

Telangana State Council Higher Education

Notations :

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

Question Paper Name :	Nanotechnology 31st May 2026 Shift 2
Subject Name :	Nanotechnology
Creation Date :	2026-05-31 16:25:07
Duration :	120
Total Marks :	120
Display Marks:	Yes
Share Answer Key With Delivery Engine :	Yes
Actual Answer Key :	Yes
Change Font Color :	No
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Show Reports :	No
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Nanotechnology

Group Number :	1
Group Id :	10513126
Group Maximum Duration :	0
Group Minimum Duration :	120
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	120

Nanotechnology

Section Id :	10513164
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 :	10513164
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 1051313481 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The Hall–Petch relation correlates yield stress with

Options :

1. ✖ Temperature
2. ✖ Strain rate
3. ✔ Grain size
4. ✖ Dislocation density

Question Number : 2 Question Id : 1051313482 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Cast iron typically shows

Options :

1. ✖ High ductility
2. ✖ Yield point
3. ✔ Brittle fracture
4. ✖ Large plastic deformation

Question Number : 3 Question Id : 1051313483 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The Clausius–Mossotti equation relates

Options :

1. ✖ Polarization and temperature
2. ✔ Dielectric constant and polarizability
3. ✖ Conductivity and permittivity
4. ✖ Stress and strain

Question Number : 4 Question Id : 1051313484 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Stacking faults are commonly observed in

Options :

1. ✖ BCC metals
2. ✔ FCC metals
3. ✖ Ionic crystals
4. ✖ Polymers

Question Number : 5 Question Id : 1051313485 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Burgers vector represents

Options :

1. ✖ Slip plane
2. ✔ Magnitude and direction of lattice distortion
3. ✖ Dislocation density

4. ✖ Atomic spacing

Question Number : 6 Question Id : 1051313486 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The smallest repeating unit of a crystal lattice is called

Options :

1. ✔ Unit cell
2. ✖ Primitive cell
3. ✖ Wigner–Seitz cell
4. ✖ Crystal system

Question Number : 7 Question Id : 1051313487 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Type-II superconductors are characterized by

Options :

1. ✖ Single critical field
2. ✖ No mixed state
3. ✔ Two critical magnetic fields
4. ✖ Complete flux expulsion

Question Number : 8 Question Id : 1051313488 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A semiconductor laser operates mainly on the principle of

Options :

1. ✖ Spontaneous emission
2. ✔ Stimulated emission
3. ✖ Black body radiation
4. ✖ Photoelectric effect

Question Number : 9 Question Id : 1051313489 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Which of the following is a Bravais lattice?

Options :

1. ✖ Cubic
2. ✖ Tetragonal
3. ✔ Face-centered cubic
4. ✖ Hexagonal

Question Number : 10 Question Id : 1051313490 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The crystal structure of aluminum at room temperature is

Options :

1. ✖ BCC
2. ✔ FCC
3. ✖ HCP
4. ✖ Diamond cubic

Question Number : 11 Question Id : 1051313491 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A vacancy is classified as a

Options :

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

Question Number : 12 Question Id : 1051313492 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The number of crystal systems in three dimensions is

Options :

1. ✗ 5
2. ✓ 7
3. ✗ 10
4. ✗ 14

Question Number : 13 Question Id : 1051313493 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Dislocation climb occurs due to

Options :

1. ✗ Shear stress
2. ✓ Vacancy diffusion
3. ✗ Applied magnetic field

4. ✖ Grain boundary motion

Question Number : 14 Question Id : 1051313494 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The number of atoms per unit cell in FCC structure is

Options :

1. ✖ 8

2. ✖ 6

3. ✔ 4

4. ✖ 2

Question Number : 15 Question Id : 1051313495 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Cross-slip is possible only for

Options :

1. ✖ Edge dislocations

2. ✖ Grain boundaries

3. ✖ Mixed dislocations

4. ✔ Screw dislocations

Question Number : 16 Question Id : 1051313496 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Hot working differs from cold working because it

Options :

1. ✖ Increases strain hardening

2. ✓ Promotes recrystallization
3. ✗ Reduces ductility
4. ✗ Increases dislocation density

