AP PGECET QUESTION PAPER

2023



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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 30th May 2023 Shift 2
Duration :	120
Total Marks :	120
Display Marks:	No
Share Answer Key With Delivery Engine :	Yes
Calculator :	None
Magnifying Glass Required? :	No
Ruler Required? :	No
Eraser Required? :	No
Scratch Pad Required? :	No
Rough Sketch/Notepad Required? :	No
Protractor Required? :	No
Show Watermark on Console? :	Yes
Highlighter :	No
Auto Save on Console?	Yes
Change Font Color :	No
Change Background Color :	No
Change Theme :	No
Help Button :	No
Show Reports :	No

Show Progress Bar :	No
Is this Group for Examiner? :	No
Examiner permission :	Cant View
Show Progress Bar? :	No

Nano Technology

Section Id :	78773229
Section Number :	1
Mandatory or Optional :	Mandatory
Number of Questions :	120
Section Marks :	120
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Is Section Default? :	null

Question Number : 1 Question Id : 7877323361 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The work function of a metallic surface can be experimentally measured using

Options :

1. ✖ energy dispersive X-ray analysis

2. ✔ scanning Kelvin probe microscopy

3. ✖ electron back-scattered diffraction

4. ✖ back-scattered electron imaging

Question Number : 2 Question Id : 7877323362 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

When can the Curie temperature of a ferromagnetic thin film be lowered compared with its bulk/macroscopic counterpart?

Options :

1. ✖ when the film thickness > the spin-spin correlation length

2. ✔ when the film thickness < the spin-spin correlation length

3. ✖ when the film thickness = 1 nm (and independent of spin-spin correlation length)

4. ✖ when the film thickness = few tens of microns

Question Number : 3 Question Id : 7877323363 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following is correct w.r.t the thermodynamic properties of a system when its physical size is in the nanoscale?

Options :

1. ✖ the thermodynamic properties strictly follow an inverse square law related to size

2. ✖ the thermodynamic properties are directly proportional to the size

3. ✖ the thermodynamic properties strictly follow a square law related to size

4. ✔ the thermodynamic properties are no more directly proportional to the size

Question Number : 4 Question Id : 7877323364 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

If S_1 and S_2 are the initial and final entropy states of a system, respectively and T is the temperature of the system, then the expression $\int_{S_1}^{S_2} T\,dS$ gives

Options :

1. ✔ heat received by the system

2. ✖ heat given by the system to the surroundings

3. ✖ work done by the system

4. ✖ thermal energy given by the system to the surroundings

Question Number : 5 Question Id : 7877323365 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

In which of the following cases the torque is the least when opening a door?

Options :

1. ✖ the torque at the hinge of the door

2. ✖ the torque at a point that is precisely between the hinge and the free end of the door

3. ✔ the torque at the farthest point from the hinge of the door, i.e., the free end of the door

4. ✖ the torque at a point that is far away from the hinge and close to the free end of the door

Question Number : 6 Question Id : 7877323366 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

A material that is constituted by at least two constituents that are mixed at the atomic or molecular level is called as

Options :

1. ✖ a mixture

2. ✔ an alloy

3. ✖ a doped material

4. ✖ a composite

Question Number : 7 Question Id : 7877323367 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which one of the following sets is the false representation of point functions?

Options :

1. ✖ density, enthalpy

2. ✖ entropy, density

3. ✖ enthalpy, entropy

4. ✔ work, density

Question Number : 8 Question Id : 7877323368 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

If 1/L is a typical linear dimension in a body and if any other linear dimension in the body varies proportionally to 1/L, then the volume of the body scales as

Options :

1. ✔ $1/L^3$

2. ✖ $1/L$

3. ✖ L^3

4. ✖ L^2

Question Number : 9 Question Id : 7877323369 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The lengths of the edges of a unit cell are 11.6 Å, 9 Å, and 6 Å, and the angles between the respective unit cell edges are 40°, 79° and 95°. The unit cell belongs to

Options :

1. ✖ tetragonal crystal system

2. ✖ body-centered cubic crystal system

3. ✔ triclinic crystal system

4. ✖ hexagonal crystal system

Question Number : 10 Question Id : 7877323370 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following is the best thermal conductor?

Options :

1. ✔ diamond

2. ✖ copper

3. ✖ zinc

4. ✖ graphite

Question Number : 11 Question Id : 7877323371 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Inconel, Incoloy, Waspaloy, Hastelloy, and Rene alloys are examples of

Options :

1. ✔ superalloys

2.

✖ metallic glass-based alloys

3. ✖ hard magnetic alloys

4. ✖ soft magnetic alloys

Question Number : 12 Question Id : 7877323372 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The indentation hardness of a material is directly related to its

Options :

1. ✔ bulk modulus

2. ✖ shear modulus

3. ✖ ability to absorb impact energy

4. ✖ resilience

Question Number : 13 Question Id : 7877323373 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

0.02 m thick heat-conducting wall with two opposite heat-conducting planar surfaces, each having an area of 1 m^2 are at 500 K and 300 K. If the thermal conductivity of the material of the conducting wall is 10 W/m-K, what is the amount of heat transfer from the high to the low-temperature side between the surfaces?

Options :

1. ✖ 1 kW

2. ✖ 10 kW

3. ✔ 100 kW

4. ✖ 1000 kW

Question Number : 14 Question Id : 7877323374 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following is correct w.r.t. hydrogen fluoride (HF) and hydrogen chloride (HCl)?

