

Andhra Pradesh State Council of Higher Education

Notations :

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

Question Paper Name :	Nano Technology 08th June 2025 Shift 2
Subject Name :	Nano Technology
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Nano Technology

Group Number :	1
Group Id :	83189663
Group Maximum Duration :	0
Group Minimum Duration :	120
Show Attended Group? :	No
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Break time : 0
Group Marks : 120

Nano Technology

Section Id : 83189663
Section Number : 1
Section type : Online
Mandatory or Optional : Mandatory
Number of Questions : 120
Number of Questions to be attempted : 120
Section Marks : 120
Maximum Instruction Time : 0
Sub-Section Number : 1
Sub-Section Id : 83189663
Question Shuffling Allowed : Yes

Question Number : 1 Question Id : 8318967441 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The shape of first Brillouin zone of an FCC lattice is?

Options :

1. ✖ Tetrahedral
2. ✖ Triagonal

3. ✖ Truncated hexagon

4. ✔ Truncated octahedron

Question Number : 2 Question Id : 8318967442 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

For a body to be in equilibrium under concurrent coplanar forces, the sum of:

Options :

1. ✖ Moments must be zero

2. ✖ Forces in vertical direction must be zero

3. ✖ All forces must be zero

4. ✔ Horizontal and vertical components of forces must each be zero

Question Number : 3 Question Id : 8318967443 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A metal nanopowder is produced by four different process as given below. Spherical morphology of the powder is more likely in?

Options :

1. ✖ Electrolytic reduction process
2. ✖ Water atomization process
3. ✖ Machining process
4. ✔ Air atomization process

Question Number : 4 Question Id : 8318967444 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In a simply supported beam, where does maximum bending moment occur under a point load?

Options :

1. ✖ At the support

2. ✓ At the point load

3. ✗ Mid-span

4. ✗ Uniform throughout

Question Number : 5 Question Id : 8318967445 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which mathematical method is used in X-ray crystallography?

Options :

1. ✓ Fourier Transformation

2. ✗ Partial Differentiation

3. ✗ Geiger Method

4. ✗ Permutation

Question Number : 6 Question Id : 8318967446 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In 2D viscous incompressible flow, the continuity equation is:

Options :

1. ✓ $\partial u / \partial x + \partial v / \partial y = 0$

2. ✗ $\partial u / \partial x + \partial v / \partial x = 0$

3. ✗ $\partial u / \partial y = \partial v / \partial x$

4. ✗ $\partial^2 u / \partial x^2 = \partial^2 v / \partial y^2$

Question Number : 7 Question Id : 8318967447 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Grain size distribution in nano material is close to?

Options :

1. ✗ Bimodal

2. ✖ Parabolic

3. ✔ Log normal

4. ✖ Exponential

Question Number : 8 Question Id : 8318967448 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The number of dimensionless groups formed using Buckingham's π -theorem is:

Options :

1. ✖ Equal to number of variables

2. ✖ Equal to number of fundamental dimensions

3. ✔ Variables minus fundamental dimensions

4. ✖ Always 3

Question Number : 9 Question Id : 8318967449 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

On a Mohr's circle, any point on the circle represents:

Options :

1. ✖ Axial stress only

2. ✖ Pure shear

3. ✔ Stress on some inclined plane

4. ✖ Principle stress

Question Number : 10 Question Id : 8318967450 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The equation which describes the relationship between grain size and
the yield of poly crystalline metals is called as?

Options :

1. ✖ Burgers' equation
2. ✔ Hall – Petch equation
3. ✖ Boltzmann equation
4. ✖ Braags' equation

Question Number : 11 Question Id : 8318967451 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A method used to produce high quality semiconductor grade material?

Options :

1. ✔ Floating zone refining
2. ✖ Laser ablation
3. ✖ Vacuum arc melting

Vacuum induction melting

4. ✖

Question Number : 12 Question Id : 8318967452 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Laminar flow is characterized by:

Options :

High Reynolds number

1. ✖

Random particle motion

2. ✖

Smooth, orderly layers

3. ✔

Sudden pressure drops

4. ✖

Question Number : 13 Question Id : 8318967453 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Differential scanning calorimetry is used for the determination of?