Question Number : 17 Question Id : 1051313497 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Proof stress is used when

Options :

1. ✗ Clear yield point exists
2. ✗ Material fractures elastically
3. ✓ Yield point is not well defined
4. ✗ Material is brittle

Question Number : 18 Question Id : 1051313498 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Aluminum alloy stress–strain curve shows

Options :

1. ✗ Sharp yield point
2. ✗ Large elastic region only
3. ✗ Brittle fracture
4. ✓ Smooth yielding

Question Number : 19 Question Id : 1051313499 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Quantum well lasers achieve lower threshold current because of

Options :

1. ✖ Larger active volume
2. ✔ Carrier confinement
3. ✖ Higher losses
4. ✖ Lower gain

Question Number : 20 Question Id : 1051313500 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The active medium in a semiconductor laser is

Options :

1. ✖ Insulator
2. ✖ Metal
3. ✔ p-n junction
4. ✖ Dielectric

Question Number : 21 Question Id : 1051313501 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Composites are designed primarily to

Options :

1. ✔ Combine desirable properties
2. ✖ Reduce cost
3. ✖ Improve conductivity only

4. ✖ Replace metals

Question Number : 22 Question Id : 1051313502 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Grain refinement improves strength mainly by

Options :

1. ✖ Increasing slip length
2. ✖ Increasing dislocation mobility
3. ✔ Hindering dislocation motion
4. ✖ Reducing elastic modulus

Question Number : 23 Question Id : 1051313503 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Which mechanism involves the movement of atoms to form a mirror image of the crystal structure across a plane?

Options :

1. ✖ Slip
2. ✖ Climbing
3. ✖ Creep
4. ✔ Twinning

Question Number : 24 Question Id : 1051313504 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Which material typically exhibits a distinct upper and lower yield point in its stress-strain curve?

Options :

1. ✖ Pure Aluminum
2. ✔ Mild Steel
3. ✖ Copper
4. ✖ Grey Cast Iron

Question Number : 25 Question Id : 1051313505 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

During the recovery stage of annealing, which property changes the most significantly?

Options :

1. ✖ Grain size
2. ✖ Mechanical hardness
3. ✔ Electrical conductivity
4. ✖ Macroscopic shape

Question Number : 26 Question Id : 1051313506 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

In which structure the Copper and Aluminum crystallize?

Options :

1. ✖ BCC
2. ✔ FCC
3. ✖ HCP
4. ✖ Simple Cubic

Question Number : 27 Question Id : 1051313507 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The area under the engineering stress-strain curve up to the point of fracture represents

Options :

1. ✘ Resilience
2. ✘ Elastic Modulus
3. ✘ Hardness
4. ✔ Toughness

Question Number : 28 Question Id : 1051313508 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Which of the following is not a mechanism of polymerization?

Options :

1. ✘ Addition
2. ✘ Condensation
3. ✔ Sintering
4. ✘ Ring-opening

Question Number : 29 Question Id : 1051313509 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

In a fiber-reinforced composite, the primary role of the matrix is to

Options :

1. ✘ Carry the major load
2. ✔ Transfer stress to the fibers and protect them
3. ✘ Increase the density

4. ✖ Decrease the thermal conductivity

Question Number : 30 Question Id : 1051313510 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Electrical conductivity in metals primarily depends on

Options :

1. ✔ Number of free electrons

2. ✖ Atomic mass

3. ✖ Grain size

4. ✖ Lattice defects

Question Number : 31 Question Id : 1051313511 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Free electron theory treats conduction of electrons in metals as

Options :

1. ✔ Classical gas of electrons

2. ✖ Bound electrons

3. ✖ Ions

4. ✖ Magnetic dipoles

Question Number : 32 Question Id : 1051313512 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The point on the stress-strain curve beyond which the material will not return to its original shape when the load is removed is called the

Options :

1. ✖ Proportional Limit
2. ✖ Fracture Point
3. ✖ Ultimate Tensile Strength
4. ✔ Elastic Limit

