

Telangana State Council Higher Education

Notations :

- Options shown in green color and with ✓ icon are correct.
- Options shown in red color and with ✗ icon are incorrect.

Question Paper Name :

Nano Technology 14th Aug 2021 Shift 2

Subject Name :

Nano Technology

Creation Date :

2021-08-14 16:27:26

Duration :

120

Total Marks :

120

Display Marks:

Yes

Calculator :

None

Magnifying Glass Required? :

No

Ruler Required? :

No

Eraser Required? :

No

Scratch Pad Required? :

No

Rough Sketch/Notepad Required? :

No

Protractor Required? :

No

Show Watermark on Console? :

Yes

Highlighter :

No

Auto Save on Console? :

Yes

Nano Technology

Group Number :

1

Group Id :

12984028

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 :

12984049

Section Number :

1

Section type :

Online

Mandatory or Optional :

Mandatory

Number of Questions :

120

Number of Questions to be attempted :

120

Section Marks :

120

Enable Mark as Answered Mark for Review and Clear Response :

Yes

Sub-Section Number :

1

Sub-Section Id :

12984049

Question Shuffling Allowed :

Yes

Question Number : 1 Question Id : 1298403241 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question

Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

When a dielectric material is subjected to an alternating field of frequency in the infra-red region,

Options :

1. ✖ The atomic or ionic polarization ceases but the orientation polarization remains
2. ✖ The electronic polarization ceases but the atomic or ionic polarization remains

The atomic or ionic polarization and the orientation polarization cease but electronic polarization remains

3. ✓

4. ✗ All types of polarizations cease

Question Number : 2 Question Id : 1298403242 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

In the elastic regime, torque on a shaft causes

Options :

Distribution of shear stress along the radius of the shaft with maximum stress

1. ✓ at the outer edge of the shaft

2. ✗ Uniform shear stress across the cross-section of the shaft

Distribution of shear stress along the radius of the shaft with maximum stress

3. ✗ at the center of the shaft

4. ✗ Uniform bi-axial stress across the cross-section of the shaft

Question Number : 3 Question Id : 1298403243 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

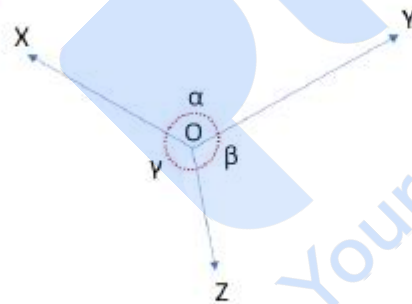
Which of the following can be designed to exceed the Stefan–Boltzmann law?

Options :

1. ✓ Nanostructures, metamaterials and sub-wavelength particles
2. ✗ Only nanostructures but not metamaterials and sub-wavelength particles
3. ✗ Only sub-wavelength particles but not nanostructures and metamaterials
4. ✗ Only metamaterials but not nanostructures and sub-wavelength particles

Question Number : 4 Question Id : 1298403244 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Three coplanar, concurrent, and non-collinear forces X, Y, and Z, respectively, are acting at a point O.



If the forces X, Y and Z are in equilibrium, then which of the following relations is correct?

Options :

1. ✘ $\frac{X}{\sin \gamma} = \frac{Y}{\sin \beta} = \frac{Z}{\sin \alpha}$

2. ✘ $\frac{X}{\sin \alpha} = \frac{Y}{\sin \beta} = \frac{Z}{\sin \alpha}$

3. ✘ $\frac{X}{\sin \beta} = \frac{Y}{\sin \alpha} = \frac{Z}{\sin \gamma}$

4. ✔ $\frac{X}{\sin \beta} = \frac{Y}{\sin \gamma} = \frac{Z}{\sin \alpha}$

Question Number : 5 Question Id : 1298403245 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A perpetual motion machine

Options :

1. ✘ Obeys the first and second law of thermodynamics

2. ✘ Violates the zeroth law of thermodynamics

3. ✔ Violates the first or second law of thermodynamics

4. ✘ Obeys all laws of thermodynamics

Question Number : 6 Question Id : 1298403246 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The ductility of free-cutting steels is

Options :

1. ✗ Slightly higher than those for the ordinary carbon steels due to the presence of lead
2. ✓ Lower than those for the ordinary carbon steels
3. ✗ Equal to that of ordinary carbon steels
4. ✗ Much higher than those for the ordinary carbon steels due to the presence of lead

Question Number : 7 Question Id : 1298403247 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the entropic contribution to the free energy at absolute zero of temperature?

Options :

1. ✓ 0
2. ✗ ∞

3. ✖ 1

4. ✖ 0.5

Question Number : 8 Question Id : 1298403248 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A large volume of gas above the water implies

Options :

1. ✖ Higher pressure on water and therefore lower boiling point for water
2. ✔ Higher pressure on water and therefore higher boiling point for water
3. ✖ Lower pressure on water and therefore lower boiling point for water
4. ✖ Lower pressure on water and therefore higher boiling point for water

Question Number : 9 Question Id : 1298403249 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The static moment around a considered axis for the composite area is equivalent to

Options :

1. ✖ The multiplication of the static moments of its sub areas of the composite area

- The multiplication of the squares of static moments of its sub areas of the composite area
2. ✖
3. ✖ The sum of the squares of static moments of its sub areas of the composite area
4. ✔ The sum of the static moments of its sub areas of the composite area

Question Number : 10 Question Id : 1298403250 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

If D is the longest dimension in a vacuum chamber and λ is the mean free path of the residual air molecules in the chamber. The molecular flow occurs in the chamber when

Options :

1. ✖ $\lambda < D/100$
2. ✖ $\lambda < D$
3. ✖ $D/100 < \lambda < D$
4. ✔ $D < \lambda$

Question Number : 11 Question Id : 1298403251 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

The conductance of a simple pipe with uniform cross-section can be increased by

Options :

1. ✓ Considering short and wide pipe
2. ✗ Considering short and narrow pipe
3. ✗ Considering long and wide pipe
4. ✗ Considering long and narrow pipe

Question Number : 12 Question Id : 1298403252 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following is correct as per Maxwell-Boltzmann equation?