Options :

1. ✖ boiling point of HF < boiling point of HCl even though the molecular weight of HF > boiling point of HCl

2. ✖ boiling point of HF = boiling point of HCl even though and molecular weight of HF < boiling point of HCl

3. ✖ boiling point of HF = boiling point of HCl even though the molecular weight of HF > boiling point of HCl

4. ✔ boiling point of HF > boiling point of HCl even though the molecular weight of HF < boiling point of HCl

Question Number : 15 Question Id : 7877323375 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following is representative of far-infrared radiation's wavelength range?

Options :

1. ✖ 780 nm-1.4 μm

2. ✔ 3 μm-1 mm

3. ✖ 1.4 μm-3 μm

4. ✖ 1 mm-3 mm

Question Number : 16 Question Id : 7877323376 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Suppose the unit cell volume of the face-centered cubic structured material, the number of atoms associated with each unit cell, the atomic weight of the material, and Avagadro's number are V, n, A, and N, respectively. What is the density of the material?

Options :

1. ✖ $\frac{nAV}{N}$

2. ✖ $\frac{nNA}{V}$

3. ✖ $\frac{NA}{nV}$

4.

✔ $\frac{nA}{NV}$

Question Number : 17 Question Id : 7877323377 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which thermodynamics law is related to the temperature measurement by a thermometer?

Options :

1. ✔ zeroth law of thermodynamics

2. ✖ first law of thermodynamics

3. ✖ zeroth law of thermodynamics in combination with the third law of thermodynamics

4. ✖ second law of thermodynamics

Question Number : 18 Question Id : 7877323378 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What is the maximum efficiency of a heat engine operating between 300 K and 600 K?

Options :

1. ✖ 30%

2. ✖ 40%

3. ✔ 50%

4. ✖ 52%

Question Number : 19 Question Id : 7877323379 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What is the thermodynamic cycle on which a real petrol car runs?

Options :

1. ✖ Rankine cycle

2. ✖ Lenoir cycle

3. ✖ Carnot cycle

4. ✔ Otto cycle

Question Number : 20 Question Id : 7877323380 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

In the case of nano-sized thermodynamics systems, the free energy

Options :

1. ✖ is no longer an intensive property but depends on the size of the system

2. ✖ continues to be an intensive property while other properties change

3. ✔ is no longer an extensive property but depends on the size of the system

4.

✖ continues to be an extensive property while other properties change

Question Number : 21 Question Id : 7877323381 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Between which points on a typical stress-strain curve of a ductile material, the strain hardening takes place?

Options :

1. ✔ between the yield point and the point of ultimate strength

2. ✖ between the elastic regime and yield point

3. ✖ between the point of ultimate strength and fracture point

4. ✖ between any two points in the elastic regime

Question Number : 22 Question Id : 7877323382 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following is incorrect w.r.t the functions of a matrix material in a composite?

Options :

1. ✖ controlling the operating temperature of the composite

2. ✔ controlling only the shear modulus (but not the transverse modulus) of the composite

3. ✖ controlling both the shear and transverse moduli of the composite

4. ✖ controlling both the shear and transverse strengths of the composite

Question Number : 23 Question Id : 7877323383 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

In which of the following manufacturing processes does the workpiece's mass remain unaltered?

Options :

1. ✔ forging

2. ✖ drilling

3. ✖ milling

4. ✖ sawing

Question Number : 24 Question Id : 7877323384 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What happens to a heat engine's efficiency if the heat source's temperature decreases?

Options :

1. ✖ remains the same

2. ✖ increases linearly

3. ✔ decreases

4. ✖ increases exponentially

Question Number : 25 Question Id : 7877323385 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

If a gas expands adiabatically, what happens to the gas temperature?

Options :

1. ✖ increases exponentially

2. ✖ remains the same

3. ✖ increases linearly

4. ✔ decreases

Question Number : 26 Question Id : 7877323386 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

If a 50 g of chocolate is put on a human palm, what is the force experienced?

Options :

1. ✖ 1 N

2. ✖ 1 kN

3. ✔ 0.5 N

4. ✖ 0.5 kN

Question Number : 27 Question Id : 7877323387 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

In Gaussian electromagnetism, the units Mega-Gauss-Oersted are related to

Options :

1. ✖ magnetic coercivity

2. ✔ magnetic energy product

3. ✖ magnetic field strength

4. ✖ magnetic flux density

Question Number : 28 Question Id : 7877323388 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The metal-forming process which does not involve severe plastic deformation is?

Options :

1. ✔ conventional closed-die forging

2. ✖ equal channel angular pressing

3. ✖ high-pressure torsion

4. ✖ accumulative roll-bonding

Question Number : 29 Question Id : 7877323389 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What is the value of bending stress along the neutral axis of a beam?

Options :

1. ✖ ∞

2. ✖ 2 times that of the bending moment

3. ✖ 0.5 times that of the bending moment

4. ✔ 0

Question Number : 30 Question Id : 7877323390 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Two objects A and B are made of the same material, shape, and dimensions. A tensile load of 10 N is applied in the middle point of A, while a cyclic load of magnitude 10 N is applied in the middle point of B, leading to the failure of both A and B. However, which of the following statements is correct?