Options :

1. ✖ Surface topography
2. ✖ Co-efficient of thermal expansion
3. ✔ Phase transformations
4. ✖ Grain boundary chemical analysis

Question Number : 14 Question Id : 8318967454 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In Joule's experiment, heat is converted into:

Options :

1. ✖ Light
2. ✖ Work
3. ✖ Entropy

Internal energy

4. ✓

Question Number : 15 Question Id : 8318967455 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Inert gas used in Brunauer – Emmet – Teller (BET) surface area analysis for measuring low surface area values is:

Options :

1. ✗ N₂

2. ✗ Ar

3. ✓ Kr

4. ✗ Xe

Question Number : 16 Question Id : 8318967456 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

An Ellingham diagram is used to:

Options :

1. ✖ Calculate melting points
2. ✖ Determine gas fugacity
3. ✔ Predict reduction feasibility of metal oxides
4. ✖ Evaluate activity coefficients

Question Number : 17 Question Id : 8318967457 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In the case of nanostructures, the ratio of number of atoms on the surface to the number of atoms in the interior is _____

Options :

1. ✖ exactly zero because the total tends to infinity

may be of the order of unity

2. ✓

always 0.5

3. ✗

tends to infinity because the surface energy tends to infinity

4. ✗

Question Number : 18 Question Id : 8318967458 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A quantum dot emits light at 600 nm. If the particle size is reduced,
the emitted wavelength will:

Options :

Increase

1. ✗

Decrease

2. ✓

Remain same

3. ✗

First increase, then decrease

4. ✖

Question Number : 19 Question Id : 8318967459 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The primary mode of heat transfer in solids is:

Options :

1. ✔ Conduction

2. ✖ Convection

3. ✖ Radiation

4. ✖ All modes equally

Question Number : 20 Question Id : 8318967460 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

How many number of Bravais lattices are there in the monoclinic crystal system?

Options :

- 1. ✖ 4
- 2. ✖ 3
- 3. ✖ 1
- 4. ✔ 2

Question Number : 21 Question Id : 8318967461 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Displacement thickness in boundary layer theory represents:

Options :

- 1. ✖ Thickness of wall

2. ✖ Distance where velocity is zero
3. ✔ Shift in outer inviscid flow due to boundary layer
4. ✖ Distance of maximum shear

Question Number : 22 Question Id : 8318967462 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The Navier-Stokes equation is based on:

Options :

1. ✖ Conservation of mass only
2. ✔ Newton's second law for fluids
3. ✖ Bernoulli's principle
4. ✖ Pascal's law

Question Number : 23 Question Id : 8318967463 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

For the emission of characteristic X-rays from the K-shell of an element, the incident energy should be?

Options :

1. ✖ Less than the corresponding ionization potential
2. ✔ Greater than the corresponding ionization potential
3. ✖ Greater than the bond energy
4. ✖ Less than the bond energy

Question Number : 24 Question Id : 8318967464 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A material shows the following stress strain data: Stress = 400 MPa at strain = 0.002. Find modulus of elasticity.

Options :

200 GPa

1. ✓

100 GPa

2. ✗

300 GPa

3. ✗

250 GPa

4. ✗

Question Number : 25 Question Id : 8318967465 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Surface area per gram of the adsorbent is called?

Options :

Molar surface area

1. ✗

Normal surface area

2. ✗

3. ✓ Specific surface area

4. ✗ Equivalent surface area

Question Number : 26 Question Id : 8318967466 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Reynolds stresses arise due to:

Options :

1. ✗ Laminar sublayer

2. ✗ Density variation

3. ✗ Mean flow gradients

4. ✓ Turbulent fluctuations

Question Number : 27 Question Id : 8318967467 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Optical fibers rely primarily on:

Options :

1. ✖ Electron tunneling
2. ✖ Magnetic hysteresis
3. ✔ Total internal reflection
4. ✖ Photoluminescence

Question Number : 28 Question Id : 8318967468 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Electron backscattered diffraction is a technique based on?

Options :

1. ✖ Optical microscopy
2. ✔ Scanning electron microscopy

Atomic force microscopy

3. ✖

X-ray diffraction

4. ✖

Question Number : 29 Question Id : 8318967469 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A polymer shows a glass transition temperature (T_g) of 100°C . If modified with nanofillers, T_g increases by 15%. What is the new T_g ?

Options :

1. ✖ 110°C

2. ✔ 115°C

3. ✖ 120°C

4. ✖ 130°C

Question Number : 30 Question Id : 8318967470 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Thermodynamically stable defects are?