Options :

1. ✗ RMS velocity of Al gas at 1200 °C is greater than that of H₂ gas at 1200 °C
2. ✓ RMS velocity of Al gas at 1200 °C is lesser than that of H₂ gas at 1200 °C
3. ✗ RMS velocity of Al gas at 1200 °C is greater than that of H₂ gas at 25 °C
4. ✗ Al gas flows with the same velocity as that of H₂ gas at 1200 °C

Question Number : 13 Question Id : 1298403253 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Monoclinic crystal lattices can be

Options :

1. ✘ Strictly face-centered
2. ✘ Simple or face-centered
3. ✘ Simple or body-centered
4. ✔ Simple or base-centered

Question Number : 14 Question Id : 1298403254 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A cantilever beam of circular cross section is subjected to a load at its free end. If the depth of the beam and load is doubled, the deflection of the free end compared with original deflection will become

Options :

1. ✘ Remains same
2. ✘ Halved
3. ✘ Doubled

4. ✓ One fourth

Question Number : 15 Question Id : 1298403255 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

In CaF_2 crystal

Options :

1. ✗ The coordination number of Ca is two while that of F is one
2. ✗ The coordination number of Ca is four while that of F is two
3. ✓ The coordination number of Ca is eight while that of F is four
4. ✗ The coordination number of Ca is eight while that of F is eight

Question Number : 16 Question Id : 1298403256 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

If the element of a fluid at each point has no net angular velocity about that point,
the fluid flow is called as

Options :

1. ✗ A nonsteady flow
2. ✓ An irrotational flow

3. ✖ An incompressible flow
4. ✖ A nonviscous flow

Question Number : 17 Question Id : 1298403257 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

When two streamlines in a steady fluid flow cross one another, the fluid flow

Options :

1. ✔ Become Unsteady
2. ✖ Continues to be steady with the same velocity
3. ✖ Continues to be steady with the reduced velocity
4. ✖ Stops abruptly

Question Number : 18 Question Id : 1298403258 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

In dielectric liquids, the electric field acting on a given molecule in the liquid

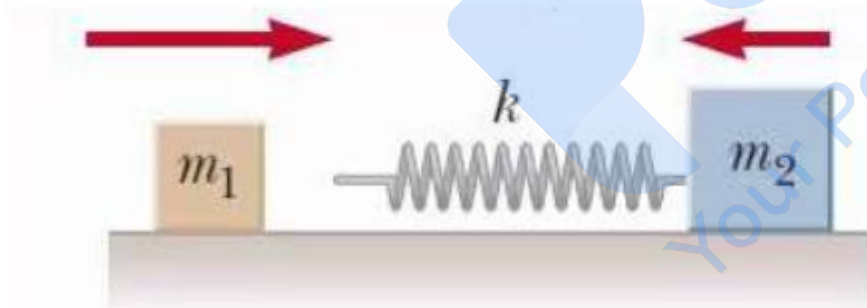
Options :

1. ✔ Consists of the external applied field and the local molecular field (due to mutual interaction of the surrounding polarized molecules)

2. ✖ Is only the local molecular field due to mutual interaction of the surrounding molecules
3. ✖ Is only the local molecular field due to mutual interaction of the surrounding polarized molecules
4. ✖ Is only the external applied field

Question Number : 19 Question Id : 1298403259 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

A block of mass $m_1 = 2.0\text{kg}$ initially moving to right with a speed of 4 m/s on a frictionless, horizontal track, collides (perfect elastic collision) with a light spring attached to second block of mass $m_2 = 1.0\text{ kg}$ initially moving to left with a speed of 2.0 m/sec as shown in Fig. find the velocities of the blocks when spring again come to original length.



Options :

1. ✔ $V_1 = 0$ and $V_2 = 6.0\text{ m/sec}$

2. ✖ $V_1 = 6 \text{ m/sec}$ and $V_2 = 0$
3. ✖ $V_1 = 8 \text{ m/sec}$ and $V_2 = 6.0 \text{ m/sec}$
4. ✖ $V_1 = 0$ and $V_2 = 8.0 \text{ m/sec}$

Question Number : 20 Question Id : 1298403260 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

A particle travels through diffusion to a certain distance called diffusion length in a certain time called the diffusion time. The relation between diffusion time and diffusion length is given by

Options :

1. ✖ Diffusion time scales as diffusion length
2. ✔ Diffusion time scales as square of diffusion length
3. ✖ Diffusion time scales as cube of diffusion length
4. ✖ Diffusion time is inversely proportional to diffusion length

Question Number : 21 Question Id : 1298403261 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

The unit for plane-strain fracture toughness

Options :

1. ✘ MN/m^2
2. ✘ $\text{MN/m}^{1/2}$
3. ✔ $\text{MN/m}^{3/2}$
4. ✘ MN/m

Question Number : 22 Question Id : 1298403262 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The type of bonding in diamond and SiC is

Options :

1. ✘ Covalent and metallic, respectively
2. ✘ Covalent and ionic, respectively
3. ✔ Covalent and covalent, respectively
4. ✘ Ionic and covalent, respectively

Question Number : 23 Question Id : 1298403263 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

If the lowest limit of grain size is considered in designing a material, then the designed material will be

Options :

1. ✓ An amorphous material
2. ✗ A nanocrystalline material
3. ✗ A microcrystalline material
4. ✗ A macrocrystalline material

Question Number : 24 Question Id : 1298403264 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which one of the following methods introduces grain refinement in the material?