Options :

1. ✔ B fails before A because here, failure can happen at stress values less than the yield strength of the material

2. ✖ A fails before B because here, failure happens at stress values greater than the yield strength of the material

A and B fail at the same time because the stress levels are the same here, and no other consideration is needed

3. ✖

A and B fail at the same time because A and B are made of the same material, shape, and dimensions

4. ✖

Question Number : 31 Question Id : 7877323391 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

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

Options :

1. ✔ creep

2. ✖ elastic fracture

3. ✖ fracture

4. ✖ fatigue

Question Number : 32 Question Id : 7877323392 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What is the entropy change when the ice melts in an environment at 25 °C?

Options :

1. ✖ the entropy change is negative because the process is taking heat from the surroundings

2. ✖ the entropy change is negative because the process is giving heat to the surroundings

3. ✔ the entropy change is positive because the process is taking heat from the surroundings

4. ✖ the entropy change is positive because the process is giving heat to the surroundings

Question Number : 33 Question Id : 7877323393 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The true strain (ε_T) and engineering strain (ε_E) are related as

Options :

1. ✖ $\varepsilon_T = \ln(\varepsilon_E)$

2. ✖ $\varepsilon_E = \ln(1+\varepsilon_T)$

3. ✔ $\varepsilon_T = \ln(1+\varepsilon_E)$

4. ✖ $\varepsilon_E = \ln(\varepsilon_T)$

Question Number : 34 Question Id : 7877323394 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following materials exhibit a negative Poisson's ratio?

Options :

1. ✖ anisotropic materials such as carbon nanotubes

2.

✔ auxetics materials such as auxetic polyurethane foam

3. ✖ isotropic materials such as steel

4. ✖ glasses

Question Number : 35 Question Id : 7877323395 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following method is used to measure the chemical state, electronic structure and density of the electronic states of the surface atoms in a material?

Options :

1. ✖ wavelength dispersive spectroscopy

2. ✖ energy dispersive x-ray analysis

3. ✖ micro x-ray diffraction

4. ✔ x-ray photoelectron spectroscopy

Question Number : 36 Question Id : 7877323396 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

When a pure liquid is cooled below the equilibrium freezing temperature, a solid particle is precipitated in the liquid. The critical radius of the solid particle can be estimated by calculating

Options :

1. ✖ the total internal energy of the system

2. ✔ total change in Gibbs free energy

3. ✖ the total entropy of the system

4. ✖ total change in enthalpy

Question Number : 37 Question Id : 7877323397 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following is correct w.r.t the addition of the alloying element Cr in steels?

Options :

1. ✖ Cr softens the surface and therefore it is avoided

2. ✖ Cr reacts with Fe on the surface and forms an unwanted alloy on the surface

3. ✖ Cr reacts with C on intentionally form Cr-carbides on the surface

4. ✔ Cr has the ability to passivate the surface by forming Cr-oxide which acts as a corrosion inhibitor

Question Number : 38 Question Id : 7877323398 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following radioactive decays is through α-decay?

Options :

1. ✖ protactinium-234 to uranium-234

2. ✔ uranium-238 to thorium-234

3. ✖ lead 214 to bismuth 214

4. ✖ protactinium-234 to uranium-238

Question Number : 39 Question Id : 7877323399 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Ductile to brittle transition in an elemental metal takes place at the transition temperature. Here,

Options :

1. ✔ yield stress = fracture stress of the metal

2. ✖ yield stress > fracture stress of the metal

3. ✖ yield stress < fracture stress of the metal

4. ✖ yield stress of the metal = ∞

Question Number : 40 Question Id : 7877323400 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

If Mg is used as the sacrificial anode for the cathodic protection of a ship hull at a certain current density, how much of Mg will be used up as for every 2F of charge?

Options :

1. ✔ 1 mole of Mg

2. ✖ 0.5 mole of Mg

3. ✖ 1.5 moles of Mg

4. ✖ 2 moles of Mg

Question Number : 41 Question Id : 7877323401 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

A thin layer of Silver atoms when diffused along the grain boundaries of brittle Iron at -196 °C will make the Iron ductile. What is the reason?

Options :

1. ✖ Silver is FCC metal having a high Peierls-Nabarro stress at -196 °C

2. ✖ Silver is BCC metal having a high Peierls-Nabarro stress at -196 °C

3. ✔ Silver is FCC metal having a low Peierls-Nabarro stress at -196 °C

4. ✖ Silver is BCC metal having a low Peierls-Nabarro stress at -196 °C

Question Number : 42 Question Id : 7877323402 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The steam temperature in a boiler at a pressure 200 atm is 600 °C. The steam is ejected from a Laval nozzle. As the steam leaves the nozzle, why should its temperature be maintained above 100 °C?

Options :

1. ✔ to prevent condensation of the steam as it leaves

2. ✖ to allow the condensation inside the nozzle

3. ✖ to maintain the steam temperature the same as inside the boiler

4. ✖ to easily facilitate the escape of unwanted steam

Question Number : 43 Question Id : 7877323403 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

A plane is traveling at an altitude with a certain Mach number. What is the plane's distance from an observer on the ground when the observer first hears the plane coming?