Options :

1. ✓ Point defects
2. ✗ Line defects
3. ✗ Surface defects
4. ✗ Volume defects

Question Number : 31 Question Id : 8318967471 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Enthalpy and temperature are?

Options :

1. ✗ Both extensive properties

2. ✖ Both intensive properties
3. ✔ Extensive and intensive properties, respectively
4. ✖ Intensive and extensive properties, respectively

Question Number : 32 Question Id : 8318967472 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In laminar boundary layer flow over a flat plate, wall shear stress:

Options :

1. ✖ Constant
2. ✔ Decreases with distance
3. ✖ Increases with distance
4. ✖ Zero

Question Number : 33 Question Id : 8318967473 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The third law of thermodynamic states that in the limit $T \rightarrow 0$?

Options :

1. ✖ $U = 0$

2. ✔ $S = 0$

3. ✖ $H = 0$

4. ✖ $G = 0$

Question Number : 34 Question Id : 8318967474 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Turbulent flow is generally observed when Reynolds number is:

Options :

1. ✖ < 2000

2. ✓ > 4000

3. ✗ < 500

4. ✗ Between 500–1000

Question Number : 35 Question Id : 8318967475 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The product of electron and hole concentration in an extrinsic semiconductor is?

Options :

1. ✗ Infinity

2. ✗ Dependent of impurity concentration

3. ✓ Independent of impurity concentration

4. ✖ Zero

Question Number : 36 Question Id : 8318967476 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The susceptibility of a diamagnetic material is essentially independent of temperature.

Options :

1. ✖ At very high temperatures

2. ✔ As long as the electronic structure is independent of temperature

3. ✖ At very low temperature of the order 10 K

4. ✖ Under all circumstances

Question Number : 37 Question Id : 8318967477 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A flat plate is placed in an air stream at 20 °C. The free stream velocity is 2 m/s. If the kinematic viscosity of air is $1.5 \times 10^{-5} \text{ m}^2/\text{s}$, what is the Reynolds number at a distance of 1 m from the leading edge?

Options :

1. ✓ 1.33×10^5

2. ✗ 1.00×10^5

3. ✗ 2.00×10^5

4. ✗ 2.67×10^5

Question Number : 38 Question Id : 8318967478 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

An elemental superconductor is a perfect?

Options :

1. ✖ Ferromagnetic

2. ✔ Diamagnetic

3. ✖ Paramagnetic

4. ✖ Dielectric

Question Number : 39 Question Id : 8318967479 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Maximum shear stress in a circular shaft under torque is at:

Options :

1. ✖ Center

2. ✔ Surface

3. ✖ At radius/2

At neutral axis

4. ✖

Question Number : 40 Question Id : 8318967480 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

High elastic modulus in material arises from?

Options :

1. ✔ High strength of bonds

2. ✖ Combination of bonds

3. ✖ Weak bonds

4. ✖ No bond

Question Number : 41 Question Id : 8318967481 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Nusselt number is a function of:

Options :

1. ✖ Heat capacity
2. ✖ Conductivity only
3. ✔ Grashof and Prandtl numbers
4. ✖ Reynolds number only

Question Number : 42 Question Id : 8318967482 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In bending, the stress is maximum at:

Options :

1. ✖ Neutral axis
2. ✔ Outer fibers
3. ✖ Midpoint

At centroid

4. ✖

Question Number : 43 Question Id : 8318967483 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A Salt Bath Furnace provides heat transfer primarily by:

Options :

Conduction

1. ✖

Radiation

2. ✖

Immersion (convection + conduction)

3. ✔

Direct flame contact

4. ✖

Question Number : 44 Question Id : 8318967484 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In plane Couette flow, the flow is generated by:

Options :

1. ✖ Pressure gradient
2. ✖ Gravity
3. ✔ Relative motion between two plates
4. ✖ Viscous heating

Question Number : 45 Question Id : 8318967485 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The ceramic that can be used as a cutting tool?

Options :

1. ✖ Magnesita
2. ✖ Titania
3. ✔ Alumina

4. ✖ Yittria

Question Number : 46 Question Id : 8318967486 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which of the following is a dimensionless number related to heat conduction?