Options :

1. ✗ Chemical vapor deposition
2. ✗ Plasma spray processing
3. ✓ Equal-channel angular pressing
4. ✗ Welding

Question Number : 25 Question Id : 1298403265 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Type II superconductor has

Options :

1. ✘ Two critical magnetic fields and only below the lower critical field, the superconductivity is observed
2. ✘ Two critical magnetic fields and only above the higher critical field, the superconductivity is observed
3. ✘ Two critical magnetic fields between which it doesn't allow even the partial penetration of the magnetic flux
4. ✔ Two critical magnetic fields between which it allows partial penetration of the magnetic flux through some isolated points

Question Number : 26 Question Id : 1298403266 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Dry ice is

Options :

1. ✘ Solid N₂

2. ✓ Solid CO₂
3. ✗ Solid NO₂
4. ✗ Solid H₂O + N₂

Question Number : 27 Question Id : 1298403267 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which of the following discoveries won the Nobel prize

Options :

1. ✗ Carbon nanotubes (CNTs) and buckyballs
2. ✗ Graphene and CNTs
3. ✗ Buckyballs and diamond
4. ✓ Graphene and buckyballs

Question Number : 28 Question Id : 1298403268 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Frank-Read mechanism is through which

Options :

1. ✖ Vacancies multiple in a crystal under stress
2. ✖ Frenkel defects multiple in a crystal under stress
3. ✖ Schottky defects multiple in a crystal under stress
4. ✔ Multiple dislocations in a crystal under stress

Question Number : 29 Question Id : 1298403269 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which of the following represents the typical thumb rules with respect to the constituents of bulk composite materials

Options :

1. ✔ The contents of the constituents should be $\geq 10\%$ by volume and the property (to be enhanced by making a composite) of one of the constituents should be ≥ 5 times than the other constituents
2. ✖ The contents of the constituents should be $\geq 5\%$ by volume and the property (to be enhanced by making a composite) of one of the constituents should be ≥ 10 times than the other constituents

3. ✖ The contents of the constituents should be $\geq 5\%$ by volume and the property (to be enhanced by making a composite) of one of the constituents should be ≥ 5 times than the other constituents

4. ✖ The contents of the constituents should be $\geq 10\%$ by volume and the property (to be enhanced by making a composite) of one of the constituents should be ≥ 10 times than the other constituents

Question Number : 30 Question Id : 1298403270 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which law of thermodynamics is applicable when a doctor measures the body temperature of a patient

Options :

1. ✔ Zeroth law
2. ✖ First law
3. ✖ Second law
4. ✖ Third law

Question Number : 31 Question Id : 1298403271 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which law of thermodynamics is applicable when a piece of iron rusts

Options :

1. ✘ Zeroth law
2. ✘ First law
3. ✔ Second law
4. ✘ Third law

Question Number : 32 Question Id : 1298403272 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which law of thermodynamics is applicable in the case of radioactive decay

Options :

1. ✘ Zeroth law
2. ✘ First law
3. ✔ Second law
4. ✘ Third law

Question Number : 33 Question Id : 1298403273 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If $C(T)$ is the thermal capacity of a solid at temperature T , and when an amount of heat is absorbed by the body, then the entropy of the body at temperature T is given by

Options :

1. ✖ $\int_0^T \frac{C(T)}{T^3} dT$

2. ✖ $\int_0^T \frac{C(T)}{T^2} dT$

3. ✖ $\int_0^{T/2} \frac{C(T)}{T} dT$

4. ✔ $\int_0^T \frac{C(T)}{T} dT$

Question Number : 34 Question Id : 1298403274 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What are Volmer–Weber, Frank–van der Merwe and Stranski–Krastanov modes

Options :

1. ✖ Additive manufacturing modes

2. ✓ Thin film growth modes
3. ✗ Line defect formation modes
4. ✗ Ultrasonic testing modes

Question Number : 35 Question Id : 1298403275 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Alloy is an example of a material

Options :

1. ✓ That has constituents that are mixed at the atomic/molecular level
2. ✗ That is constituted by impurities as secondary constituents in addition to a primary constituent
3. ✗ That is constituted by defects as secondary constituents in addition to a primary constituent
4. ✗ That is constituted by at least 2 macroscopically identifiable/distinguishable materials, which have distinct chemical and physical (including mechanical) properties

Question Number : 36 Question Id : 1298403276 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Which of the following is true with respect to phase diagrams?

Options :

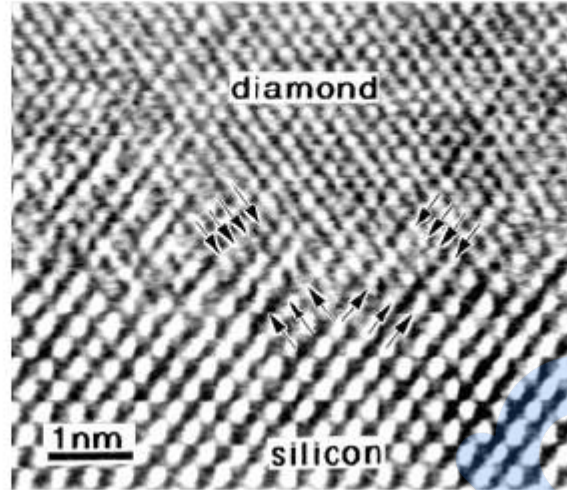
1. ✘ Only metals and alloys can have phase diagrams but not polymers and ceramics
2. ✘ Only ceramics can have phase diagrams but no other class of materials
3. ✘ Only metals, alloys and ceramics can have phase diagrams but not polymers
4. ✔ Metals, alloys, ceramics and polymers can have phase diagrams

Question Number : 37 Question Id : 1298403277 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the resolution in the micrograph given below?