Question Number : 33 Question Id : 1051313513 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The band gap of an intrinsic semiconductor increases with

Options :

1. ✖ Temperature
2. ✔ Pressure
3. ✖ Doping
4. ✖ Time

Question Number : 34 Question Id : 1051313514 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Diamagnetic materials have

Options :

1. ✖ Permanent magnetic moments
2. ✔ Magnetic susceptibility < 0
3. ✖ Magnetic susceptibility > 0
4. ✖ Hysteresis

Question Number : 35 Question Id : 1051313515 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The refractive index of a material is defined as

Options :

1. ✓ Ratio of velocity of light in vacuum to velocity in material
2. ✗ Ratio of permittivity to permeability
3. ✗ Absorption coefficient of light
4. ✗ Polarization per unit field

Question Number : 36 Question Id : 1051313516 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A metal has one free electron per atom, density $\rho = 0.97 \text{ g/cm}^3$ and molar mass $M = 39 \text{ g/mol}$. Calculate the Fermi energy E_F of the metal.

Options :

1. ✗ 4.5 eV
2. ✗ 7.0 eV
3. ✗ 5.5 eV
4. ✓ 1.78 eV

Question Number : 37 Question Id : 1051313517 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A metal has free electron density $n = 8.5 \times 10^{28} \text{ m}^{-3}$ and relaxation time $\tau = 2.5 \times 10^{-14} \text{ s}$.

Calculate its electrical conductivity (σ)?

Options :

1. ✓ $3.4 \times 10^7 \text{ S/m}$

- 2. ✖ $2.0 \times 10^7 \text{ S/m}$
- 3. ✖ $1.0 \times 10^7 \text{ S/m}$
- 4. ✖ $5.0 \times 10^7 \text{ S/m}$

Question Number : 38 Question Id : 1051313518 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Which of the following best describes the general properties of Ceramics?

Options :

- 1. ✖ Soft and flexible
- 2. ✔ Brittle and insulating
- 3. ✖ Metallic and conductive
- 4. ✖ Ductile and malleable

Question Number : 39 Question Id : 1051313519 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Composite materials are typically made up of

Options :

- 1. ✖ Single-phase materials
- 2. ✔ Matrix and reinforcement
- 3. ✖ Only polymers
- 4. ✖ Only metals

Question Number : 40 Question Id : 1051313520 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

In composite materials, Matrices mainly function to

Options :

1. ✓ Transfer load to reinforcement
2. ✗ Increase brittleness
3. ✗ Reduce density
4. ✗ Absorb light

Question Number : 41 Question Id : 1051313521 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Nanomaterials can be synthesized by the following approaches

Options :

1. ✗ Top-down approaches only
2. ✗ Bottom-up approaches only
3. ✓ Both Top-down and Bottom-up approaches
4. ✗ Only mechanical grinding

Question Number : 42 Question Id : 1051313522 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Dielectric constant of a material measures

Options :

1. ✗ Electrical conductivity
2. ✓ Polarizability in electric field
3. ✗ Magnetic susceptibility

4. ✖ Optical absorption

Question Number : 43 Question Id : 1051313523 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Soft magnetic materials are mainly used in

Options :

1. ✖ Permanent magnets
2. ✔ Transformers and cores
3. ✖ Optical devices
4. ✖ Ceramics

Question Number : 44 Question Id : 1051313524 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Ferrimagnetic materials are found in

Options :

1. ✔ Iron oxides like magnetite
2. ✖ Copper
3. ✖ Silicon
4. ✖ Aluminium

Question Number : 45 Question Id : 1051313525 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Top-down approach in nanotechnology involves

Options :

1. ✖ Building from atoms

2. ✖ Electron-hole recombination
3. ✖ Chemical self-assembly
4. ✔ Breaking bulk material into nano-size

Question Number : 46 Question Id : 1051313526 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

In band theory, metals have

Options :

1. ✖ Completely filled valence band and empty conduction band
2. ✔ Partially filled conduction band
3. ✖ Large band gap
4. ✖ No electrons

Question Number : 47 Question Id : 1051313527 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The critical temperature of a superconductor is the temperature at which