Options :

1. ✖ Mach number ÷ altitude

2. ✔ Mach number x altitude

3. ✖ 2(Mach number x altitude)

4. ✖ altitude ÷ Mach number

Question Number : 44 Question Id : 7877323404 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

In an intrinsic semiconductor,

Options :

1. ✖ hole concentration is greater than the electron concentration

2. ✔ hole concentration is exactly equal to the electron concentration

3. ✖ hole concentration is slightly lesser than the electron concentration

4. ✖ hole concentration is far lesser than the electron concentration

Question Number : 45 Question Id : 7877323405 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

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

Options :

1. ✖ micron-level resolution

2. ✔ atomic resolution

3. ✖ sub-micron resolution

4. ✖ nuclear resolution

Question Number : 46 Question Id : 7877323406 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

If x is the oxide layer thickness on a metal, t is the time of oxidation, and D is the diffusion coefficient of oxygen atoms through the oxide layer, what is the parabolic law of oxidation of the metal at a constant temperature of oxidation?

Options :

1. ✖ $x \propto \sqrt{t/D}$

2. ✖ $x \propto \sqrt[3]{Dt}$

3. ✖ $x \propto \sqrt{D/t}$

4. ✔ $x \propto \sqrt{Dt}$

Question Number : 47 Question Id : 7877323407 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What will be the Hall coefficient of an intrinsic semiconductor exhibiting conductivity from the mobility of electrons and the mobility of holes?

Options :

1. ✖ it is always a constant '0.5' for any intrinsic semiconductor

2. ✖ zero because the mobility of electrons is equal to the mobility of holes in an intrinsic semiconductor

3. ✖ negative because the mobility of electrons is greater than the mobility of holes

4. ✔ positive because the mobility of electrons is greater than the mobility of holes

Question Number : 48 Question Id : 7877323408 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

When a known fluid flows in a pipe, the thickness of the boundary layer can be calculated using

Options :

1. ✔ the Reynolds number

2. ✖ the Knudsens number

3. ✖ the Christs number

4. ✖ the Eulers number

Question Number : 49 Question Id : 7877323409 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

According to Von Mises criterion, how many minimum independent slip systems are necessary to maintain the integrity of the grain boundaries during plastic deformation?

Options :

1. ✖ 3

2. ✖ 4

3. ✔ 5

4. ✖ 6

Question Number : 50 Question Id : 7877323410 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following is correct w.r.t diffusion along in a polycrystalline material?

Options :

1. ✖ the speed of lattice diffusion is equal to the pipe diffusion

2. ✔ the speed of pipe diffusion is greater than the lattice diffusion

3. ✖ the speed of lattice diffusion is greater than the pipe diffusion

4. ✖ the lattice diffusion cannot take place in polycrystalline materials

Question Number : 51 Question Id : 7877323411 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which crystal structures have the same atomic packing factor?

Options :

1. ✖ hexagonal closed packed and simple cubic crystal structures

2. ✖ body centered cubic and hexagonal closed packed crystal structures

3. ✖ face centered cubic and simple cubic crystal structures

4. ✔ face centered cubic and hexagonal closed packed crystal structures

Question Number : 52 Question Id : 7877323412 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

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

Options :

1. ✖ 10^{-1}

2. ✖ 10^{-2}

3. ✖ 10^{-3}

4. ✔ 10^{-4}

Question Number : 53 Question Id : 7877323413 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Empirical Euler's theory of buckling of columns primarily assumes that the stress due to direct loads on

Options :

1. ✖ very short column is greater than the stress due to buckling failure

2. ✖ very short column is less than the stress due to buckling failure

3. ✖ very long column is greater than the stress due to buckling failure

4. ✔ very long column is less than the stress due to buckling failure

Question Number : 54 Question Id : 7877323414 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

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

Options :

1. ✖ bandgap broadening

2. ✔ bandgap narrowing

3. ✖ reduced lattice constants

4. ✖ lower melting temperatures

Question Number : 55 Question Id : 7877323415 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What happens to the temperature of a thermally insulated room when a ceiling fan in switched on?

Options :

1. ✔ the temperature increases

2. ✖ the temperature decreases linearly depending on the speed of the fan

3. ✖ the temperature decreases non-linearly

4. ✖ the temperature remains the same

Question Number : 56 Question Id : 7877323416 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The valve of an evacuated bottle is opened to facilitate the entry of 1 litre of atmospheric air at a pressure of 1 atm into the bottle. What is the work done by the air?

Options :

1. ✖ 0.01325 J

2. ✖ 1.01325 J

3. ✔ 101.325 J

4. ✖ 1 kJ

Question Number : 57 Question Id : 7877323417 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The frictional forces between two contacting rough surfaces scale as the

Options :

1. ✖ square of the true contact area

2. ✔ true contact area

3. ✖ the square root of the true contact area

4. ✖ square of the contact volume

Question Number : 58 Question Id : 7877323418 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What is the crystal structure of Copper?

Options :

1. ✖ simple cubic structure

2. ✖ body centered cubic structure

3. ✖ hexagonal closed pack structure

4. ✔ face centered cubic structure

Question Number : 59 Question Id : 7877323419 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

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

Options :

1. ✔ fatigue test

2. ✖ hardness test

3. ✖ impact test

4. ✖ bend test

Question Number : 60 Question Id : 7877323420 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What is Knudsen's number w.r.t the gas flow in a reactor?