Options :

1. ✗ Micron-scale resolution
2. ✗ Nanometer-scale resolution
3. ✓ Atomic-scale resolution
4. ✗ Sub-atomic scale resolution

Question Number : 38 Question Id : 1298403278 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following can be applied to design Nozzle for a rocket produced to escape of its exhaust gases?

Options :

1. ✖ Maxwell's equation and equation of continuity
2. ✔ Bernoulli's equation and equation of continuity
3. ✖ Buoyancy
4. ✖ Buoyancy and Newton's laws of motion

Question Number : 39 Question Id : 1298403279 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Bernoulli's equation $\frac{p}{\rho} + \frac{v^2}{2} + gh = \text{constant}$, is applicable for

Options :

1. ✔ Steady, frictionless and incompressible flow along a streamline
2. ✖ Uniform and frictionless flow along a streamline when ρ is a function P
3. ✖ Steady and frictionless flow along a streamline when ρ is a function P
4. ✖ Steady, uniform and incompressible flow along a streamline

Question Number : 40 Question Id : 1298403280 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A body attains equilibrium only when the net external force and net external torque acting on the body

Options :

1. ✘ Attain the maximum value possible
2. ✔ Tend to be equal to zero
3. ✘ Attain the minimum possible value but not zero
4. ✘ Attain values close to that of the maximum value possible

Question Number : 41 Question Id : 1298403281 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following methods is used to estimate the dislocation densities in semiconductors?

Options :

1. ✘ Infrared spectroscopy
2. ✘ Raman scattering

- 3. ✓ Etch pitting
- 4. ✗ X-ray diffraction

Question Number : 42 Question Id : 1298403282 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which of the following statements is correct with regards to redundant supports?

Options :

- 1. ✗ Redundant supports allow the structure to attain the equilibrium but make the equilibrium calculation complicated
- 2. ✗ Redundant supports allow the structure to attain the equilibrium and make the equilibrium calculation easier
- 3. ✗ Redundant supports do not allow the structure to attain the equilibrium but they make the equilibrium calculation easier
- 4. ✓ Redundant supports do not allow the structure to attain the equilibrium and also make the equilibrium calculation complicated

Question Number : 43 Question Id : 1298403283 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

In a typical 'Engineering Stress' versus 'Engineering Strain' plot, the amount of mechanical energy converted to heat in a volume of material resulting in damping is obtained by

Options :

1. ✓ Calculating the area covered by any instant of a loading and unloading cycle
2. ✗ Calculating the area covered by any instant of a loading and unloading cycle and dividing it with the slope of the elastic line
3. ✗ Multiplying the slope of the elastic line and strain at the yield point
4. ✗ Dividing the strain at the yield point with the slope of the elastic line

Question Number : 44 Question Id : 1298403284 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

X and $Y \text{ Jmol}^{-1}\text{K}^{-1}$ are the entropies per mole of the two equilibrium forms white Tin and grey Tin, respectively. If $T \text{ K}$ is the transition temperature below which white Tin transforms to grey Tin, then calculate the heat of transformation.

Options :

1. ✓ $T(X-Y)$
2. ✗ $T(Y-X)$

3. ✖ X-Y

4. ✖ X+Y

Question Number : 45 Question Id : 1298403285 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Single crystal Si ingots are produced by

Options :

1. ✔ Floating zone method

2. ✖ BS Murthy's method

3. ✖ Thornton's method

4. ✖ Hummers method

Question Number : 46 Question Id : 1298403286 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

In the case of nanostructures, the ratio of surface energy to total energy

Options :

1. ✖ Is always 0.5

2. ✓ Usually in the order of unity
3. ✗ Is exactly zero because the total energy tends to infinity
4. ✗ Tends to infinity because the surface energy tends to infinity

Question Number : 47 Question Id : 1298403287 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Giant Magnetoresistance (GMR) effect (which is one of the modern nanoscience revelations and which won the Nobel Prize) is based on a phenomenon called

Options :

1. ✗ Tunneling of magnetic domains
2. ✗ Tunnelling of atoms
3. ✗ Tunneling of resistance
4. ✓ Tunneling of magnetization

Question Number : 48 Question Id : 1298403288 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Madelung energy is the main contribution to the binding energy of

Options :

1. ✓ Ionic crystals
2. ✗ Covalent crystals
3. ✗ Metals
4. ✗ Both metals and covalent crystals

Question Number : 49 Question Id : 1298403289 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Crystals of inert gas atoms are bound by Van der Waals interaction, which varies with distance (R) as

Options :

1. ✗ R^{-8}
2. ✓ R^{-6}
3. ✗ R^{-4}
4. ✗ R^{-2}

Question Number : 50 Question Id : 1298403290 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The ratio of the distances of two particles from their center of mass is the

Options :

1. ✘ Ratio of the square of their masses
2. ✘ Inverse ratio of the square of their masses
3. ✘ Ratio of their masses
4. ✔ Inverse ratio of their masses

Question Number : 51 Question Id : 1298403291 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Torsional vibrations in a typical internal combustion engine could break the crankshaft when

Options :

1. ✘ The frequency of the torsional vibration is $2/3^{\text{rd}}$ of the torsional resonant frequency of the crankshaft
2. ✘ The frequency of the torsional vibration is $3/4^{\text{th}}$ of the torsional resonant frequency of the crankshaft
3. ✔ The frequency of the torsional vibration equals the torsional resonant frequency of the crankshaft