Options :

1. ✔ Fourier Number

2. ✖ Nusselt Number

3. ✖ Prandtl Number

4. ✖ Stanton Number

Question Number : 47 Question Id : 8318967487 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The efficiency of a furnace is generally defined as:

Options :

1. ✖ Energy lost / energy input
2. ✖ Energy input / energy loss
3. ✔ Useful heat / heat supplied
4. ✖ Mass of fuel / heat output

Question Number : 48 Question Id : 8318967488 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In materials characterization, electron microscopy uses which property
of electron?

Options :

1. ✖ Negative charge

2. ✖ Spin nature
3. ✔ Wave nature
4. ✖ Zero

Question Number : 49 Question Id : 8318967489 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A particle moves along a straight line with uniformly increasing acceleration. In the first 2 seconds, it covers 10 meters, and in the next 2 seconds it covers 30 meters. Which of the following statements is correct?

Options :

1. ✖ The particle has a constant velocity.
2. ✖ The particle's acceleration is increasing linearly with time.

3. ✖ The particle has a constant non-zero acceleration, and the initial velocity is non-zero.

4. ✔ The particle starts from rest and has constant acceleration.

Question Number : 50 Question Id : 8318967490 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The slope of the stress-strain curve in the elastic deformation region is

Options :

1. ✔ Elastic modulus

2. ✖ Plastic modulus

3. ✖ Poisson's ratio

4. ✖ Bulk modulus

Question Number : 51 Question Id : 8318967491 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Boltzmann's equation is:

Options :

$$S = kT \ln P$$

1. ✖

$$S = k \ln W$$

2. ✔

$$S = PV / T$$

3. ✖

$$S = Q / T$$

4. ✖

Question Number : 52 Question Id : 8318967492 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Requirement of cross-slip movement of distortion?

Options :

Preferred slip plane

1. ✖

Preferred slip direction

2. ✖

No preferred slip plane

3. ✔

No preferred slip direction

4. ✖

Question Number : 53 Question Id : 8318967493 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Recuperators are more suitable than regenerators when:

Options :

Fuel is solid

1. ✖

Operation is continuous

2. ✔

Fuel cost is negligible

3. ✖

Space is not an issue

4. ✖

Question Number : 54 Question Id : 8318967494 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The first law of thermodynamics is conservation of?

Options :

1. ✖ Momentum
2. ✔ Energy
3. ✖ Pressure
4. ✖ Velocity

Question Number : 55 Question Id : 8318967495 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The role of a reducing agent in metallic nanomaterials synthesis is to?

Options :

1. ✖ Act as a solvent for the reaction

2. ✓ Donate electrons to the metal ions
3. ✗ Accept electrons from the metal ions
4. ✗ Increase the temperature of the reaction mixture

Question Number : 56 Question Id : 8318967496 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Carnot engine consists of?

Options :

1. ✗ Two constant volume and two reversible adiabatic process
2. ✓ Two isothermal and two reversible adiabatic process
3. ✗ Two constant pressure and two reversible adiabatic process

One constant volume, one constant pressure and two reversible
adiabatic process

4. ✖

Question Number : 57 Question Id : 8318967497 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A furnace uses preheated air at 300°C instead of ambient air at
 30°C . If fuel consumption reduces by 20%, the impact is:

Options :

Higher stack temperature

1. ✖

Lower available heat

2. ✖

Increased efficiency

3. ✔

More fuel required

4. ✖

Question Number : 58 Question Id : 8318967498 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Quantum dots are used in display technologies because they

Options :

1. ✖ Are very large in size
2. ✖ Emit fixed wavelengths regardless of size
3. ✔ Emit light with size-tunable wavelengths
4. ✖ Absorb only UV light

Question Number : 59 Question Id : 8318967499 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which of the following techniques is used to determine particle sizes
in the sub-nanometer range?

Options :

Sedimentation

1. ✖

Dynamic light scattering

2. ✔

X-ray radiography

3. ✖

Sieving

4. ✖

Question Number : 60 Question Id : 8318967500 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which of the information is true regarding scanning electron microscopy?

Options :

As working distance increases resolution increases

1. ✖

As working distance decreases resolution increases

2. ✔

3. ✖ As working distance decreases depth of field increases

4. ✖ As working distance changes depth of field remains unaltered

Question Number : 61 Question Id : 8318967501 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Fugacity is a corrected pressure that:

Options :

1. ✔ Replaces pressure in ideal gas equations

2. ✖ Applies to solids only

3. ✖ Equals actual pressure

4. ✖ Increases with ideality

Question Number : 62 Question Id : 8318967502 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The throttling process is _____ process.