Options :

1. ✔ it is the ratio between the mean free path of the gas molecules and the longest dimension in the reactor

2. ✖ it is the ratio between the mean free path of the gas molecules and the shortest dimension in the reactor

3. ✖ it is always 1 when gas flows in a reactor

4. ✖ it is the ratio between the gas flow rate and the shortest dimension in the reactor

Question Number : 61 Question Id : 7877323421 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

When liquid nitrogen comes in contact with a solid at room temperature, an insulating layer of nitrogen gas bubbles forms on the solid surface. This is known as

Options :

1. ✔ Leidenfrost effect

2. ✖ Leidenevaporation effect

3. ✖ Leidencondensation effect

4. ✖ Leidencoolant effect

Question Number : 62 Question Id : 7877323422 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following forces are in contact with the axis of rotation of a body in some way or another?

Options :

1. ✖ parallel forces

2. ✖ unparallel forces

3. ✔ concurrent forces

4. ✖ non-concurrent forces

Question Number : 63 Question Id : 7877323423 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Square threads exhibit the highest efficiency because their flank angle is

Options :

1. ✖ $90°$

2. ✔ $0°$

3. ✖ $45°$

4. ✖ $28°$ as per the theoretical derivation

Question Number : 64 Question Id : 7877323424 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What will be the nature of the force a constituent of a truss will apply on a joint if the constituent is under compression?

Options :

1. ✖ inward force enough for the joint, in turn, to apply an equivalent outward force

2. ✔ outward force enough for the joint, in turn, to apply an equivalent inward force

3. ✖ negligible outward force

4. ✖ negligible inward force

Question Number : 65 Question Id : 7877323425 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What is the total area under typical stress versus strain curve?

Options :

1. ✖ endurance limit

2. ✔ modulus of toughness

3. ✖ modulus of elasticity

4. ✖ modulus of resilience

Question Number : 66 Question Id : 7877323426 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

A combination turbine receives saturated Hg vapor from a boiler at 800 K and exhausts it to heat a steam boiler at 540 K. The steam turbine exhausts the steam to a condenser at 240 K. What is the maximum efficiency of the combination turbine?

Options :

1. ✖ 65%

2. ✖ 55.5%

3. ✖ 32.5%

4. ✔ 70%

Question Number : 67 Question Id : 7877323427 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What are the SI units of Hall-Petch constant?

Options :

1. ✖ MN/m^2

2. ✔ $MN/m^{3/2}$

3. ✖ $MN/m^{-3/2}$

4. ✖ MN/m^{-2}

Question Number : 68 Question Id : 7877323428 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The yield stress of a polycrystalline material

Options :

1. ✖ increases as the reciprocal of the square of the grain diameter

2. ✖ decreases as the reciprocal of the square of the grain diameter

3. ✔ increases as the reciprocal of the square root of the grain diameter

4. ✖ decreases as the reciprocal of the square root of the grain diameter

Question Number : 69 Question Id : 7877323429 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Creep is the thermally activated deformation that occurs in a metallic material as a function of time but at temperatures

Options :

1. ✔ only above 0.4 T_m, T_m being the melting temperature of the material undergoing creep

2. ✖ only above 0.5 T_m, T_m being the melting temperature of the material undergoing creep

3. ✖ above 0.2 T_m and below 0.4 T_m, T_m being the melting temperature of the material undergoing creep

4. ✖ above 0.2 T_m and below 0.3 T_m, T_m being the melting temperature of the material undergoing creep

Question Number : 70 Question Id : 7877323430 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

In a crystal, the activation energy required for dislocation motion at a particular rate is 40 kT, k being the Boltzmann constant and T is the temperature. Then which of the following is correct w.r.t the stress required to move the dislocation at 500 K?

Options :

1. ✖ the activation volume is needed to calculated the stress required to move the dislocation

2. ✖ P-N stress is needed to estimate the stress required to move the dislocation

3. ✔ the thermal energy is more than that required to overcome the barrier to dislocation motion therefore no other cosiderations are need to calculate the stress required

4. ✖ the thermal energy is less than that required to overcome the barrier to dislocation motion therefore it is impossible to calculate the stress required to move the dislocation

Question Number : 71 Question Id : 7877323431 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

When a tensile stress (σ) is applied to a cylindrical metallic crystal, the expression for resolved shear stress on a slip plane whose normal makes an angle of θ with the stress axis, along a slip direction inclined at an angle of γ to this axis is given by

Options :

1. ✖ $\sigma \sin(\theta) \sin(\gamma)$

2. ✔ $\sigma \cos(\theta) \cos(\gamma)$

3. ✖ $\sigma \cot(\theta) \cot(\gamma)$

4. ✖ $\sigma \tan(\theta) \tan(\gamma)$

Question Number : 72 Question Id : 7877323432 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

For a floating body to be in stable equilibrium

Options :

1. ✔ the body's metacenter should be above its center of gravity

2. ✖ the body's metacenter should be below its center of gravity

3. ✖ the body's center of gravity should be below its center of buoyancy

4. ✖ the body's metacenter should be at its center of gravity

Question Number : 73 Question Id : 7877323433 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

A 5 m high tank contained water upto 4 m and the rest kerosene. Find the pressure at the interface between kerosene and water given the density of water as 1000 kg/m^3, density of kerosene as 800 kg/m^3 and acceleration due to gravity as 10 m/s^2.