4. ✖ The frequency of the torsional vibration is half of the torsional resonant frequency of the crankshaft

Question Number : 52 Question Id : 1298403292 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

The dimensions of angular momentum are same as that of

Options :

1. ✔ Planck's constant
2. ✖ Acceleration due to gravity
3. ✖ Energy
4. ✖ Boltzmann constant

Question Number : 53 Question Id : 1298403293 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Phonon contribution to the thermal conductivity may be comparable with the electronic contribution in

Options :

1. ✖ Only pure metals

- 2. ✖ Both pure metals and impure metals
- 3. ✖ Both disordered alloys and pure metals
- 4. ✔ Both impure metals and disordered alloys

Question Number : 54 Question Id : 1298403294 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

If K and σ represent thermal and electrical conductivity, respectively of metals, then the ratio K/σ is

Options :

- 1. ✔ Directly proportional to temperature, with the value of proportionality constant independent of the metal
- 2. ✖ Inversely proportional to temperature, with the value of proportionality constant independent of the metal
- 3. ✖ Directly proportional to temperature, with the value of proportionality constant strongly dependent of the metal
- 4. ✖ Inversely proportional to temperature, with the value of proportionality constant strongly dependent of the metal

The color centers in crystals absorb

Options :

1. ✘ Infrared light
2. ✔ Visible light
3. ✘ Ultraviolet light
4. ✘ X-rays

Question Number : 56 Question Id : 1298403296 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Transmission shafts transmit torque due to

Options :

1. ✔ Torsional load
2. ✘ Tensile load
3. ✘ Shear forces
4. ✘ Compressive plus shear forces

Question Number : 57 Question Id : 1298403297 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

A light spring balance hangs from the hook of another but same type of a light spring balance and a mass S kg hangs from the hook of the bottom spring. Then the tension in the upper spring in Newtons is?

Options :

1. ✗ $S/2$
2. ✓ S
3. ✗ $2S$
4. ✗ $2S^{1/2}$

Question Number : 58 Question Id : 1298403298 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

For good ductility, a material must have

Options :

1. ✗ Small number of different slip planes and also have the highest possible number of slip directions
2. ✗ Large number of different slip planes and also have the smallest possible number of slip directions

3. ✓ Large number of different slip planes and also have the highest possible number of slip directions

4. ✗ Small number of different slip planes and also have the smallest possible number of slip directions

Question Number : 59 Question Id : 1298403299 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Catalytic activity of nano-sized Pt particles will be

Options :

1. ✗ Infinitesimally lesser than the micron-sized Pt particles

2. ✗ Far lesser than the micron-sized Pt particles

3. ✗ Same as that of the micron-sized Pt particles

4. ✓ Greater than the micron-sized Pt particles

Question Number : 60 Question Id : 1298403300 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

The average oxidation number of Fe in Fe_3O_4 is

Options :

1. ✖ 1/3

2. ✖ 7/3

3. ✔ 8/3

4. ✖ 7/4

Question Number : 61 Question Id : 1298403301 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Ionic charge on Zn in forming a bond with Cl.

Options :

1. ✖ 0

2. ✔ 2+

3. ✖ 4+

4. ✖ 1+

Question Number : 62 Question Id : 1298403302 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Kr and O are two non-metals. They form a

Options :

1. ✓ Covalent compound
2. ✗ Ionic compound
3. ✗ Compound with hydrogen bonding
4. ✗ Compound with a mixture of ionic and hydrogen bonding

Question Number : 63 Question Id : 1298403303 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which of the following can undergo combustion reactions with oxygen?

Options :

1. ✗ Only organic compounds
2. ✗ Only metals
3. ✗ Only non-metals
4. ✓ All metals, Non-metals and organic compounds

Question Number : 64 Question Id : 1298403304 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

The color displayed by a fire-cracker is a consequence of

Options :

- Formation of a metal oxide during the combustion reaction of a metal with oxygen in air
1. ✓
 2. ✗
 3. ✗
 4. ✗
- Formation of carbon dioxide as the cracker material burns
- Formation of sulphur dioxide as the cracker material burns
- Formation of magnesium dioxide as the cracker material burns

Question Number : 65 Question Id : 1298403305 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Radiography is used to detect

Options :

- Surface defects
- Volume defects
- Surface and subsurface defects
- Cracks and unfused defects only

Question Number : 66 Question Id : 1298403306 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Electrons and holes in a semi-conductor can be identified using

Options :

1. ✓ Hall measurements
2. ✗ A Joule-Thomson set-up
3. ✗ Raman scattering experiment
4. ✗ Rayleigh scattering experiment

Question Number : 67 Question Id : 1298403307 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Tridymite and cristobalite are the crystalline forms of

Options :

1. ✗ Manganese
2. ✗ Alumina
3. ✓ Silica
4. ✗ Lithium oxide

Question Number : 68 Question Id : 1298403308 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following has the lowest temperature?

Options :

1. ✓ Liquid He
2. ✗ Liquid N₂
3. ✗ Liquid CO₂
4. ✗ Liquid H₂

Question Number : 69 Question Id : 1298403309 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following statements is correct when quantum mechanics is applied to understand the motion of an electron in 1 nm wide box and the motion of a big solid spherical ball of mass 100 g in 100 cm wide box?

