ specific surface area of a solid spherical microparticle is greater than a solid spherical nanoparticle made of the same material

Question Number : 37 Question Id : 88039610957 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For a hypothetical heat dissipating application a special amorphous material in the form of a film of thickness 100 nm was deposited on one planar side of a computer hard disk with dimensions: length 6 cm, breadth 4 cm and width 1 cm. The phonon scattering length in the special material is 120 nm. The special material is classified as:

Options :

88039643825. ✖ zero dimensional nanomaterial

88039643826. ✖ one dimensional nanomaterial

88039643827. ✔ two dimensional nanomaterial

88039643828. ✖ three dimensional nanomaterial

Question Number : 38 Question Id : 88039610958 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If the length of the micron bar on a micrograph is 0.1cm and the original dimension of a feature imaged is as 1 nm, what is the magnification at which the micrograph has been recorded?

Options :

88039643829. ✔ 10^6

88039643830. ✖ 10^5

88039643831. ✖ 10^4

88039643832. ✖ 1000

Question Number : 39 Question Id : 88039610959 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

How do the fluctuations scale relative to the mean property of a simple thermodynamic system in equilibrium constituted by very large number (N) of particles?

Options :

88039643833. ✖ fluctuations scale as N

88039643834. ✖ fluctuations scale as $N^{1/2}$

88039643835. ✔ fluctuations scale as $1/N^{1/2}$

88039643836. ✖ fluctuations scale as 1/N

Question Number : 40 Question Id : 88039610960 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The competition between core cluster Volume Growth and cluster Surface Passivation that arrests further core growth results in which of the following?

Options :

88039643837. ✔ stabilization of nanoclusters of various sizes and shapes

88039643838. ✖ stabilization of nanoclusters of various shapes but not sizes

88039643839. ✖ stabilization of nanoclusters of various sizes but not shapes

88039643840. ✖ disintegration of nanoclusters of various sizes and shapes

Question Number : 41 Question Id : 88039610961 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The specific surface area of nanomaterials is approximately measured based on which of the following?

Options :

88039643841. ✖ absorption

88039643842. ✔ adsorption

88039643843. ✖ striction

88039643844. ✖ surface undulations

Question Number : 42 Question Id : 88039610962 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Nanotechnology offers

Options :

88039643845. ✖ only miniaturization

88039643846. ✖ miniaturization and new phenomenon but not any application

88039643847. ✖ miniaturization and an application, which has no scientific basis

88039643848. ✔ miniaturization, novel phenomenon (along with suitable associated phenomena) and an appropriate application

Question Number : 43 Question Id : 88039610963 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following nanomaterial processing methods is a top-down approach?

Options :

88039643849. ✖ wet chemical synthesis

88039643850. ✔ equal channel angular pressing

88039643851. ✖ laser ablation

88039643852. ✖ molecular beam epitaxy

Question Number : 44 Question Id : 88039610964 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Severe plastic deformation during controlled processing of a ductile material results in

Options :

88039643853. ✔ grain refinement in the bulk of the specimen and improvement in strength

88039643854. ✖ grain refinement only on surface of the specimen and reduction in strength

88039643855. ✖ grain coarsening in the bulk of the specimen and reduction in strength

88039643856. ✖ grain coarsening only on surface of the specimen and improvement in strength

Question Number : 45 Question Id : 88039610965 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Through which process the heat transfer typically takes place in fluids?

Options :

88039643857. ✖ combination of radiation and conduction

88039643858. ✖ combination of conduction and convection

88039643859. ✔ convection only

88039643860. ✖ conduction only

Question Number : 46 Question Id : 88039610966 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Prandtl number of ~0.015 for liquid mercury indicates that

Options :

88039643861. ✖ convection and heat conduction are more or less the same in liquid mercury

88039643862. ✖ convection is dominant over heat conduction in liquid mercury

88039643863. ✔ heat conduction is dominant over convection in liquid mercury

88039643864. ✖ heat conduction is absent in liquid mercury

Question Number : 47 Question Id : 88039610967 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

In which of the following phenomena is associated to "Meisner effect"?

Options :

88039643865. ✖ super plastic deformation of ductile materials

88039643866. ✔ superconductivity

88039643867. ✖ reflectivity from an ultra-smooth optical surface

88039643868. ✖ dielectric breakdown

Question Number : 48 Question Id : 88039610968 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Titanium alloys are widely used to fabricate

Options :

88039643869. ✖ fuel clad tubes in nuclear thermal reactors

88039643870. ✖ heat exchangers in super critical power plants

88039643871. ✖ dental implants

88039643872. ✔ hip joints

Question Number : 49 Question Id : 88039610969 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following metals is produced by Kroll process?

