International Advanced Research Centre for Powder Metallurgy and New Materials ARCI

Notations :

1.Options shown in green color and with ✔ icon are correct.

2.Options shown in red color and with ✖ icon are incorrect.

Scientist B SRF JRF Materials & Metallurgical Engineering

PART A

Question Number : 1 Question Id : 8616631101 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

For a hydrogen electrode at 25 °C, the potential is measured at pH = 3. What is the electrode potential relative to the standard hydrogen electrode?$(E = E \circ -0.0591\ pH)$

Options :

1. ✖ −0.059 V

2. ✔ −0.177 V

3. ✖ +0.059 V

4. ✖ +0.177 V

Question Number : 2 Question Id : 8616631102 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

For an FCC metal, the vacancy formation energy is Q_v=0.90 eV. What is the equilibrium vacancy fraction C_v at T=800 K? [Use $C_v \approx \exp(-Q_v/kT)$]

Options :

1. ✖ 2×10^{-8}

2. ✖ 2×10^{-7}

3. ✔ 2×10^{-6}

4. ✖ 2×10^{-5}

Question Number : 3 Question Id : 8616631103 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A low-angle tilt boundary of misorientation of 5° can be modeled as an array of edge dislocations of Burgers vector 0.25 nm. For small angles (in radians), what is the dislocation spacing?

Options :

1. ✖ 1.65 nm

2. ✔ 2.86 nm

3. ✖ 5.22 nm

4. ✖ 7.75 nm

Question Number : 4 Question Id : 8616631104 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A Frank–Read source of arm length of 2.0 μm operates on a slip system with shear modulus 30 GPa and Burgers vector 0.25 nm. What is the critical shear stress?

Options :

1. ✖ 7.50 MPa

2. ✖ 15.75 MPa

3. ✖ 1.95 MPa

4. ✔ 3.75 MPa

Question Number : 5 Question Id : 8616631105 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A steel slab of 50 mm thickness is reduced to 40 mm in one pass during hot rolling. The percentage draft is:

Options :

1. ✖ 10%

2. ✔ 20%

3. ✖ 25%

4. ✖ 5%

Question Number : 6 Question Id : 8616631106 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A cylindrical billet of diameter 50 mm and height 100 mm is compressed between flat dies at 25 °C. Assume yield stress in compression of 300 MPa and friction factor of 0.2, calculate the forging load.

Options :

1. ✖ 550 kN

2. ✖ 600 kN

3. ✖ 650 kN

4. ✔ 750 kN

Question Number : 7 Question Id : 8616631107 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In wire drawing, a wire of 10 mm diameter is drawn to 7 mm diameter. calculate true strain.

Options :

1. ✖ 0.3

2. ✖ 0.5

3. ✔ 0.7

4. ✖ 0.9

Question Number : 8 Question Id : 8616631108 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The limiting draw ratio (LDR) for deep drawing is defined as:

Options :

1. ✔ LDR = D_b/D_p (where D_b = blank diameter, D_p = punch diameter)

2. ✖ LDR = D_p/D_b (where D_b = blank diameter, D_p = punch diameter)

3. ✖ LDR = t/D_p (where t = initial thickness, D_p = punch diameter)

4. ✖ LDR = t/D_b (where D_b = blank diameter, t = initial thickness)

Question Number : 9 Question Id : 8616631109 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In a sheet metal forming process, the punch diameter is 50 mm, maximum blank diameter is 100 mm and initial thickness of the flat sample is 50 mm, what is the limiting draw ratio?

Options :

1. ✖ 0.2

2. ✔ 2.0

3. ✖ 0.3

4. ✖ 3.0

Question Number : 10 Question Id : 8616631110 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

For a gating system with a gating ratio of 1 : 2 : 2, the sequence represents:

Options :

1. ✔ Sprue : Runner : Ingate (unpressurized system)

2. ✖ Runner : Sprue : Ingate (pressurized system)

3. ✖ Sprue : Ingate : Runner

4. ✖ Pouring basin : Sprue : Ingate

Question Number : 11 Question Id : 8616631111 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

For effective feeding and to avoid shrinkage porosity, risers should be placed:

Options :

1. ✖ At the thinnest section of the casting

2. ✔ At the section expected to solidify last

3. ✖ At the section expected to solidify first

4. ✖ At the geometrical centre of the casting

Question Number : 12 Question Id : 8616631112 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A steel casting of volume 100 cm^3 and surface area 60 cm^2 solidifies in 5 minutes. Estimate the solidification time for a geometrically similar casting of 800 cm^3 volume. (Use n = 2)

Options :

1. ✔ 20 min

2. ✖ 25 min

3. ✖ 30 min

4. ✖ 40 min

Question Number : 13 Question Id : 8616631113 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A stainless-steel electrode in 0.1 M NaCl has a pitting potential of +0.20 V vs. SHE. If the open circuit potential is +0.05 V, what additional anodic polarization (overpotential) is required to initiate pitting?