Options :

1. ✓ Energy quantization can be observed in both electron and solid spherical ball cases but the energy quantization will be clear in the case of electron
2. ✗ Energy quantization can be observed in only in the case of electron but not in the case of solid spherical ball

- Energy quantization cannot be observed in both electron and solid spherical ball cases because the box sizes of 1 nm and 100 cm are not sufficiently small to observe energy quantization
3. ✖

- Quantum mechanics cannot be applied in the two given cases because both are single body cases and therefore energy quantization cannot be observed
4. ✖

Question Number : 70 Question Id : 1298403310 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Superalloys are used primarily in making

Options :

1. ✖ Bicycle bodies
2. ✔ Blades of steam and gas turbines
3. ✖ Utensils for household purposes
4. ✖ Vehicle bodies

Question Number : 71 Question Id : 1298403311 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is the maximum energy of the ejected photoelectrons when a light with a quantum energy 3.2 eV is incident on a metal surface having a work function of 1.8 eV?

Options :

1. ✓ 1.4 eV
2. ✗ 1.8 eV
3. ✗ 2.8 eV
4. ✗ 0.7 eV

Question Number : 72 Question Id : 1298403312 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Conventional Si solar cells are classified as

Options :

1. ✗ Photoconductive cells
2. ✗ Photoresistive cells
3. ✗ Photoemissive cells
4. ✓ Photovoltaic cells

Which of the following traditional manufacturing processes is used to make crankshafts?

Options :

1. ✘ Welding
2. ✘ Hot isostatic pressing
3. ✔ Forging and machining
4. ✘ Rolling

Question Number : 74 Question Id : 1298403314 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following material properties is needed for an operating crankshaft to retain its original dimensions at varying temperatures?

Options :

1. ✘ High thermal conductivity
2. ✘ Good fatigue resistance
3. ✔ Low thermal coefficient of expansion

4. ✖ High thermal coefficient of expansion

Question Number : 75 Question Id : 1298403315 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

For a given amount of gas, the product of pressure and volume is constant at a constant temperature. What is the shape of the curve, if logarithmic pressure versus logarithmic volume graph is plotted?

Options :

1. ✖ Rectangular hyperbola
2. ✔ Straight line
3. ✖ Parabola
4. ✖ Circle

Question Number : 76 Question Id : 1298403316 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is the volume fraction of atoms in the grain boundaries in comparison to the volume fraction of atoms in grains of a material with average grain size of $>1 \mu\text{m}$?

Options :

1. ✓ Negligibly small
2. ✗ 50%
3. ✗ 30%
4. ✗ 10%

Question Number : 77 Question Id : 1298403317 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What sort of driving force is expected for grain growth in 3D nanocrystalline materials in comparison to the driving force for grain growth in regular 3D polycrystalline materials?

Options :

1. ✗ Negligibly small
2. ✗ Equal
3. ✗ Lower
4. ✓ Higher

Question Number : 78 Question Id : 1298403318 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which of the following standard complimentary techniques are used to determine the grain size in a nanocrystalline material?

Options :

1. ✓ Transmission electron microscopy and X-ray diffraction
2. ✗ Scanning kelvin probe microscopy and X-ray diffraction
3. ✗ Raman scattering and neutron diffraction
4. ✗ Scanning kelvin probe microscopy and neutron diffraction

Question Number : 79 Question Id : 1298403319 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which of the following wavelengths of a radiation can be used to determine the crystal structure using diffraction technique?

Options :

1. ✗ 0.01 nm
2. ✓ 0.1 nm
3. ✗ 1 nm
4. ✗ 10 nm

Question Number : 80 Question Id : 1298403320 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following is also known as cold flow of a material?

Options :

1. ✗ Fatigue
2. ✓ Creep
3. ✗ Brittle Fracture
4. ✗ Endurance

Question Number : 81 Question Id : 1298403321 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What is the reciprocal lattice of a simple hexagonal Bravais lattice?

Options :

1. ✗ Same hexagonal lattice with the same lattice constants
2. ✗ Same hexagonal lattice but with different lattice constants

Hexagonal lattice rotated with respect to the direct lattice and with different

3. ✓ lattice constants

Hexagonal lattice rotated with respect to the direct lattice and with the same lattice constants

4. ✖

Question Number : 82 Question Id : 1298403322 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is the de Broglie wavelength in meters of a 1 kg mass moving with a velocity of 1 m/sec?

Options :

1. ✔ Magnitude of Planck's constant
2. ✖ Magnitude of Boltzmann constant
3. ✖ Magnitude of Newtonian constant of gravitation
4. ✖ Magnitude of Josephson constant

Question Number : 83 Question Id : 1298403323 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

One dimensional unsteady state heat transfer equation for a sphere with heat generation at the rate of 'q' can be written as

Options :

$$\frac{1}{r} \frac{\partial}{\partial r} \left(r \frac{\partial T}{\partial r} \right) + \frac{q}{k} = \frac{1}{\alpha} \frac{\partial T}{\partial t}$$

1. ✖

$$\frac{1}{r^2} \frac{\partial}{\partial r} \left(r^2 \frac{\partial T}{\partial r} \right) + \frac{q}{k} = \frac{1}{\alpha} \frac{\partial T}{\partial t}$$

2. ✔

$$\frac{\partial^2 T}{\partial^2 r} + \frac{q}{k} = \frac{1}{\alpha} \frac{\partial T}{\partial t}$$

3. ✖

$$\frac{\partial^2}{\partial^2 r} (rT) + \frac{q}{k} = \frac{1}{\alpha} \frac{\partial T}{\partial t}$$

4. ✖

Question Number : 84 Question Id : 1298403324 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

The bulk modulus of an ideal fluid is infinity because it

Options :

1. ✖ Has infinite compressibility

2. ✖ Doesn't form free surfaces

3. ✔ Is incompressible

4. ✖ Has finite compressibility

Question Number : 85 Question Id : 1298403325 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In which of the following energy transfer between a hot fluid and a cold fluid takes place due to their complete physical mixing?