Options :

Reversible

1. ✖

Irreversible

2. ✔

Closed

3. ✖

Open

4. ✖

Question Number : 63 Question Id : 8318967503 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The fraction of heat which changes into work?

Options :

Helm – Holtz frequency

1. ✖

2. ✓ Gibbs's free energy

3. ✗ H + G

4. ✗ F + G

Question Number : 64 Question Id : 8318967504 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Magnetic flux is expressed by?

Options :

1. ✗ Ampere

2. ✗ Volts

3. ✓ Weber

4. ✗ Weber/m²

Question Number : 65 Question Id : 8318967505 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which of the following technique is used to measure the chemical composition of the nanomaterials?

Options :

1. ✖ Raman spectroscopy
2. ✖ X-ray diffraction
3. ✔ Energy Dispersive Spectroscopy
4. ✖ UV – VIS spectroscopy

Question Number : 66 Question Id : 8318967506 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In simple harmonic motion, the velocity is zero when:

Options :

1. ✖ Displacement is zero
2. ✖ Only displacement is maximum
3. ✖ Only acceleration is maximum
4. ✔ Both displacement and acceleration is maximum

Question Number : 67 Question Id : 8318967507 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Miller indices for a plane cutting $x = a$, $y = \infty$, $z = c$ is:

Options :

1. ✔ $(1\ 0\ 1)$
2. ✖ $(1\ 0\ 0)$

3. ✖ (1 1 1)

4. ✖ (0 1 1)

Question Number : 68 Question Id : 8318967508 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

For a certain gas, $C_p = 29 \text{ J/mol}\cdot\text{K}$ and $C_v = 21 \text{ J/mol}\cdot\text{K}$. What is the gas constant R ?

Options :

1. ✔ 8 J/mol·K

2. ✖ 6 J/mol·K

3. ✖ 10 J/mol·K

4. ✖ 12 J/mol·K

Question Number : 69 Question Id : 8318967509 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The total area under stress – strain curve represents?

Options :

1. ✖ Malleability

2. ✔ Toughness

3. ✖ Resilience

4. ✖ Fracture strength

Question Number : 70 Question Id : 8318967510 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The free energy of a nano-sized system compared to its bulk counterpart?

Options :

1. ✖ Is no longer intensive

2. ✖ Continues to be intensive
3. ✔ Is no longer extensive
4. ✖ Continuous to be extensive

Question Number : 71 Question Id : 8318967511 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Total internal reflection in optical fibers occurs when:

Options :

1. ✖ Light goes from low to high refractive index
2. ✖ Angle of incidence < critical angle
3. ✖ Light is absorbed by the cladding
4. ✔ Angle of incidence > critical angle and $n_1 > n_2$

Question Number : 72 Question Id : 8318967512 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Burgers vector is used to describe:

Options :

1. ✖ Twinning
2. ✔ Dislocation
3. ✖ Plastic flow
4. ✖ Vacancy migration

Question Number : 73 Question Id : 8318967513 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

One of the optical properties of nanomaterials that changes with size
is:

Options :

1. ✖ Luster
2. ✔ Absorption spectrum
3. ✖ Transparency
4. ✖ Density

Question Number : 74 Question Id : 8318967514 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Vant Hoff's isotherm is used to relate:

Options :

1. ✖ Enthalpy and entropy
2. ✖ Heat of reaction and pressure
3. ✔ Equilibrium constant and temperature

Fugacity and activity

4. ✖

Question Number : 75 Question Id : 8318967515 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Carbon nanotubes are the typical example of?

Options :

1. ✖ Zero-dimensional materials

2. ✖ Two-dimensional materials

3. ✖ Three-dimensional materials

4. ✔ One-dimensional materials

Question Number : 76 Question Id : 8318967516 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

For an ideal gas, enthalpy is a function of:

Options :

1. ✖ Pressure
2. ✔ Temperature only
3. ✖ Volume
4. ✖ Entropy

Question Number : 77 Question Id : 8318967517 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The critical resolved shear stress (CRSS) determines:

Options :

1. ✔ When slip initiates
2. ✖ Dislocation density
3. ✖ Fracture toughness

Twinning behavior

4. ✖

Question Number : 78 Question Id : 8318967518 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which of the following property makes carbon nanotubes an excellent material for nanoelectronics?