Options :

1. ✔ Resistance drops to zero
2. ✖ Magnetic susceptibility becomes zero
3. ✖ Dielectric constant diverges
4. ✖ Electron mobility decreases

Question Number : 48 Question Id : 1051313528 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The phenomenon where light is emitted from a material after the absorption of photons (excitation) is generally called

Options :

1. ✓ Luminescence
2. ✗ Refraction
3. ✗ Polarization
4. ✗ Dispersion

Question Number : 49 Question Id : 1051313529 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

In a composite material, the phase that is continuous and surrounds the other phase is called the

Options :

1. ✗ Reinforcement
2. ✓ Matrix
3. ✗ Fiber
4. ✗ Dispersoid

Question Number : 50 Question Id : 1051313530 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The method commonly used for fabricating continuous fiber-reinforced polymer composites, specifically for making pipes or tanks is

Options :

1. ✗ Injection Molding
2. ✓ Filament Winding

3. ✖ Sintering

4. ✖ Blow Molding

Question Number : 51 Question Id : 1051313531 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

As the size of a material reduces to the nanoscale, the surface area-to-volume ratio

Options :

1. ✔ Increases significantly

2. ✖ Decreases

3. ✖ Remains constant

4. ✖ Becomes zero

Question Number : 52 Question Id : 1051313532 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Above Curie temperature, a ferromagnetic material becomes

Options :

1. ✖ Diamagnetic

2. ✖ Superconducting

3. ✔ Paramagnetic

4. ✖ Antiferromagnetic

Question Number : 53 Question Id : 1051313533 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Which combination of mechanical properties is typically shown by Ceramics?

Options :

1. ✖ High ductility and low toughness
2. ✔ High hardness and high brittleness
3. ✖ Low hardness and high ductility
4. ✖ High tensile strength and high toughness

Question Number : 54 Question Id : 1051313534 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Concrete is a classic example of which type of composite?

Options :

1. ✖ Laminar composite
2. ✔ Particulate composite
3. ✖ Fiber-reinforced composite
4. ✖ Sandwich panel

Question Number : 55 Question Id : 1051313535 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Quantum confinement effects become significant when the size of the particle is comparable to the

Options :

1. ✖ Wavelength of visible light
2. ✔ Exciton Bohr radius
3. ✖ Mean free path of a gas molecule

4. ✖ Grain size of a metal

Question Number : 56 Question Id : 1051313536 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

An inverting amplifier has a phase shift of

Options :

- 1. ✖ 0°
- 2. ✖ 90°
- 3. ✔ 180°
- 4. ✖ 270°

Question Number : 57 Question Id : 1051313537 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

An op-amp adder sums voltages using

Options :

- 1. ✖ Voltage divider
- 2. ✖ Series connection of resistors
- 3. ✔ Inverting configuration
- 4. ✖ Differential pair

Question Number : 58 Question Id : 1051313538 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Integrator using op-amp uses

Options :

- 1. ✖ Resistor in feedback

2. ✓ Capacitor in feedback
3. ✗ Inductor in input
4. ✗ No feedback

Question Number : 59 Question Id : 1051313539 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Whenever a JFET operates above pinch-off voltage

Options :

1. ✗ Drain current starts decreasing
2. ✓ Drain current remains nearly constant
3. ✗ Depletion regions become smaller
4. ✗ Drain current increases steeply

Question Number : 60 Question Id : 1051313540 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A half-adder has

Options :

1. ✗ One input only
2. ✗ Two outputs only
3. ✓ Two inputs and two outputs
4. ✗ Three outputs

Question Number : 61 Question Id : 1051313541 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Basic function of ADC is to convert

Options :

1. ✓ Analog to Digital
2. ✗ Digital to Analog
3. ✗ Voltage to Current
4. ✗ Current to Voltage

Question Number : 62 Question Id : 1051313542 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

BJT in common-emitter configuration has

Options :

1. ✗ High input, high output
2. ✓ Low input, high output
3. ✗ High input, low output
4. ✗ Low input, low output

Question Number : 63 Question Id : 1051313543 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

DFT converts

Options :