Options :

1. ✖ 0.05 V

2. ✖ 0.10 V

3. ✔ 0.15 V

4. ✖ 0.20 V

Question Number : 14 Question Id : 8616631114 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A mild steel specimen loses 0.50 g in 10 days of exposure. Surface area = 100 cm^2, density of steel = 7.87 g/cm^3. Find corrosion penetration rate (mm/year).

Options :

1. ✖ 0.12 mm/yr

2. ✖ 0.25 mm/yr

3. ✔ 0.36 mm/yr

4. ✖ 0.50 mm/yr

Question Number : 15 Question Id : 8616631115 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Which type of corrosion generally produces the most predictable and uniform metal loss?

Options :

1. ✔ Uniform corrosion

2. ✖ Crevice corrosion

3. ✖ Pitting corrosion

4. ✖ Intergranular corrosion

Question Number : 16 Question Id : 8616631116 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

When steel is coupled with zinc in a corrosive environment, which statement is correct?

Options :

1. ✖ Steel acts as the anode and corrodes preferentially

2. ✔ Zinc acts as the anode and corrodes preferentially

3. ✖ Both corrode at the same rate

4. ✖ Neither corrodes because of passivation

Question Number : 17 Question Id : 8616631117 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Austenitic stainless steel becomes susceptible to intergranular corrosion when:

Options :

1. ✖ Exposed to HCl at room temperature.

2. ✔ Heated to 500–800 °C and Cr carbides precipitate at grain boundaries.

3. ✖ Rapidly quenched from high temperature.

4. ✖ Cold worked at room temperature.

Question Number : 18 Question Id : 8616631118 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

If a material has a small negative magnetic susceptibility (χ), it is classified as:

Options :

1. ✖ Ferromagnetic

2. ✖ Paramagnetic

3. ✔ Diamagnetic

4. ✖ Antiferromagnetic

Question Number : 19 Question Id : 8616631119 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

If the grain size decreases from 100 µm to 25 µm, the yield strength will:

Options :

1. ✖ Decrease by factor of 2

2. ✔ Increase by factor of 2

3. ✖ Increase by factor of 4

4. ✖ Remain same

Question Number : 20 Question Id : 8616631120 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

During plastic deformation of metals at room temperature, the main cause of work hardening is:

Options :

1. ✖ Increase in grain size

2. ✖ Annihilation of dislocations

3. ✔ Increase in dislocation density and interaction

4. ✖ Formation of twins

Question Number : 21 Question Id : 8616631121 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In gas carburizing, the purpose of introducing carbon into the surface of low-carbon steels is to:

Options :

1. ✖ Make the surface more machinable.

2. ✖ Reduce surface residual stresses.

3. ✖ Increase ductility of the surface

4. ✔ Increase surface hardness and wear resistance

Question Number : 22 Question Id : 8616631122 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Which statement is correct "During recovery after cold working _____"

Options :

1. ✔ Stored dislocations annihilate/rearrange, lowering internal stress.

2. ✖ Grain boundaries migrate and new grains form.

3. ✖ Grain size increases rapidly.

4. ✖ Mechanical properties remain exactly same as in cold-worked state.

Question Number : 23 Question Id : 8616631123 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In a nitriding process, nitrogen diffuses into steel for 25 h at high temperature. What happens to case depth if time is increased to 100 h (same temperature)?

Options :

1. ✔ Doubles

2. ✖ Quadruples

3. ✖ Remains same

4. ✖ Triples

Question Number : 24 Question Id : 8616631124 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option

Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The main purpose of heat treatment of white cast iron to produce malleable cast iron is to:

Options :

1. ✖ Increase hardness by forming martensite.

2. ✔ Convert combined carbon (Fe_3C) into temper carbon (graphite).

3. ✖ Increase retained austenite content.

4. ✖ Reduce grain size by recrystallization.

Question Number : 25 Question Id : 8616631125 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In precipitation-hardening aluminium alloys (e.g., Al–Cu), the solution treatment step is carried out at:

Options :

1. ✔ Just below the melting point of copper.

2. ✖ Low temperature below room temperature.

3. ✖ A temperature where maximum solubility of solute in Al occurs.

4. ✖ At any arbitrary temperature.

Question Number : 26 Question Id : 8616631126 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

An Al–Cu alloy after solutionizing and quenching is aged at 150 °C. The hardness first increases, then decreases on prolonged holding. This is because:

Options :

1. ✔ Overaging leads to coarsening of precipitates, reducing strength.

2. ✖ Grain boundaries dissolve during aging.

3. ✖ Dislocation density decreases with time.

4. ✖ Matrix composition becomes completely random.

Question Number : 27 Question Id : 8616631127 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Which of the following correctly distinguishes precipitation from spinodal decomposition in solid solutions?

Options :

1. ✖ Precipitation occurs only at cryogenic temperatures.

2. ✖ Both occur without nucleation barrier.

3. ✖ Both require nucleation barrier.

4. ✔ Precipitation requires nucleation barrier; spinodal decomposition occurs spontaneously without barrier.

Question Number : 28 Question Id : 8616631128 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The martensitic transformation in steels is best described as:

Options :

1. ✖ Massive transformation governed by partitioning of solute.

