

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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Share Answer Key With Delivery Engine :	Yes
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
Highlighter :	No
Auto Save on Console? :	Yes

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

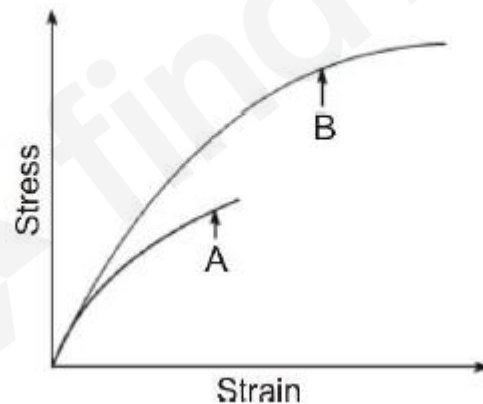
88039643698. ✘ Any hole extended outside a compound shape contributes positively with a multiplicity factor of 0.5 to the centroid calculation

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 $F_{\text{spring}} = -k\delta L$, 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 $\langle 110 \rangle$ 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

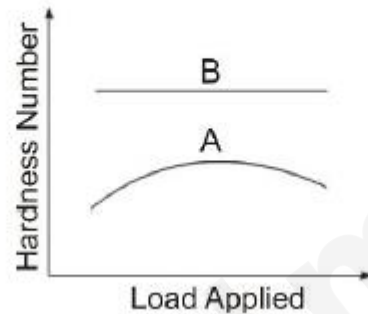
88039643755. ✓ more dissipated electrical power per unit area of the component at a constant voltage

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

far greater than that under atmospheric pressure conditions and in few tens of km to

88039643795. ✓ few hundreds of km

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

88039643796. ✘

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 \AA) can be put side by side (without any gap) on a straight line of length 1.98 nm.

Options :

88039643813. ✓ 11

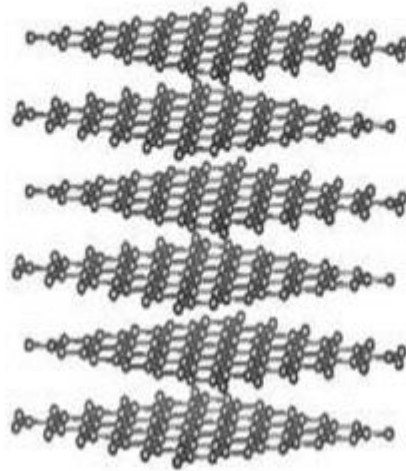
88039643814. ✗ 10

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 $1.7 \mu\text{m}$ 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, $PV = \text{constant}$ 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. ✗ $(V_i V_f)^{\frac{1}{2}}$

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 $\beta e \ll 1$, 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 Schaeffler 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

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

88039643984. ✘

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

to remove the material from the surface of the work piece through controlled

88039644059. ✘ 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 m²

88039644082. ✘ 0.01 kg m²

88039644083. ✘ 0.033 kg m²

88039644084. ✔ 0.066 kg m²

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 \neq 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. ✔ Al₂O₃

88039644127. ✘ Y₂O₃

88039644128. ✘ TiO₂

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