1. ✓ Time domain to Frequency domain
2. ✗ Frequency domain to Time domain
3. ✗ Voltage to Current

4. ✖ Analog to Digital

Question Number : 64 Question Id : 1051313544 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

CMOS technology is preferred for

Options :

1. ✖ Oscillators
2. ✖ Resistors
3. ✖ High power circuits
4. ✔ Low power circuits

Question Number : 65 Question Id : 1051313545 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The characteristic of an ideal operational amplifier is

Options :

1. ✔ Infinite input impedance and zero output impedance
2. ✖ Zero input impedance and infinite output impedance
3. ✖ Infinite input impedance and infinite output impedance
4. ✖ Zero input impedance and zero output impedance

Question Number : 66 Question Id : 1051313546 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Which of the following logic gate is known as a "Universal Gate"?

Options :

1. ✖ XOR

2. ✖ AND

3. ✔ NAND

4. ✖ OR

Question Number : 67 Question Id : 1051313547 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A CMOS inverter consists of

Options :

1. ✔ A PMOS pull-up and an NMOS pull-down network

2. ✖ An NMOS pull-up and a PMOS pull-down network

3. ✖ Two NMOS transistors

4. ✖ Two PMOS transistors

Question Number : 68 Question Id : 1051313548 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

How many flip-flops are required to design a Mod-10 counter?

Options :

1. ✖ 3

2. ✔ 4

3. ✖ 10

4. ✖ 5

Question Number : 69 Question Id : 1051313549 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The process of converting a continuous-time signal into a discrete-time signal is called

Options :

1. ✖ Quantization
2. ✔ Sampling
3. ✖ Encoding
4. ✖ Aliasing

Question Number : 70 Question Id : 1051313550 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Charge Coupled Devices (CCDs) are primarily used in

Options :

1. ✖ High-power amplification
2. ✖ Digital Logic
3. ✔ Image sensing and signal processing
4. ✖ Voltage regulation

Question Number : 71 Question Id : 1051313551 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A 4-bit ripple counter uses flip-flops with a propagation delay of 50 ns each. The maximum clock frequency that can be used is

Options :

1. ✔ 5 MHz
2. ✖ 10 MHz
3. ✖ 20 MHz

4. ✖ 50 MHz

Question Number : 72 Question Id : 1051313552 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A 10-bit ADC has a reference voltage of 10.24 V. The resolution (step size) of the converter is

Options :

1. ✖ 1 mV

2. ✔ 10 mV

3. ✖ 10.24 mV

4. ✖ 100 mV

Question Number : 73 Question Id : 1051313553 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

"Latch-up" in CMOS circuits is caused by the formation of parasitic

Options :

1. ✖ Capacitors

2. ✖ Inductors

3. ✔ Thyristors (SCRs)

4. ✖ Resistors

Question Number : 74 Question Id : 1051313554 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A practical op-amp differentiator requires a small resistor in series with the input capacitor to

Options :

1. ✖ Increase gain
2. ✖ Reduce input impedance
3. ✔ Improve stability and reduce high-frequency noise sensitivity
4. ✖ Increase bandwidth

Question Number : 75 Question Id : 1051313555 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

In a MOSFET, if the source-to-body voltage $V_{SB} > 0$ (for NMOS), the threshold voltage V_T

Options :

1. ✖ Decreases
2. ✔ Increases
3. ✖ Remains constant
4. ✖ Becomes negative

Question Number : 76 Question Id : 1051313556 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

D/A converter resolution improves with

Options :

1. ✔ More bits
2. ✖ Lower voltage
3. ✖ Faster clock
4. ✖ Larger load

Question Number : 77 Question Id : 1051313557 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Digital signals for FFT are assumed

Options :

1. ✓ Periodic
2. ✗ Non-periodic
3. ✗ Random
4. ✗ DC only

Question Number : 78 Question Id : 1051313558 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

CMOS inverter output is LOW when input is

Options :

1. ✗ LOW
2. ✓ HIGH
3. ✗ Floating
4. ✗ Zero current

Question Number : 79 Question Id : 1051313559 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A counter with modulus 8 has