Options :

1. ✖ High aspect ratio

2. ✖ High melting point

3. ✖ High specific heat capacity

4. ✔ Ballistic electron transport

Question Number : 79 Question Id : 8318967519 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which is not a feature of cold working?

Options :

1. ✖ Increase in dislocation density
2. ✖ Grain refinement
3. ✔ High ductility
4. ✖ Strain hardening

Question Number : 80 Question Id : 8318967520 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

X-rays are?

Options :

1. ✖ Stream of electrons
2. ✖ Stream of positively charged particles

3. ✓ Electromagnetic radiations of high frequency

4. ✗ Stream of uncharged particles

Question Number : 81 Question Id : 8318967521 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

When temperature increases, the energy bandgap of a semiconductor?

Options :

1. ✓ Decreases

2. ✗ Does not change

3. ✗ Increases

4. ✗ Almost zero

Question Number : 82 Question Id : 8318967522 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Hall–Petch equation relates yield strength (σ_y) to:

Options :

1. ✖ Strain rate
2. ✔ Grain size
3. ✖ Stacking fault energy
4. ✖ Poisson's ratio

Question Number : 83 Question Id : 8318967523 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which of the following polymers are widely used in organic light emitting diodes (OLEDs)?

Options :

1. ✖ Polypropylene

2. ✓ Electroluminescent polymers

3. ✗ Polyaniline

4. ✗ Kevlar

Question Number : 84 Question Id : 8318967524 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The Gibbs-Helmholtz equation relates:

Options :

1. ✗ Enthalpy and entropy

2. ✓ Gibbs free energy and enthalpy

3. ✗ Internal energy and volume

4. ✗ Work and entropy

Question Number : 85 Question Id : 8318967525 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In an impurity semiconductor, donor impurity atoms?

Options :

1. ✖ Add holes to the valence band
2. ✖ Remove electrons from the valence band
3. ✔ Add electrons to the conduction band
4. ✖ Add electrons to the valence band

Question Number : 86 Question Id : 8318967526 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In the sol – gel process, the transition from sol to gel is mainly due to?

Options :

1. ✖ High temperature annealing

2. ✓ Hydrolysis and poly-condensation reactions

3. ✗ Application of external magnetic field

4. ✗ Application of an electric field

Question Number : 87 Question Id : 8318967527 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which material typically shows no yield point in its stress-strain diagram?

Options :

1. ✗ Mild steel

2. ✓ Cast iron

3. ✗ Annealed copper

High carbon steel

4. ✖

Question Number : 88 Question Id : 8318967528 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

When hydrogen peroxide is added to an acidified solution of KI, iodine (I_2) is liberated. In this case, hydrogen peroxide acts as?

Options :

1. ✖ A weak acid

2. ✖ A strong acid

3. ✔ Oxidizing agent

4. ✖ Reducing agent

Question Number : 89 Question Id : 8318967529 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The laws of thermodynamic apply only to

Options :

1. ✓ Matter in bulk
2. ✗ Individual atom
3. ✗ Individual molecule
4. ✗ Individual proton

Question Number : 90 Question Id : 8318967530 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A furnace uses 1000 kJ of fuel energy.

Useful heat output = 700 kJ.

What is the furnace efficiency?

Options :

1. ✗ 50%

2. ✓ 70%

3. ✗ 80%

4. ✗ 30%

Question Number : 91 Question Id : 8318967531 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The ΔH for a reaction is independent of?

Options :

1. ✓ The path followed
2. ✗ ΔV
3. ✗ The initial and final states
4. ✗ T

Question Number : 92 Question Id : 8318967532 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A metal specimen elongates 0.2 mm under a tensile load. Original gauge length = 50 mm. Find engineering strain.

Options :

1. ✓ 0.004

2. ✖ 0.02

3. ✖ 0.002

4. ✖ 0.04

Question Number : 93 Question Id : 8318967533 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which is a bottom-up approach in nanotechnology?

Options :

1. ✖ Ball milling

2. ✖ Lithography

3. ✔ Chemical vapour deposition

4. ✖ Cutting bulk materials

Question Number : 94 Question Id : 8318967534 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A cantilever beam carrying a point load at free end, BM at fixed end
is:

Options :

1. ✖ Zero

2. ✔ PL

3. ✖ $PL/2$

4. ✖ Maximum at mid-span

Question Number : 95 Question Id : 8318967535 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which of the following material deposition techniques involves plasma for the deposition of the material?