Options :

1. ✖ 0.8 kPa

2. ✖ 80 kPa

3. ✖ 800 kPa

4. ✔ 8 kPa

Question Number : 74 Question Id : 7877323434 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Dimensional formula of kinematic viscosity is

Options :

1. ✔ L^2T^{-1}

2. ✖ L^2T^{-2}

3. ✖ LT^{-1}

4. ✖ L^2T

Question Number : 75 Question Id : 7877323435 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Venturimeter is used to measure

Options :

1. ✔ flow rate of a fluid inside a pipe

2. ✖ change in viscosity of a fluid inside a pipe

3. ✖ change in pressure during the flow of a fluid inside a pipe

4. ✖ change in density of the fluid inside a pipe

Question Number : 76 Question Id : 7877323436 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

If the pressure inside a container was decreased with the help of a vacuum pump, what will happen to the mean free path of the residual molecules in the container?

Options :

1. ✖ decreases

2. ✔ increases

3. ✖ remains the same

4. ✖ the question is incorrect because the pressure and mean free path are not related

Question Number : 77 Question Id : 7877323437 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Tetrahedral bonding is characteristic of

Options :

1. ✖ ionic bonds

2. ✖ metallic bonds

3. ✔ covalent bonds

4. ✖ molecular bonds

Question Number : 78 Question Id : 7877323438 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Na and Na^+ do not differ in

Options :

1. ✖ number of electrons

2. ✔ number of protons

3. ✖ radius

4. ✖ net electrical charge

Question Number : 79 Question Id : 7877323439 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The mass of an electron varies with

Options :

1. ✔ variation in its speed

2. ✖ variation in the electrostatic field applied on it

3. ✖ variation in the magnetic field applied on it

4. ✖ variation in the gravitational field acting on it

Question Number : 80 Question Id : 7877323440 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Addition of Si to Cu results in

Options :

1. ✔ increase in hardness

2. ✖ decrease in hardness

3. ✖ increase in ductility

4. ✖ increase in strength

Question Number : 81 Question Id : 7877323441 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following materials will follow the Hooke's law most closely

Options :

1. ✖ cemented tungsten carbide

2. ✖ soft rubber

3. ✖ mild steel

4. ✔ carbon steel

Question Number : 82 Question Id : 7877323442 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Addition of Vanadium to steel results in

Options :

1. ✖ decrease in the fatigue resistance of the steel

2. ✔ increase in the fatigue resistance of the steel

3. ✖ decrease in the corrosion resistance of the steel

4. ✖ increase in the hardenability of the steel

Question Number : 83 Question Id : 7877323443 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

SiC fibers reinforced Al metal matrix composites are in

Options :

1. ✖ fabricating resistors

2. ✖ fabricating transformer cores

3. ✔ fabricating aerospace structural components

4. ✖ fabricating cutting tools

Question Number : 84 Question Id : 7877323444 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The dielectric loss in ferrites is

Options :

1. ✖ very high because they have low resistivity

2. ✔ very low because they have high resistivity

3. ✖ zero because they have low resistivity

4. ✖ zero because they have high resistivity

Question Number : 85 Question Id : 7877323445 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

The dielectric power loss varies

Options :

1. ✖ as the square of the angular frequency of the applied electric field

2. ✔ linearly with the angular frequency of the applied electric field

3. ✖ as the cube of the angular frequency of the applied electric field

4. ✖ inversely with the angular frequency of the applied electric field

Question Number : 86 Question Id : 7877323446 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Donor levels are formed by doping with impurity element with a valency

Options :

1. ✔ 3

2. ✖ 4

3. ✖ 5

4. ✖ 6

Question Number : 87 Question Id : 7877323447 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

A Thermistor is

Options :

1. ✖ nothing but a type of thermocouple

2. ✖ nothing but a type of thermometer

3. ✔ small resistance having negative temperature coefficient of resistance

4. ✖ small resistance having positive temperature coefficient of resistance

Question Number : 88 Question Id : 7877323448 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Pitot tube is used to measure

Options :

1. ✔ velocity of a fluid inside a pipe

2. ✖ change in viscosity of a fluid inside a pipe

3. ✖ change in pressure during the flow of a fluid inside a pipe

4. ✖ change in density of the fluid inside a pipe

Question Number : 89 Question Id : 7877323449 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The reason for cavitation in a moving fluid is

Options :

1. ✖ due to density variation in the moving fluid

2. ✖ due to velocity variation in the moving fluid

3. ✔ due to pressure variation in the moving fluid

4. ✖ due to viscosity variation in the moving fluid

Question Number : 90 Question Id : 7877323450 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What is the interplanar spacing for a (200) plane in a simple cubic lattice with a lattice constant of 3.6 Å

Options :

1. ✖ 3.6 nm

2. ✖ 1.8 Å

3. ✔ 7.2 Å

4. ✖ 3.6 Å

Question Number : 91 Question Id : 7877323451 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Jahn-Teller effect in a transition metal complex

Options :

1. ✔ induces geometric distortion in the complex in degenerate state and enhances its stability

2. ✖ induces geometric distortion in the complex in degenerate state and reduces its stability

3. ✖ induces geometric distortion in the complex in non-degenerate state and enhances its stability

4. ✖ induces geometric distortion in the complexe in non-degenerate state and reduces the stability

Question Number : 92 Question Id : 7877323452 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

In the atomic approach to entropy, all atoms in a solid at 0 K are in the

Options :

1. ✖ non-degenerate highest allowed energy level

2. ✔ lowest allowed energy level

3. ✖ Fermi level

4. ✖ degenerate highest energy levels

Question Number : 93 Question Id : 7877323453 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The energy required to separate one mole of an ionic compound into its constituent ions in the gas phase is known as

Options :

1. ✖ microscopic energy

2. ✖ phonon energy

3. ✔ lattice energy

4. ✖ ionization energy

Question Number : 94 Question Id : 7877323454 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The concept of "Delocalized electrons" is a consequence of which of the following?