Options :

88039643873. ✖ Mn

88039643874. ✖ Al

88039643875. ✔ Ti

88039643876. ✖ Fe

Question Number : 50 Question Id : 88039610970 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A gas is described by the equation of state, PV = constant where P and V are pressure and volume, respectively. To which of the following is the work done proportional to if it is obtained by integrating –PdV between the initial volume (V_i) and final volume (V_f)?

Options :

88039643877. ✖ $\frac{V_i - V_f}{V_i + V_f}$

88039643878. ✖ $\frac{1}{V_f} - \frac{1}{V_i}$

88039643879. ✖ $(V_i V_f)^{1/2}$

88039643880. ✔ $\ln\left(\frac{V_i}{V_f}\right)$

Question Number : 51 Question Id : 88039610971 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following expresses Boyle's law correctly? P and V are pressure and volume, respectively?

Options :

88039643881. ✔ $\frac{dV}{dP} = -\frac{V}{P}$

88039643882. ✖ $\frac{dV}{dP} = \frac{V}{P}$

88039643883. ✖ $\frac{dV}{dP} = \frac{P}{V}$

88039643884. ✖ $\frac{dV}{dP} = 1$

Question Number : 52 Question Id : 88039610972 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A body of mass 'm' orbits another body of mass 'M' in a circular orbit of radius R. The time taken by mass m to complete one revolution is

Options :

88039643885. ✖ proportional to $R^{1/2}$

88039643886. ✔ proportional to $R^{3/2}$

88039643887. ✖ proportional to R

88039643888. ✖ proportional to R^2

Question Number : 53 Question Id : 88039610973 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A system constituted by a very large number of non-interacting particles is in thermal equilibrium at a temperature given by $T = 1/(k_B*\beta)$ where k_B and β are Boltzmann constant and a constant (thermodynamic beta), respectively while each of the non-interacting particles can be in any of the three possible non-degenerate energies 0, e, and 2e. If $\beta e << 1$, then what is the average energy of the system per particle?

Options :

88039643889. ✖ 2e

88039643890. ✔ e

88039643891. ✖ (2/3)e

88039643892. ✖ 0

Question Number : 54 Question Id : 88039610974 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If Gibbs free energy of a gas is expressed as a function of Pressure P and temperature 'T' as $G(T,P) = RT\log\left(\frac{P}{P_0}\right) - AP$ where A and P_0 are constants then the Entropy of the gas is given by

Options :

88039643893. ✔ $-R\log\left(\frac{P}{P_0}\right)$

88039643894. ✖ $R\log\left(\frac{P}{P_0}\right)$

88039643895. ✖ $RT^2\log\left(\frac{P}{P_0}\right) - APT$

88039643896. ✖ $R\log\left(\frac{P}{P_0}\right) - \frac{AP}{T}$

Question Number : 55 Question Id : 88039610975 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The mutual potential energy V of two particles as a function of their spatial separation (r) is given by

$$V = \frac{a}{r^2} - \frac{b}{r}; a > 0, b > 0$$

What is the value of r for which the particles attain static equilibrium?

Options :

88039643897. ✖ a/b

88039643898. ✖ $a/2b$

88039643899. ✔ $2a/b$

88039643900. ✖ a^2/b

Question Number : 56 Question Id : 88039610976 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the type of atomic bonding common in typical semiconductors?

Options :

88039643901. ✖ hydrogen bonding

88039643902. ✖ metallic bonding

88039643903. ✖ ionic bonding

88039643904. ✔ covalent bonding

Question Number : 57 Question Id : 88039610977 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

According to Newton's law of cooling, how does the rate of heat loss of a body vary?

Options :

88039643905. ✖ it is inversely proportional to the surface area of the body and directly proportional to the difference in the temperatures between the body and its surrounding

88039643906. ✖ it is directly proportional to the surface area of the body and inversely proportional to the difference in the temperatures between the body and its surrounding

88039643907. ✖ it is inversely proportional to the surface area of the body and to the difference in the temperatures between the body and its surrounding

88039643908. ✔ it is directly proportional to the surface area of the body and to the difference in the temperatures between the body and its surrounding

Question Number : 58 Question Id : 88039610978 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following statements is correct?