Options :

1. ✖ Co-precipitation
2. ✖ Thermal evaporation
3. ✔ Sputtering
4. ✖ Sol – gel

Question Number : 96 Question Id : 8318967536 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A stacking fault is an example of:

Options :

1. ✖ Volume defect

- 2. ✖ Line defect
- 3. ✖ Point defect
- 4. ✔ Planar defect

Question Number : 97 Question Id : 8318967537 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In a nanomaterial, quantum confinement occurs when the particle size becomes comparable to the?

Options :

- 1. ✖ Thermal wavelength of electrons
- 2. ✖ Gravitational wavelength of electrons
- 3. ✔ De Broglie wavelength of electrons

Electron magnetic moment

4. ✖

Question Number : 98 Question Id : 8318967538 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

During a constant pressure process, the heat added equals:

Options :

1. ✖ Change in internal energy

2. ✖ Work done

3. ✔ Change in enthalpy

4. ✖ Zero

Question Number : 99 Question Id : 8318967539 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The Carnot cycle is:

Options :

1. ✓ Reversible and ideal

2. ✗ Irreversible

3. ✗ Isobaric

4. ✗ Isochoric

Question Number : 100 Question Id : 8318967540 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which of the following is the correct relationship between fugacity (f) and chemical potential (μ)?

Options :

1. ✓ $\mu = \mu_0 + RT \ln(f)$

2. ✗ $f = \mu_0 + RT \ln(\mu)$

3. ✖ $\mu_0 = f + RT \ln(\mu)$

4. ✖ $f = \mu + RT \ln(\mu_0)$

Question Number : 101 Question Id : 8318967541 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Adiabatic flame temperature is highest when:

Options :

1. ✖ Air-fuel ratio is lean

2. ✔ Combustion is complete and adiabatic

3. ✖ Heat loss occurs

4. ✖ Fuel is incomplete

Question Number : 102 Question Id : 8318967542 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The Zeroth Law of Thermodynamics is used to define:

Options :

- 1. ✖ Entropy
- 2. ✖ Enthalpy
- 3. ✔ Temperature
- 4. ✖ Internal energy

Question Number : 103 Question Id : 8318967543 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Glass transition temperature (T_g) in polymers marks:

Options :

- 1. ✖ Melting point

Onset of cross-linking

2. ✖

Transition from brittle to rubbery state

3. ✔

Start of crystallization

4. ✖

Question Number : 104 Question Id : 8318967544 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

According to free electron theory, electrical conductivity increases
with:

Options :

Increasing temperature

1. ✖

Decreasing temperature

2. ✔

Increasing atomic number

3. ✖

Decreasing electron mobility

4. ✖

Question Number : 105 Question Id : 8318967545 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A quantum dot is a nanomaterial of dimension?

Options :

1. ✖ One

2. ✖ Four

3. ✖ Two

4. ✔ Zero

Question Number : 106 Question Id : 8318967546 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A ductile material exhibits:

Options :

1. ✖ Brittle fracture without warning
2. ✔ Large plastic deformation before breaking
3. ✖ High thermal conductivity
4. ✖ High hardness

Question Number : 107 Question Id : 8318967547 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The work done during isothermal expansion of an ideal gas is:

Options :

1. ✖ Zero
2. ✖ $P\Delta V$
3. ✔ $nRT \ln(V_2/V_1)$

4. ✖ $nC_v\Delta T$

Question Number : 108 Question Id : 8318967548 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

What is the primary reason for the unique properties of nanomaterials?

Options :

1. ✖ High density

2. ✖ Large grain size

3. ✔ High surface area to volume ratio

4. ✖ High porosity

Question Number : 109 Question Id : 8318967549 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In semiconductors, light is emitted when:

Options :

1. ✖ Holes move from valence to conduction band
2. ✔ Electrons recombine with holes
3. ✖ Photons collide with atoms
4. ✖ Energy band gap increases

Question Number : 110 Question Id : 8318967550 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The monomer of poly vinyl chloride (PVC) is?