Options :

1. ✖ Sommerfeld's atomic bond theory

2. ✖ Bohr's atomic bond theory

3. ✖ valance band theory

4. ✔ molecular orbital theory

Question Number : 95 Question Id : 7877323455 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following statements is correct w.r.t London dispersion forces?

Options :

1. ✖ London dispersion forces are attractive forces among induced dipoles in polar molecules

2. ✖ London dispersion forces are repulsive forces among induced dipoles in polar molecules

3. ✔ London dispersion forces are attractive forces among induced dipoles in nonpolar molecules

4. ✖ London dispersion forces are repulsive forces among induced dipoles in nonpolar molecules

Question Number : 96 Question Id : 7877323456 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following alkali elements is contained in the ore Petalite?

Options :

1. ✖ Fr

2. ✖ Rb

3. ✔ Li

4. ✖ Na

Question Number : 97 Question Id : 7877323457 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What is the intermolecular interaction that occurs between a hydrogen atom bonded to a highly electronegative atom and another electronegative atom with a lone pair of electrons?

Options :

1. ✔ hydrogen bonding

2. ✖ ionic interaction

3. ✖ covalent bonding

4. ✖ van der Waals interaction

Question Number : 98 Question Id : 7877323458 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What is the expansion of VSEPR?

Options :

1. ✖ valence shell electrostatic power repulsion

2. ✔ valence shell electron pair repulsion

3. ✖ valence state electron pair repulsion

4. ✖ valence shell electromagnetic pair repulsion

Question Number : 99 Question Id : 7877323459 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following statements is correct w.r.t the bond order in molecular bonding?

Options :

1. ✖ a higher bond order corresponds to a longer bond length and stronger bond strength

2. ✖ a lower bond order corresponds to a shorter bond length and weaker bond strength

3. ✖ a lower bond order corresponds to a shorter bond length and stronger bond strength

4. ✔ a higher bond order corresponds to a shorter bond length and stronger bond strength

Question Number : 100 Question Id : 7877323460 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following can be estimated using Pauling's scale?

Options :

1. ✔ electronegativity of elements

2. ✖ electronaffinity of elements

3. ✖ workfunction of a metallic surface

4. ✖ ionization energy molecules

Question Number : 101 Question Id : 7877323461 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Consider the following data recorded when a material underwent tensile testing:

Gauge length = 220 mm; Diameter of the specimen = 10 mm; Change in length for load up to proportionality limit = 0.25 mm; load at proportionality limit = 314 kN; maximum load = 314 kN and diameter at neck = 8 mm. Calculate the ultimate tensile strength of the material.

Options :

1. ✖ 1000 MPa

2. ✖ 500 MPa

3. ✔ 250 MPa

4. ✖ 125 MPa

Question Number : 102 Question Id : 7877323462 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

A hydraulic system with piston areas A (10 m^2) and B (0.5 m^2) is available to lift a car weighing 1000 kg. Where should be the car placed (on which piston) and what is the minimum force needed to lift the car?

Options :

1. ✖ car should be placed on A and 100 kgf should be applied on B

2. ✔ car should be placed on A and 50 kgf should be applied on B

3. ✖ car should be placed on B and 100 kgf should be applied on A

4. ✖ car should be placed on B and 50 kgf should be applied on A

Question Number : 103 Question Id : 7877323463 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

An object has a mass of 10 kg on the Earth. What is its mass on moon (acceleration due to gravity (g) on the moon is $(1/6)^{th}$ of Earth, g on earth is 9.8 m/s^2).

Options :

1. ✖ 16.33 kg

2. ✖ 60 kg

3. ✔ 10 kg

4. ✖ 1.66 kg

Question Number : 104 Question Id : 7877323464 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the heat tranfer mechanisms require a medium for the heat tranfer?

Options :

1.

✔ conduction and convection

2. ✖ conduction and radiation

3. ✖ convection and radiation

4. ✖ radiation

Question Number : 105 Question Id : 7877323465 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Commercial small diameter wire drawing of a ductile material starts with

Options :

1. ✖ a coil of hot rolled same diameter wire

2. ✔ a coil of hot rolled larger diameter wire

3. ✖ a hot rolled metallic stripe

4. ✖ a cold rolled metallic stripe

Question Number : 106 Question Id : 7877323466 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Mosquitoes can stand on still water because of

Options :

1. ✖ the formation of glue like material as their feet touch the water surface

2. ✖ the surface tension of water providing a thin solid sheet-like support

3. ✖ small hairs on their legs resulting in larger surface contact area with water

4. ✔ both the surface tension of water and small hairs on their legs

Question Number : 107 Question Id : 7877323467 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following statements is correct w.r.t true stress and engineering stress?