Options :

88039643909. ✔ dynamic friction < static friction

88039643910. ✖ dynamic friction > static friction

88039643911. ✖ dynamic friction = static friction

88039643912. ✖ sometimes dynamic friction > static friction and sometimes dynamic friction = static friction

Question Number : 59 Question Id : 88039610979 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is angle between two equal forces F yielding a resultant force equal to F?

Options :

88039643913. ✖ 30°

88039643914. ✖ 60°

88039643915. ✖ 90°

88039643916. ✔ 120°

Question Number : 60 Question Id : 88039610980 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is acceleration of a body sliding down along a 30° inclined surface?

Options :

88039643917. ✖ $19.6\ m/s^2$

88039643918. ✖ $9.8\ m/s^2$

88039643919. ✔ $4.9\ m/s^2$

88039643920. ✖ $7.06\ m/s^2$

Question Number : 61 Question Id : 88039610981 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The composition of which of the following can be predicted by using Schaefler diagram?

Options :

88039643921. ✔ Austenitic stainless steel

88039643922. ✖ Al

88039643923. ✖ Ti

88039643924. ✖ Ti alloys

Question Number : 62 Question Id : 88039610982 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the electrical resistivity of a material if it is in its superconducting state?

Options :

88039643925. ✖ ∞

88039643926. ✔ 0

88039643927. ✖ 1

88039643928. ✖ one tenth of the normal electrical resistivity

Question Number : 63 Question Id : 88039610983 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

As per the Stefan-Boltzmann law, to which of the following is the total radiant heat loss from the surface of a hot body proportional to?

Options :

88039643929. ✖ (absolute temperature of the body)$^{1/4}$

88039643930. ✔ (absolute temperature of the body)^{4}

88039643931. ✖ (absolute temperature of the body)/4

88039643932. ✖ absolute temperature of the body

Question Number : 64 Question Id : 88039610984 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Three forces are acting on a rigid body in such a way that the body is in equilibrium. Then which of the following statements is correct?

Options :

88039643933. ✔ the lines of action of the three forces are parallel and meet in a point

88039643934. ✖ the lines of action of the two forces (among the three) are perpendicular but the three forces meet in a point

88039643935. ✖ the lines of action of the two forces (among the three) are parallel but the three forces meet in a point

88039643936. ✖ the lines of action of the three forces are parallel but do not meet in a point

Question Number : 65 Question Id : 88039610985 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the correct relation between mechanical advantage and velocity ratio of a simple ideal machine?

Options :

88039643937. ✖ mechanical advantage > velocity ratio

88039643938. ✖ mechanical advantage < velocity ratio

88039643939. ✔ mechanical advantage = velocity ratio

88039643940. ✖ always mechanical advantage + velocity ratio = 1

Question Number : 66 Question Id : 88039610986 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following is undesirably affected during tempering embrittlement?

Options :

88039643941. ✔ Impact Strength

88039643942. ✖ Yield Strength

88039643943. ✖ Hardness

88039643944. ✖ Tensile Strength

Question Number : 67 Question Id : 88039610987 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

If four forces are acting on a rigid body resting on a plane in such a way that the body does not change its position or shape then which of the following , the four forces must satisfy?

Options :

88039643945. ✖ 2 forces must be parallel and the other 2 forces must be opposite to each other

88039643946. ✔ all the four forces must be collinear

88039643947. ✖ all the four forces must be of equal magnitude

88039643948. ✖ the vector sum of all the four forces must be zero

Question Number : 68 Question Id : 88039610988 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following gives the work function of the metal?

Options :

88039643949. ✖ Helmholtz free energy of the electrons in the metal

88039643950. ✖ volume of electron gas in the metal

88039643951. ✔ density of electrons in the metal

88039643952. ✖ Gibbs free energy of the electrons in the metal

Question Number : 69 Question Id : 88039610989 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the metal forming operation that involves plane strain compression?

Options :

88039643953. ✖ stretch forming

88039643954. ✖ wire drawing

88039643955. ✖ extrusion

88039643956. ✔ cold rolling

Question Number : 70 Question Id : 88039610990 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the relation between melting temperature and recrystallization temperature of a pure metal?