Options :

1. ✖ Ethylene dichloride
2. ✖ Ethylene chloride
3. ✖ Chloroform

4. ✓ Chloro ethene

Question Number : 111 Question Id : 8318967551 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

If A is a 3×3 matrix with eigenvalues 1, 2 and 3, what is the trace of $A^2 - 3A + I$?

Options :

1. ✗ -2

2. ✗ 1

3. ✗ 2

4. ✓ -1

Question Number : 112 Question Id : 8318967552 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Consider the system of equations:

$$x + 2y - z = 3$$

$$2x + 4y - 2z = 7$$

$$3x + 6y - 3z = 9$$

Which of the following statements is true about the system?

Options :

The system has a unique solution.

1. ✖

The system has infinitely many solutions

2. ✖

The system has no solution

3. ✔

The system has finitely many solutions but not unique.

4. ✖

Question Number : 113 Question Id : 8318967553 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

A direction in which the function $f(x) = 2x + y$ remain constant at the point (1,1) is _____

Options :

$$\frac{\hat{i}}{\sqrt{5}} - \frac{2\hat{j}}{\sqrt{5}}$$

1. ✓

$$-\frac{2\hat{i}}{\sqrt{5}} + \frac{\hat{j}}{\sqrt{5}}$$

2. ✗

$$-\frac{\hat{i}}{\sqrt{5}} - \frac{\hat{j}}{\sqrt{5}}$$

3. ✗

$$\frac{\hat{i}}{\sqrt{5}} + \frac{2\hat{j}}{\sqrt{5}}$$

4. ✗

Question Number : 114 Question Id : 8318967554 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The surface integral $\int_S x^2 dS$ over the upper hemisphere

$z = \sqrt{1 - x^2 - y^2}$ with radius 1 is _____

Options :

1. ✓ $\frac{\pi}{4}$

2. ✗ $\frac{\pi}{3}$

3. ✗ π

4. ✗ 2π

Question Number : 115 Question Id : 8318967555 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The set of all critical points of the function $f(x) = |x^2 - 1|$ on $[-2, 2]$ is _____

Options :

1. ✗ $\{-1, 1\}$

2. ✓ $\{-1, 0, 1\}$

3. ✖ $\{1, 0\}$

4. ✖ $\{0\}$

Question Number : 116 Question Id : 8318967556 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Suppose $\sum_{n=1}^{\infty} a_n(x-2)^n$ is convergent at $x = -5$, then it need not be convergent on which interval?

Options :

1. ✖ $|x-2| \leq 5$

2. ✖ $|x-2| < 5$

3. ✔ $|x-2| \leq 7$

4. ✖ $|x-2| < 7$

Question Number : 117 Question Id : 8318967557 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

The general solution of the ordinary differential equation

$$\frac{dy}{dx} = \log\left(x \frac{dy}{dx} - y\right) \text{ is}$$

Options :

1. ✖ $y = cx + e^c$, where c is an arbitrary constant
2. ✖ $y = cx^2 + e^c$, where c is an arbitrary constant
3. ✔ $y = cx - e^c$, where c is an arbitrary constant
4. ✖ $y = cx^2 - e^c$, where c is an arbitrary constant

Question Number : 118 Question Id : 8318967558 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

If X is a normal distribution with mean μ and variation σ^2 , then the standard deviation and the mean of $Z = \frac{X-\mu}{2\sigma}$ are _____ , _____ respectively.

Options :

1. ✖ σ, μ

2. ✖ $1, 0$

3. ✖ $0, \frac{1}{2}$

4. ✔ $\frac{1}{2}, 0$

Question Number : 119 Question Id : 8318967559 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

In a binomial distribution $B(n = 10, p)$ the probability of getting exactly 4 successes equals the probability of getting exactly 6 successes. What is the mean of the distribution?

Options :

1. ✖ 0.5

2. ✖ 3.5

3. ✖ 2.5

4. ✔ 5

Question Number : 120 Question Id : 8318967560 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Given $x_0 \neq 0$, the iteration $x_{n+1} = \frac{1}{2} \left(-\frac{9}{x_n} + x_n \right), n \geq 0$ is a

Options :

Newton's method for $f(x) = -9 + x^2$

1. ✖

Fixed point iteration for $f(x) = \frac{9+x^2}{2x}$

2. ✖

Newton's method for $f(x) = 9 + x^2$

3. ✔

Fixed point iteration for $f(x) = 9 + x^2$

4. ✖