Options :

1. ✓ 3 flip-flops
2. ✗ 4 flip-flops

3. ✖ 2 flip-flops

4. ✖ 8 flip-flops

Question Number : 80 Question Id : 1051313560 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

MOSFET cutoff occurs when

Options :

1. ✔ $V_{GS} < V_{th}$

2. ✖ $V_{GS} > V_{th}$

3. ✖ $V_{DS} = 0$

4. ✖ $V_{GS} = V_{DS}$

Question Number : 81 Question Id : 1051313561 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The de Broglie wavelength of a particle is

Options :

1. ✔ $\frac{h}{p}$

2. ✖ $\frac{p}{h}$

3. ✖ $\frac{h^2}{p}$

4. ✖ $\sqrt{\frac{h}{p}}$

Question Number : 82 Question Id : 1051313562 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Schrödinger equation is

Options :

1. ✓ $H\psi = E\psi$

2. ✗ $F = ma$

3. ✗ $p = mv$

4. ✗ $E = mc^2$

Question Number : 83 Question Id : 1051313563 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The time-independent Schrödinger equation is fundamentally an eigenvalue equation for which operator?

Options :

1. ✗ Momentum Operator

2. ✓ Hamiltonian Operator

3. ✗ Position Operator

4. ✗ Parity Operator

Question Number : 84 Question Id : 1051313564 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The ground state energy of the Hydrogen atom is approximately

Options :

1. ✗ -1.5 eV

2. ✗ -3.4 eV

3. ✓ -13.6 eV

4. ✗ -54.4 eV

Question Number : 85 Question Id : 1051313565 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The wavefunction of a system of identical fermions must be

Options :

1. ✗ Symmetric under particle exchange

2. ✓ Antisymmetric under particle exchange

3. ✗ Symmetric for spin, antisymmetric for space

4. ✗ Unrelated to exchange symmetry

Question Number : 86 Question Id : 1051313566 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The energy levels of a quantum harmonic oscillator are

Options :

1. ✗ Degenerate

2. ✓ Equally spaced

3. ✗ Proportional to n^2

4. ✗ Continuous

Question Number : 87 Question Id : 1051313567 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Particles with integer spin are called

Options :

1. ✖ Fermions
2. ✔ Bosons
3. ✖ Leptons
4. ✖ Baryons

Question Number : 88 Question Id : 1051313568 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The second-order correction to the energy of the ground state is always

Options :

1. ✖ Zero
2. ✖ Imaginary
3. ✖ Positive
4. ✔ Negative

Question Number : 89 Question Id : 1051313569 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Harmonic oscillator potential is

Options :

1. ✔ $V = \frac{m\omega^2 x^2}{2}$
2. ✖ $V = mgh$
3. ✖ $V = kx$
4. ✖ $V = 0$

Question Number : 90 Question Id : 1051313570 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The Born's approximation is applicable for

Options :

1. ✓ High energy, low atomic number for scatterer
2. ✗ Low energy, low atomic number for scatterer
3. ✗ High energy, high atomic number for scatterer
4. ✗ Low energy, high atomic number for scatterer

Question Number : 91 Question Id : 1051313571 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The following are the centroidal coordinates of semicircular plane of 16π cm diameter and is symmetric about x-axis.

Options :

1. ✗ $\left(0, \frac{32}{3}\right)$
2. ✓ $\left(\frac{32}{3}, 0\right)$
3. ✗ $\left(0, \frac{64}{3}\right)$
4. ✗ $\left(\frac{64}{3}, 0\right)$

Question Number : 92 Question Id : 1051313572 Question Type : MCQ Option Shuffling : Yes
Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The polar moment of inertia of a circular plane of diameter about its centroid is (in cm^4)

Options :

1. ✓ 128π
2. ✗ 156π
3. ✗ 64π
4. ✗ 312π

Question Number : 93 Question Id : 1051313573 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A ball of mass 0.1 kg, initially at rest, is dropped from height of 1 m. Ball hits the ground and bounces off the ground. Upon impact with the ground, the velocity reduces by 20%. The height (in m) to which the ball will rise is

Options :

1. ✓ 0.64
2. ✗ 0.86
3. ✗ 0.34
4. ✗ 0.72

Question Number : 94 Question Id : 1051313574 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Which of the following has the highest specific heat capacity?