Options :

88039643957. ✖ melting temperature = recrystallization temperature

88039643958. ✔ melting temperature = 2.5 times that of recrystallization temperature

88039643959. ✖ melting temperature = 5 times that of recrystallization temperature

88039643960. ✖ melting temperature = 7 times that of recrystallization temperature

Question Number : 71 Question Id : 88039610991 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If the half-life of X radioactive atoms in a given sample is 10 years, then how many of these atoms would decay in 20 years?

Options :

88039643961. ✔ 0.75X

88039643962. ✖ 0.50X

88039643963. ✖ 0.25X

88039643964. ✖ X

Question Number : 72 Question Id : 88039610992 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

If the Gaussian function representing grain size distribution in x is $f(x) = e^{-x^2}$, then its Fourier transform to k-space is given by?

Options :

88039643965. ✖ a power law in k given by $1/k^2$

88039643966. ✖ a power law in k given by $-1/k^2$

88039643967. ✔ a Gaussian in k given by e^{-k^2}

88039643968. ✖ a sinusoidal function in k given by $\sin(k)$

Question Number : 73 Question Id : 88039610993 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

All good electrical conductors are also good thermal conductors due to the availability of free electrons. In this scenario, which of the following statement is correct?

Options :

88039643969. ✔ diamond, which is an electrical insulator, is a better thermal conductor than copper at room temperature

88039643970. ✖ diamond, which is an electrical insulator, is a poor thermal conductor than copper at room temperature

88039643971. ✖ diamond's thermal conductivity is same as that of copper at room temperature

88039643972. ✖ diamond is an electrical insulator and therefore it is not a thermal conductor

Question Number : 74 Question Id : 88039610994 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What does the area bound by stress versus strain curve, the X-axis, the Y-axis and a parallel line to Y-axis connecting X-axis and the fracture point of a ductile material give?

Options :

88039643973. ✔ fracture toughness of the material

88039643974. ✖ resilience of the material

88039643975. ✖ ultimate strength of the material

88039643976. ✖ yield strength of the material

Question Number : 75 Question Id : 88039610995 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Bernoulli's equation is applicable for

Options :

88039643977. ✖ the fluid flows which are turbulent but non-adiabatic processes are negligible

88039643978. ✔ the fluid flows for which turbulence and non-adiabatic processes are negligible

88039643979. ✖ the fluid flows which are not turbulent but adiabatic processes are negligible

88039643980. ✖ the fluid flows for which turbulence and non-adiabatic processes are dominant

Question Number : 76 Question Id : 88039610996 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is one of the primary assumptions in designing cables by considering tension, span, sag and length as design parameters?

Options :

88039643981. ✖ the cable offers resistance to bending

88039643982. ✖ the cable is not considered as a rigid body

88039643983. ✔ the cable is considered as a rigid body

88039643984. ✖ the tensile force acting in the cable is always perpendicular to the cable at points along its length

Question Number : 77 Question Id : 88039610997 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is caused by lash and stick slip?

Options :

88039643985. ✖ melt joining defects due to improper movement of the work piece

88039643986. ✖ grain boundary sliding due to slip planes in face centred cubic systems

88039643987. ✖ grain boundary sliding due to dislocations and slip planes, respectively

88039643988. ✔ torsional vibrations

Question Number : 78 Question Id : 88039610998 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is jerk if a moving body is defined by $a(t) = -\cos(2t)$ with units m/s^2?

Options :

88039643989. ✖ $-2\sin(2t)$ with units m/s^2

88039643990. ✖ $-2\sin(2t)$ with units m/s^3

88039643991. ✖ $2\sin(2t)$ with units m/s^2

88039643992. ✔ $2\sin(2t)$ with units m/s^3

Question Number : 79 Question Id : 88039610999 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the Knudsen number for a viscous flow of a fluid?

Options :

88039643993. ✖ Knudsen number > 10

88039643994. ✖ Knudsen number > 1 but < 10

88039643995. ✖ Knudsen number > 0.01 but < 1

88039643996. ✔ Knudsen number < 0.01

Question Number : 80 Question Id : 88039611000 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

If L is any linear dimension in the system (such as internal diameter of a pipe) through which a fluid flows with a velocity which scales as L, then how does the Reynolds number scale with respect to L?

Options :

88039643997. ✖ Reynolds number scale scales as L

88039643998. ✔ Reynolds number scale scales as L^2

88039643999. ✖ Reynolds number scale scales as $L^{1/2}$

88039644000. ✖ Reynolds number scale scales as L^{-1}

Question Number : 81 Question Id : 88039611001 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following is correct if a liquid that flows in macro-systems (such as typical pipes) is allowed to flow in microsystems (such as a micro-pipe) or much smaller systems (such as nano-pipes)?