Options :

1. ✖ Counter-flow energy recovery heat exchanger

2. ✔ Direct contact heat exchanger

3. ✖ Regenerative heat exchanger

4. ✖ Microchannel heat exchanger

Question Number : 86 Question Id : 1298403326 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In which of the following transmission of molecular heat is the least?

Options :

1. ✔ Gas

2. ✖ Liquid

3. ✖ Pure metal

4. ✖ Alloy

Question Number : 87 Question Id : 1298403327 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is the process during which the entropy remains constant?

Options :

1. ✖ Isothermal process

2. ✖ Irreversible process

3. ✔ Isentropic process

4. ✖ Polytropic process

Question Number : 88 Question Id : 1298403328 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is the slope of the straight-line portion of inverse of paramagnetic susceptibility versus temperature curve?

Options :

1. ✖ Loss tangent

2. ✖ Effective magnetic moment
3. ✔ Curie constant
4. ✖ Externally applied magnetic field

Question Number : 89 Question Id : 1298403329 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which of the following describes the existence of a material with two or more crystalline structures?

Options :

1. ✔ Polymorphism
2. ✖ Isomerism
3. ✖ Isomorphism
4. ✖ Pseudomorphism

Question Number : 90 Question Id : 1298403330 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

The work function of a metal can be best expressed in terms of

Options :

1. ✘ Gibbs free energy of the electrons in the metal
2. ✔ Oscillations in density of electrons in the metal
3. ✘ Helmholtz free energy of the electrons in the metal
4. ✘ Volume of the electron gas in the metal

Question Number : 91 Question Id : 1298403331 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Nitriding is carried out for

Options :

1. ✘ Annealing
2. ✘ Spheroidizing
3. ✘ Normalizing
4. ✔ Case hardening

Question Number : 92 Question Id : 1298403332 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the type of magnetism exhibited by ferrites?

Options :

1. ✘ Ferromagnetism
2. ✘ Antiferromagnetism
3. ✔ Ferrimagnetism
4. ✘ Antiferrimagnetism

Question Number : 93 Question Id : 1298403333 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

How does the resilience of a material useful?

Options :

1. ✘ In doing work on the application of the straining force in the elastic regime
2. ✔ In doing work on the removal of the straining force within the elastic limit
3. ✘ In doing work on the application of the straining force in the plastic regime
4. ✘ In doing work on the removal of the straining force in the plastic regime

Question Number : 94 Question Id : 1298403334 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Thermal stress in a rod made up of a metallic material is dependent on

Options :

1. ✓ Rise in temperature of the metallic material only
2. ✗ Coefficient of linear thermal expansion of the metallic material only
3. ✗ Young's modulus of the metallic material
4. ✗ Both young's modulus and coefficient of linear thermal expansion of the metallic material

Question Number : 95 Question Id : 1298403335 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following curves best explains distribution of temperature in the case of radial heat conduction in a solid sphere?

Options :

1. ✓ Hyperbola
2. ✗ Straight line
3. ✗ Parabola
4. ✗ Circle

Question Number : 96 Question Id : 1298403336 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

What will happen to the enthalpy and molar heat capacity at constant volume of a system if its temperature increases?

Options :

1. ✓ Both enthalpy and molar heat capacity at constant volume also increase
2. ✗ Molar heat capacity at constant volume decreases but enthalpy increases
3. ✗ Molar heat capacity at constant volume increases but enthalpy decreases
4. ✗ Molar heat capacity at constant volume remains the same but enthalpy decreases

Question Number : 97 Question Id : 1298403337 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A composite slab has two layers of different materials with thermal conductivities K_1 and K_2 . If each layer had the same thickness, the equivalent thermal conductivity of the slab would be

Options :

1. ✗ $K_1 + K_2$
2. ✓ $(K_1 + K_2) / (K_1 K_2)$

3. ✖ $(2K_1 K_2) / (K_1 + K_2)$

4. ✖ $K_1 K_2$

Question Number : 98 Question Id : 1298403338 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which of the following is correct in the case of a uniform circular motion?

Options :

1. ✖ Velocity remains constant but acceleration continuously changes

2. ✖ Both velocity and acceleration continuously change

3. ✔ Direction of velocity changes at a constant acceleration

4. ✖ Both velocity and acceleration are constant

Question Number : 99 Question Id : 1298403339 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

A block of mass is pulled along a smooth horizontal surface by a horizontal force? What is the force exerted on the body by the surface?

Options :

1. ✖ Upward normal force perpendicular to the surface

2. ✓ Downward normal force perpendicular to the surface
3. ✗ Additional horizontal force in the opposite direction of the original horizontal force
4. ✗ Additional horizontal force in the same direction of the original horizontal force

Question Number : 100 Question Id : 1298403340 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is the work done by a winning team in a tug of war?

Options :

1. ✗ Zero
2. ✗ Equal work as that of losing work
3. ✗ Negative work on the losing team
4. ✓ Positive work on the losing team

Question Number : 101 Question Id : 1298403341 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What type of equilibrium is exhibited by a marble on a flat horizontal surface?

Options :

1. ✖ Unstable equilibrium
2. ✖ Stable equilibrium
3. ✖ Biased equilibrium
4. ✔ Neutral equilibrium

Question Number : 102 Question Id : 1298403342 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which of the following is correct with respect to center of mass of a body?