Options :

1. ✗ Copper
2. ✗ Iron

3. ✖ Aluminium

4. ✔ Water

Question Number : 95 Question Id : 1051313575 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A uniform cylinder of radius 10 cm and mass 20 kg is mounted so as to rotate freely about a horizontal axis that is parallel to and 5.0 cm from the central longitudinal axis of the cylinder. What is the rotational inertia of the cylinder about the axis of rotation?

Options :

1. ✔ 0.15 kgm^2

2. ✖ 0.21 kgm^2

3. ✖ 0.26 kgm^2

4. ✖ 0.17 kgm^2

Question Number : 96 Question Id : 1051313576 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

When a torque of 32.0 Nm is applied to a certain wheel, the wheel acquires an angular acceleration of 25.0 units. What is the rotational inertia of the wheel?

Options :

1. ✖ 1.25 kgm^2

2. ✔ 1.28 kgm^2

3. ✖ 2.28 kgm^2

4. ✖ 2.25 kgm^2

Question Number : 97 Question Id : 1051313577 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The minimum value of angular momentum by coupling three angular momenta 1 , $\frac{3}{2}$ and $\frac{5}{2}$ is

Options :

1. ✖ -5

2. ✖ $\frac{1}{2}$

3. ✖ 0

4. ✔ 1

Question Number : 98 Question Id : 1051313578 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

If a particle has mass of 20 kg moves with an acceleration of 2.5 m/s^2 , then the magnitude of force acting on the particle is (in kg m/s^2)

Options :

1. ✖ 25

2. ✔ 50

3. ✖ 75

4. ✖ 100

Question Number : 99 Question Id : 1051313579 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The centre of gravity for a solid hemisphere about its diametral base having diameter 120 cm and is symmetric about y-axis is (in cm)

Options :

1. ✔ 22.5

2. ✖ 90

3. ✖ 135

4. ✖ 45

Question Number : 100 Question Id : 1051313580 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

In a simple harmonic motion (SHM), the acceleration is proportional to

Options :

1. ✖ Velocity

2. ✔ Displacement and opposite in direction

3. ✖ Time

4. ✖ Square of velocity

Question Number : 101 Question Id : 1051313581 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The driving force for heat conduction is called as

Options :

1. ✔ Temperature gradient

2. ✖ Concentration gradient

3. ✖ Pressure gradient

4. ✖ Velocity gradient

Question Number : 102 Question Id : 1051313582 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Furnace efficiency is best defined as the ratio of

Options :

1. ✖ Heat input to heat output
2. ✖ Heat stored in stock to total heat input
3. ✔ Heat utilized by the stock to the heat released by the fuel
4. ✖ Heat losses to heat input

Question Number : 103 Question Id : 1051313583 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A Sankey diagram is primarily used to represent

Options :

1. ✖ Temperature distribution in a furnace
2. ✖ Pressure drops in a piping system
3. ✔ Energy balance and heat flow distribution
4. ✖ Electrical wiring diagrams

Question Number : 104 Question Id : 1051313584 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Saturated steam at 100 °C condenses on the outside of a tube. Cold fluid enters the tube at 20 °C and exits at 50 °C. The value of the Log Mean Temperature Difference (in °C) is

Options :

1. ✖ 54.89
2. ✔ 63.83

3. ✖ 72.39

4. ✖ 89.36

Question Number : 105 Question Id : 1051313585 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Consider a counter-flow heat exchanger with the inlet temperatures of two fluids (1 and 2) being $T_1 = 300$ K and $T_2 = 350$ K. The heat capacity rates of the two fluids are $C_1 = 1000$ W/K and $C_2 = 400$ W/K, and the effectiveness of the heat exchanger is 0.5. The actual heat transfer rate is (in kW)

Options :