Options :

88039644001. ✔ turbulent flow will be absent

88039644002. ✖ molecular flow will be absent

88039644003. ✖ the liquid cannot flow at all

88039644004. ✖ the liquid for some distance travels with molecular flow and then transits for a turbulent flow

Question Number : 82 Question Id : 88039611002 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following can be explained by using the concept of "Cottrell atmosphere"?

Options :

88039644005. ✖ shape memory effect

88039644006. ✖ giant magnetoresistance

88039644007. ✔ strain ageing phenomenon

88039644008. ✖ mechanism of heat treatment in a salt bath furnace

Question Number : 83 Question Id : 88039611003 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

When is a crystallographic slip initiated?

Options :

88039644009. ✖ slip is initiated when a stress less than the critical resolved shear stress is applied on the slip plane in the slip direction

88039644010. ✔ slip is initiated when critical resolved shear stress is applied on the slip plane in the slip direction

88039644011. ✖ slip is initiated when a stress less than Pierls-Nabarro stress is applied on the slip plane in the slip direction

88039644012. ✖ slip is initiated when Pierls-Nabarro stress is applied on the slip plane in the slip direction

Question Number : 84 Question Id : 88039611004 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

At what temperature does the hot working of metals carried out?

Options :

88039644013. ✖ at the recrystallization temperature of the metals

88039644014. ✖ at the melting temperature of the metals

88039644015. ✔ above the recrystallization temperature but below the melting temperature of the metals

88039644016. ✖ below its recrystallization temperature of the metals

Question Number : 85 Question Id : 88039611005 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the occupation number of an electron state lying above the Fermi level at room temperature?

Options :

88039644017. ✖ always equal to the state lying below the Fermi level

88039644018. ✖ always less than that of the state lying below the Fermi level

88039644019. ✔ always more than that of the state lying below the Fermi level

88039644020. ✖ always zero

Question Number : 86 Question Id : 88039611006 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What should be the wavelength of the light (λ) used in photolithography to manufacture micro-machine elements with a dimension L?

Options :

88039644021. ✔ $\lambda \leq L$

88039644022. ✖ $\lambda \geq L$ but only visible light

88039644023. ✖ $\lambda > L$ but not visible light

88039644024. ✖ $\lambda > L$ but not near infra-red light

Question Number : 87 Question Id : 88039611007 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which among the following are thermodynamic equilibrium defects?

Options :

88039644025. ✖ micro-cracks

88039644026. ✖ dislocations

88039644027. ✔ vacancies

88039644028. ✖ stacking faults

Question Number : 88 Question Id : 88039611008 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

If a material can exist in more than two crystalline structures, then it is known as:

Options :

88039644029. ✔ a polymorphic material

88039644030. ✖ an iso-morphic material

88039644031. ✖ an isomeric material

88039644032. ✖ an amorphic material

Question Number : 89 Question Id : 88039611009 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following as predicted by Griffith's criterion for ductile materials is unrealistically high?

Options :

88039644033. ✖ flaw length

88039644034. ✔ surface energy

88039644035. ✖ stress at fracture

88039644036. ✖ dislocation density

Question Number : 90 Question Id : 88039611010 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the use of Ellingham diagram?

Options :

88039644037. ✖ to understand stability of compounds as a function of inverse of pressure

88039644038. ✖ to understand stability of compounds as a function of pressure

88039644039. ✖ to understand stability of compounds as a function of inverse of temperature

88039644040. ✔ to understand stability of compounds as a function of temperature

Question Number : 91 Question Id : 88039611011 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For an unconstrained, closed system at constant volume and entropy, which of the following will represent the equilibrium state?

Options :

88039644041. ✖ the state that has the minimum Helmholtz free energy

88039644042. ✖ the state that has the minimum Gibbs free energy

88039644043. ✔ the state that has the minimum internal energy

88039644044. ✖ the state that has the maximum internal energy

Question Number : 92 Question Id : 88039611012 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following non-destructive testing (NDT) methods is used to detect deeply seated defects in thick components?

Options :

88039644045. ✖ magnetic particle testing

88039644046. ✔ ultrasonic testing

88039644047. ✖ eddy current testing

88039644048. ✖ liquid penetrant testing

Question Number : 93 Question Id : 88039611013 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is measured using Jominy-end quench test?