Options :

1. ✔ It is not necessary for any mass to be there at the center of mass of a body and it not necessary for the center of mass to lie within the body
2. ✖ It is not necessary for any mass to be there at the center of mass of a body but it is necessary for the center of mass to lie within the body
3. ✖ It is necessary for any mass to be there at the center of mass of a body but it not necessary for the center of mass to lie within the body
4. ✖ It is necessary for any mass to be there at the center of mass of a body and it is also necessary for the center of mass to lie within the body

Question Number : 103 Question Id : 1298403343 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

In the case of typical cantilever beam, the bending moment is maximum

Options :

1. ✓ At the fixed end
2. ✗ At the point of loading
3. ✗ Through out the beam
4. ✗ At its free end

Question Number : 104 Question Id : 1298403344 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following is used to measure the endurance limit of a ductile material?

Options :

1. ✗ Impact testing
2. ✗ Hardness testing
3. ✓ Fatigue testing

Question Number : 105 Question Id : 1298403345 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

If a structure has a factor of safety of 1 then the structure will

Options :

1. ✖ Be able to sustain 10% more load than the design load
2. ✔ Be able to sustain not more than the design load
3. ✖ Be able to sustain 50% more load than the design load
4. ✖ Be able to sustain only 1% more load than the design load

Question Number : 106 Question Id : 1298403346 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Wood is

Options :

1. ✖ An isotropic material
2. ✔ An anisotropic as well as an orthotropic material
3. ✖ An orthotropic material but not an anisotropic material

4. ✖ An isotropic material but not an orthotropic material

Question Number : 107 Question Id : 1298403347 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Equilibrium concentration of vacancies in a metal

Options :

1. ✖ Is independent of the temperature
2. ✖ Decreases with increase in temperature
3. ✔ Increases with increase in temperature
4. ✖ Increases with increase in $(\text{temperature})^{-1}$

Question Number : 108 Question Id : 1298403348 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Nitinol is a

Options :

1. ✔ Shape memory alloy
2. ✖ High entropy alloy

3. ✖ Super alloy
4. ✖ Simple alloy

Question Number : 109 Question Id : 1298403349 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Indentation hardness of a material is closely related to its

Options :

1. ✔ Bulk modulus
2. ✖ Young's modulus
3. ✖ Shear modulus
4. ✖ Shear and young's modulus

Question Number : 110 Question Id : 1298403350 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What should be the size a nanoparticle in order for it to exhibit unique electronic transport?

Options :

1. ✖ Greater than the electron scattering length in its bulk counterpart

2. ✓ Less than or equal to the electron scattering length in its bulk counterpart
3. ✗ Less than or equal to the phonon mean path in its bulk counterpart
4. ✗ Equal to the length of exchange interactions in its bulk counterpart

Question Number : 111 Question Id : 1298403351 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Which of the following statements is correct?

Options :

1. ✗ Semiconductors are not transparent to infrared light
2. ✗ Semiconductors are not opaque to visible light
3. ✓ All metals are opaque to light of all wavelengths
4. ✗ Most insulators are not transparent to visible light

Question Number : 112 Question Id : 1298403352 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

When a real gas undergoes Joule- Thomson expansion, the temperature

Options :

1. ✖ Remains Constant
2. ✖ Always increases
3. ✔ May increase or decreases
4. ✖ Always decreases

Question Number : 113 Question Id : 1298403353 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The position of a particle could be very accurately measured at a time t . Then, what is the uncertainty in measuring the momentum of the particle at t

Options :

1. ✔ ∞
2. ✖ 0
3. ✖ 1
4. ✖ $h/4\pi$, h being the Planck's constant

Question Number : 114 Question Id : 1298403354 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

An application was realized by depositing a 20 nm thick film of a crystalline material on a typical 1 m long glass window in a building. The deposited material is classified as a

Options :

1. ✗ 3D nanomaterial
2. ✓ 2D nanomaterial
3. ✗ 1D nanomaterial
4. ✗ 0D nanomaterial

Question Number : 115 Question Id : 1298403355 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following is incorrect with respect to nanoparticles in comparison to their bulk counterparts?

Options :

1. ✗ Reduced lattice constants and bandgap broadening
2. ✗ Reduced lattice constants and lower melting temperature
3. ✗ Lower melting temperature and bandgap broadening
4. ✓ Higher melting temperature and bandgap narrowing

Question Number : 116 Question Id : 1298403356 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If you are shrunk uniformly by 10000 times, what will be the approximate order of dimensions of the diameter of your eye ball?

Options :

1. ✖ Few mm (milli meter)
2. ✖ Few nm (nano meter)
3. ✔ Few μm (micro meter) or few hundreds of nm (nano meter)
4. ✖ Few $\text{\AA}$ (angstrom)

Question Number : 117 Question Id : 1298403357 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is

Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The aspect ratio of a tube of diameter (d) and length (l) is

Options :

1. ✔ l/d
2. ✖ $l.d$
3. ✖ $l/d^{1/2}$

4. ✖ $1.d^{1/2}$

Question Number : 118 Question Id : 1298403358 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

In everyday life quantum effects

Options :

1. ✔ Are taking place but they are not perceptible to the naked eye
2. ✖ Are taking place and are perceptible to the naked eye
3. ✖ Do not take place but we seem to perceive them
4. ✖ Do not take place and therefore they are not perceptible to the naked eye

Question Number : 119 Question Id : 1298403359 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is
Question Mandatory : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Statistical mechanics is a theory

Options :

1. ✖ That relates macroscopic properties of the particles constituting the system to the macroscopic properties of the system

2. ✖ That relates macroscopic properties of the particles constituting a system to the microscopic properties of the system
3. ✔ That relates microscopic properties of the particles constituting a system to the macroscopic properties of the system
4. ✖ That relates microscopic properties of the particles constituting a system to the microscopic properties of the system

Question Number : 120 Question Id : 1298403360 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Who coined the word “Nano-Technology”

Options :

1. ✖ Eric Drexler
2. ✖ Rohrer and Binnig
3. ✖ Richard Feynman
4. ✔ Norio Taniguchi