1. ✖ 12

2. ✖ 15

3. ✖ 18

4. ✔ 10

Question Number : 106 Question Id : 1051313586 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Adding insulation to a cylindrical pipe with a radius smaller than the critical radius of insulation will

Options :

1. ✖ Decrease heat loss

2. ✔ Increase heat loss

3. ✖ Have no effect

4. ✖ Stop heat flow completely

Question Number : 107 Question Id : 1051313587 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The primary mode of heat transfer to the workpiece in a salt bath furnace is

Options :

1. ✖ Radiation
2. ✔ Convection (Liquid to Solid)
3. ✖ Conduction (Gas to Solid)
4. ✖ Induction

Question Number : 108 Question Id : 1051313588 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

High excess air in a furnace combustion process generally

Options :

1. ✖ Increases furnace efficiency
2. ✔ Decreases furnace efficiency due to stack losses
3. ✖ Increases flame temperature
4. ✖ Reduces fuel consumption

Question Number : 109 Question Id : 1051313589 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Fourier's law of heat conduction relates

Options :

1. ✔ Heat flux to temperature gradient
2. ✖ Heat flux to pressure gradient

3. ✖ Heat flux to velocity gradient

4. ✖ Heat flux to density

Question Number : 110 Question Id : 1051313590 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Steady-state conduction implies

Options :

1. ✔ Temperature does not change with time

2. ✖ Temperature varies with time

3. ✖ Heat flux is zero

4. ✖ Convection occurs

Question Number : 111 Question Id : 1051313591 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Entropy of a perfect crystal at 0 K is

Options :

1. ✖ Negative

2. ✖ Infinity

3. ✖ Constant

4. ✔ Zero

Question Number : 112 Question Id : 1051313592 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Boltzmann equation relates

Options :

1. ✓ Entropy to the number of microstates $S = k \ln \Omega$
2. ✗ Enthalpy to pressure
3. ✗ Work to volume
4. ✗ Energy to temperature

Question Number : 113 Question Id : 1051313593 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Gibbs-Helmholtz equation relates

Options :

1. ✓ Gibbs free energy, enthalpy and temperature
2. ✗ Entropy and work
3. ✗ Internal energy and volume
4. ✗ Heat and temperature

Question Number : 114 Question Id : 1051313594 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Chemical potential is

Options :

1. ✗ Work done by system
2. ✗ Total enthalpy
3. ✓ Partial molar Gibbs free energy
4. ✗ Heat absorbed

Question Number : 115 Question Id : 1051313595 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Mixing entropy arises due to

Options :

1. ✖ Volume change
2. ✖ Heat transfer
3. ✖ Work done
4. ✔ Random distribution of components

Question Number : 116 Question Id : 1051313596 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Fundamental equation of state for ideal gas

Options :

1. ✔ $PV = nRT$
2. ✖ $PV^2 = nRT$
3. ✖ $\frac{P}{V} = nRT$
4. ✖ $P + V = nRT$

Question Number : 117 Question Id : 1051313597 Question Type : MCQ Option Shuffling : Yes

Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

A heat engine receives 1000 J of heat from a reservoir at 1000 K and rejects 600 J of heat to a sink at 300 K. This engine is

Options :

1. ✖ Reversible

- 2. ✓ Irreversible
- 3. ✗ Impossible
- 4. ✗ Perfectly efficient

Question Number : 118 Question Id : 1051313598 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

For a van der Waals gas, the internal energy U

Options :

- 1. ✗ Depends only on Temperature
- 2. ✓ Depends on both Temperature and Volume
- 3. ✗ Is zero
- 4. ✗ Depends only on Volume

Question Number : 119 Question Id : 1051313599 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

For a unary (one component) system, the maximum number of phases that can coexist in equilibrium at the triple point is

Options :

- 1. ✗ 1
- 2. ✗ 2
- 3. ✓ 3
- 4. ✗ 0

Question Number : 120 Question Id : 1051313600 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

Mixing two distinct ideal gases results in an increase in entropy primarily because of

Options :

1. ✖ Increase in internal energy
2. ✖ Increase in molecular interactions
3. ✔ Increase in spatial uncertainty
4. ✖ Chemical reaction between gases