Options :

88039644049. ✔ hardenability

88039644050. ✖ stiffness

88039644051. ✖ hardness

88039644052. ✖ toughness

Question Number : 94 Question Id : 88039611014 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

If A and B represent crystallographic planes, then their stacking sequence in a Hexagonal Closed Packed structure is given by

Options :

88039644053. ✔ ABABABABAB…..

88039644054. ✖ ABAAABAAABAA…

88039644055. ✖ ABBABBABBABB……..

88039644056. ✖ ABABBAABAABBA…….

Question Number : 95 Question Id : 88039611015 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the primary function of a cutting fluid during the operation of a cutting tool?

Options :

88039644057. ✖ to quench the cutting tool during cutting to make its surface hard by phase transformation

88039644058. ✔ to decrease the heat generation, friction, and wear in the cutting area

88039644059. ✖ to remove the material from the surface of the work piece through controlled corrosion

88039644060. ✖ to act as a coolant and nothing else during the cutting operation

Question Number : 96 Question Id : 88039611016 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which law would be violated by a hypothetical machine that can do work indefinitely without any energy source?

Options :

88039644061. ✖ law of conservation of mass

88039644062. ✔ first or second law of thermodynamics

88039644063. ✖ Arrhenius rate equation

88039644064. ✖ Hooke's Law

Question Number : 97 Question Id : 88039611017 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following , leads to reduction in thermal resistance in the case of convection?

Options :

88039644065. ✖ reduction in the thickness of the material

88039644066. ✖ increasing the temperature and reducing the emissivity

88039644067. ✖ increasing the thermal conductivity

88039644068. ✔ stirring the fluid

Question Number : 98 Question Id : 88039611018 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which law states that the emissivity and the absorptivity of a black body's surface at a given temperature and wavelength are equal?

Options :

88039644069. ✔ Kirchhoff's law

88039644070. ✖ Wien's law

88039644071. ✖ Planck's law

88039644072. ✖ Stefan's law

Question Number : 99 Question Id : 88039611019 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the energy required to change the temperature of a substance without changing its phase?

Options :

88039644073. ✖ total heat

88039644074. ✖ specific heat

88039644075. ✔ sensible heat

88039644076. ✖ latent heat

Question Number : 100 Question Id : 88039611020 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following is correct w.r.t. the thermal diffusivities?

Options :

88039644077. ✖ solids > liquids > gases

88039644078. ✔ solids < liquids < gases

88039644079. ✖ gases < solids < liquids

88039644080. ✖ gases < liquids < solids

Question Number : 101 Question Id : 88039611021 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the moment of inertia of thin spherical shell about its central axis given the mass and radius of the shell as 100 g and 100 cm, respectively?

Options :

88039644081. ✖ $0.04\ kg\ m^2$

88039644082. ✖ $0.01\ kg\ m^2$

88039644083. ✖ $0.033\ kg\ m^2$

88039644084. ✔ $0.066\ kg\ m^2$

Question Number : 102 Question Id : 88039611022 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The total number of carbon atoms per unit cell of diamond is

Options :

88039644085. ✔ 8

88039644086. ✖ 4

88039644087. ✖ 2

88039644088. ✖ 6

Question Number : 103 Question Id : 88039611023 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What are the Miller indices of a crystallographic plane which intercepts X, Y and Z axes at a, b/2 and 3c respectively?

Options :

88039644089. ✖ (1 2 3)

88039644090. ✔ (3 6 1)

88039644091. ✖ (2 4 6)

88039644092. ✖ (3 2 1)

Question Number : 104 Question Id : 88039611024 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The element with a simple cubic crystal structure

Options :

88039644093. ✖ Lithium

88039644094. ✔ Polonium

88039644095. ✖ Silicon

88039644096. ✖ Germanium

Question Number : 105 Question Id : 88039611025 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following statement is correct w.r.t. the volume of unit cells of simple cubic (SC), body centred cubic (BCC) and face centred cubic (FCC) crystal structures?

Options :

88039644097. ✖ FCC > BCC > SC

88039644098. ✖ FCC < BCC < SC

88039644099. ✖ FCC = BCC ≠ SC

88039644100. ✔ FCC = BCC = SC

Question Number : 106 Question Id : 88039611026 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

To which of the following is the Hall Voltage at right angle?