Options :

1. ✔ for large strains, true stress is greater than engineering stress and is more accurate as it takes into account the instantaneous material's cross-sectional area due to deformation, whereas engineering stress does not

2. ✖ for large strains, engineering stress is greater than true stress and is more accurate as it takes into account the instantaneous material's cross-sectional area due to deformation, whereas true stress does not

3. ✖ for small strains, true stress is exactly equal to engineering stress

4. ✖ for small strains, engineering stress is greater than true stress and is more accurate as it takes into account the instantaneous material's cross-sectional area due to deformation, whereas true stress does not

Question Number : 108 Question Id : 7877323468 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

What is the Poisson's ratio of a perfectly incompressible isotropic material deformed elastically at small strains?

Options :

1. ✖ -1

2. ✖ 1

3. ✔ 0.5

4. ✖ -0.5

Question Number : 109 Question Id : 7877323469 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

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

Options :

1. ✖ differential thermal analysis

2. ✔ derivative thermogravimetry

3. ✖ differential scanning calorimetry

4. ✖ thermogravimetry

Question Number : 110 Question Id : 7877323470 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which set of alloying elements are austinite formers in austenitic stainless steels?

Options :

1. ✔ Ni, Cu, and Mn

2. ✖ Ni, Cu, and Mo

3. ✖ Ni, Mn, and Mo

4. ✖ Cu, Mn, and Mo

Question Number : 111 Question Id : 7877323471 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which one of the following is true

Options :

1. ✖ $\sum_{n=1}^{\infty} \frac{n^n}{n!}$ is convergent

2. ✖ $\sum_{n=1}^{\infty} \frac{1}{n}$ is convergent

3. ✖

$\sum_{n=1}^{\infty} 4\left(\frac{4}{3}\right)^n$ is convergent

4. ✔ $\sum_{n=1}^{\infty}(-1)^n \frac{n^3}{3^n}$ is convergent

Question Number : 112 Question Id : 7877323472 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The value of $\oint_C y^3\,dx - x^3\,dy$, where C is the circle $x^2 + y^2 = 4$ is

Options :

1. ✖ 12π

2. ✖ 0

3. ✖ -12π

4. ✔ -24π

Question Number : 113 Question Id : 7877323473 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Let $f(x,y) = \begin{cases} \frac{x^3y - xy^3}{x^2+y^2} & if\ (x,y) \neq (0,0) \\ 0 & if\ (x,y) = (0,0) \end{cases}$. The value of $f_x(0,0)$ is

Options :

1. ✖ -1

2. ✔ 0

3. ✖ 1

4. ✖ Does not exists

Question Number : 114 Question Id : 7877323474 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The solution of $x\frac{dy}{dx}+y=x^2y^2, y(1)=\frac{1}{2}$ at $x=2$ is

Options :

1. ✖ $\frac{1}{4}$

2. ✖ $\frac{1}{8}$

3. ✔ $\frac{1}{2}$

4. ✖ $\frac{1}{16}$

Question Number : 115 Question Id : 7877323475 Display Question Number : Yes Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Inverse Laplace transform of $\frac{3}{s^2+6s+18}$ is

Options :

1. ✖ $e^{3t}\cos 3t$

2. ✖ $e^{3t}\sin 3t$

3. ✔ $e^{-3t}\sin 3t$

4. ✖ $e^{-3t}\cos 3t$

Question Number : 116 Question Id : 7877323476 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Let the probability density function of X be $f(x) = \begin{cases} kx^2 & 0 \le x \le 2 \\ 0 & otherwise \end{cases}$.

The value of C such that $P(X \le C) = 0.1$ is

Options :

1. ✔ 0.9283

2. ✖ 0.8123

3. ✖ 0.7254

4. ✖ 0.9825

Question Number : 117 Question Id : 7877323477 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Let X follow Poisson distribution such that $P(X = 1) = P(X = 2)$. Then $P(X = 3)$ is

Options :

1. ✖ 0.24

2. ✖ 0.16

3. ✔ 0.18

4. ✖ 0.32

Question Number : 118 Question Id : 7877323478 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

If the eigenvalues of $\begin{bmatrix} 2 & 3 \\ x & y \end{bmatrix}$ are 4 and 8, then $x + y$ is

Options :

1. ✖ 14

2. ✖ 13

3. ✔ 6

4. ✖ 12

Question Number : 119 Question Id : 7877323479 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

The linear system $x+2y-3z=a, 2x+3y+3z=b, 5x+9y-6z=c$ is consistent if

Options :

1. ✖ $7a-b-c=0$

2. ✔ $3a+b-c=0$

3. ✖ $3a-b+c=0$

4. ✖ $7a-b+c=0$

Question Number : 120 Question Id : 7877323480 Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Which of the following iterative scheme converges quadratically to 0, the root of

$f(x)=e^x-x-1=0$

Options :

1. ✖ $x_{n+1}=x_n-\frac{f(x_n)}{f'(x_n)}$

2. ✖ $$x_{n+1} = x_n - \frac{f(x_n)(x_n - x_{n-1})}{f(x_n) - f(x_{n-1})}$$

3. ✔ $$x_{n+1} = x_n - 2\frac{f(x_n)}{f'(x_n)}$$

4. ✖ $$x_{n+1} = -x_n + \frac{f(x_n)}{f'(x_n)}$$