Options :

88039644101. ✖ direction of the current flow

88039644102. ✖ direction of the magnetic field

88039644103. ✔ to both the directions of current flow and magnetic field

88039644104. ✖ to the direction of the current flow and to the opposite direction of the magnetic field

Question Number : 107 Question Id : 88039611027 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

How many electrons are present in H^+ ion?

Options :

88039644105. ✔ 0

88039644106. ✖ 1

88039644107. ✖ 2

88039644108. ✖ 3

Question Number : 108 Question Id : 88039611028 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What happens to the entropy when ice melts to water at 273 K?

Options :

88039644109. ✖ remains unchanged

88039644110. ✖ becomes zero

88039644111. ✔ becomes higher

88039644112. ✖ becomes lower

Question Number : 109 Question Id : 88039611029 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

In which of the processes, constitutional super cooling is observed?

Options :

88039644113. ✖ extrusion

88039644114. ✖ forging

88039644115. ✔ casting

88039644116. ✖ rolling

Question Number : 110 Question Id : 88039611030 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

By adding _____, the machinability of free-cutting steels/free-machining steels is typically improved?

Options :

88039644117. ✔ sulphur

88039644118. ✖ manganese

88039644119. ✖ copper

88039644120. ✖ tungsten

Question Number : 111 Question Id : 88039611031 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What happens at equicohesive temperature?

Options :

88039644121. ✖ grain boundaries become stronger than grains in the material

88039644122. ✖ all the grains in the material attain equal size

88039644123. ✔ the strength of grain boundaries becomes equal to that of grains in the material

88039644124. ✖ grain become stronger than grains boundaries in the material

Question Number : 112 Question Id : 88039611032 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following ceramic materials is used as cutting tool material?

Options :

88039644125. ✖ MgO

88039644126. ✔ Al_2O_3

88039644127. ✖ Y_2O_3

88039644128. ✖ TiO_2

Question Number : 113 Question Id : 88039611033 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which one amongst the following has the lowest toughness at room temperature?

Options :

88039644129. ✖ thermosets

88039644130. ✔ glass

88039644131. ✖ reinforced plastics

88039644132. ✖ thermoplastics

Question Number : 114 Question Id : 88039611034 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the value of the Joule-Thompson co-efficient for an ideal gas is

Options :

88039644133. ✖ some negative value

88039644134. ✖ some positive value

88039644135. ✖ ∞

88039644136. ✔ 0

Question Number : 115 Question Id : 88039611035 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

To produce which of the following, the Czochralski process is used?

Options :

88039644137. ✖ structural ceramics for high temperature applications

88039644138. ✖ steels for low temperature structural applications

88039644139. ✔ single crystal ingots

88039644140. ✖ polycrystalline Si

Question Number : 116 Question Id : 88039611036 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

When two surfaces are in contact, which of the following statements are correct?

Options :

88039644141. ✔ friction force is independent of the contact area between the two surfaces while striction is dependent on the contact area

88039644142. ✖ friction force is dependent on the contact area between the two surfaces while striction is independent of the contact area

88039644143. ✖ both friction force and striction are dependent on the contact area between the two surfaces

88039644144. ✖ both friction force and striction are independent of the contact area between the two surfaces

Question Number : 117 Question Id : 88039611037 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What will happen to the rotational kinetic energy if the dimensions of the rotating body are reduced by several order?

Options :

88039644145. ✔ the rotational kinetic energy decreases very rapidly with size

88039644146. ✖ the rotational kinetic energy increases very rapidly with size

88039644147. ✖ the rotational kinetic energy decreases infinitesimally with size

88039644148. ✖ the rotational kinetic energy increases infinitesimally with size

Question Number : 118 Question Id : 88039611038 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which type of transformation is "Martensite transformation"?

Options :

88039644149. ✖ massive phase transformation

88039644150. ✖ diffusion phase transformation

88039644151. ✔ displacive transformation

88039644152. ✖ reconstructive transformation

Question Number : 119 Question Id : 88039611039 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Why is grey cast iron preferred to make machine beds?

Options :

88039644153. ✖ due to its very high ductility

88039644154. ✖ due to its high fatigue strength

88039644155. ✖ due to its light weight

88039644156. ✔ due to its high damping capacity

Question Number : 120 Question Id : 88039611040 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which law does the thermal energy, necessary to evaporate large volume of water follow?

Options :

88039644157. ✖ square law in mass

88039644158. ✔ cube law in mass

88039644159. ✖ exponential law in mass

88039644160. ✖ square law in volume