2. ✖ Diffusion-controlled nucleation and growth process.

3. ✖ Long-range diffusion of carbon during transformation.

4. ✔ Diffusionless, shear-dominated transformation of austenite.

Question Number : 29 Question Id : 8616631129 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Spinodal decomposition occurs when:

Options :

1. ✖ $\frac{\partial^2 G}{\partial C^2} > 0$

2. ✔ $\frac{\partial^2 G}{\partial C^2} < 0$

3. ✖ $\frac{\partial G}{\partial C} = 0$

4. ✖ Gibbs free energy is maximum

Question Number : 30 Question Id : 8616631130 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In discontinuous precipitation, precipitates grow from grain boundaries into the matrix as:

Options :

1. ✔ Lamellar colonies similar to eutectoid transformation.

2. ✖ Uniform fine precipitates within grains.

3. ✖ Spinodal waves of concentration fluctuation.

4. ✖ Shear-dominated martensitic plates.

Question Number : 31 Question Id : 8616631131 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A steel plate is exposed to a carburizing atmosphere at 950 °C. The carbon concentration at one surface is 1.2 wt% and at the opposite surface is 0.2 wt%. The thickness of the plate is 1 cm. Assuming there is a steady-state diffusion and the diffusion coefficient is 1×10^{-10} m^2/s What is the carbon flux?

Options :

1. ✖ 1×10^{-16} wt. % m/s

2. ✖ 1×10^{-12} wt. % m/s

3. ✖ 1×10^{-6} wt. % m/s

4. ✔ 1×10^{-8} wt. % m/s

Question Number : 32 Question Id : 8616631132 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The Kirkendall effect in diffusion couples provides direct evidence for:

Options :

1. ✖ Grain boundary diffusion dominance.

2. ✖ Uphill diffusion of solutes.

3. ✖ Purely mechanical deformation.

4. ✔ Existence of vacancies and unequal diffusion rates of species.

Question Number : 33 Question Id : 8616631133 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

At lower temperatures, diffusion in polycrystals is often dominated by:

Options :

1. ✖ Uphill diffusion in bulk.

2. ✖ Pipe diffusion only through screw dislocations.

3. ✔ Grain boundary diffusion, because boundaries offer fast paths.

4. ✖ Volume (lattice) diffusion, because activation energy is lowest.

Question Number : 34 Question Id : 8616631134 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option

Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Paris' law for fatigue crack growth is:

$$\frac{da}{dN} = C(\Delta k)^m$$

where a is crack length, N is number of cycles, and Δk is stress intensity factor range. Which parameter controls the sensitivity of crack growth rate to ΔK?

Options :

1. ✖ C

2. ✔ M

3. ✖ Δk

4. ✖ Initial crack length

Question Number : 35 Question Id : 8616631135 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In steady-state creep, if creep rate increases 16 times when stress is doubled at constant temperature, what is the stress exponent?

Options :

1. ✔ 4

2. ✖ 16

3. ✖ 64

4. ✖ 8

Question Number : 36 Question Id : 8616631136 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The steady-state creep rate of a metal at 600 °C is 10^{-7} s^{-1}. At 700 °C, under same stress, it is 10^{-6} s^{-1}. Assuming Arrhenius behavior, Find approximate activation energy? (Take R = 8.314 J/mol·K).

Options :

1. ✔ 163 kJ/mol

2. ✖ 100 kJ/mol

3. ✖ 213 kJ/mol

4. ✖ 121 J/mol

Question Number : 37 Question Id : 8616631137 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

If a steel specimen has fatigue strength coefficient of 10^{12} and a fatigue exponent of -0.1. What is the stress amplitude for fatigue life of 10^6 cycles?

Options :

1. ✔ 2.51×10^{11}

2. ✖ 2.10×10^{12}

3. ✖ 3.51×10^{15}

4. ✖ 2.51×10^{17}

Question Number : 38 Question Id : 8616631138 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Which of the following best represents tertiary creep?

Options :

1. ✖ Constant strain rate due to balance between hardening and recovery.

2. ✖ Strain rate decreases with time.

3. ✔ Strain rate accelerates rapidly leading to failure.

4. ✖ Strain rate remains zero.

Question Number : 39 Question Id : 8616631139 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Which of the following is true about low cycle fatigue (LCF) compared to high cycle fatigue (HCF)?

Options :

1. ✖ LCF has no plastic deformation component.

2. ✖ Both LCF and HCF occur in the same strain amplitude range.

3. ✔ LCF occurs at higher strain amplitude and lower number of cycles.

4. ✖ LCF occurs at lower strain amplitude and higher number of cycles.

Question Number : 40 Question Id : 8616631140 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

For brittle fracture in an elastic solid, if there is an increase in the modulus, what effect does it have on the critical stress for crack propagation?

Options :

1. ✔ Increases

2. ✖ First increases then decreases

3. ✖ Remains unchanged

4. ✖ Decreases

Question Number : 41 Question Id : 8616631141 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The ductile-to-brittle transition temperature (DBTT) in BCC is mainly due to:

Options :

1. ✖ Increased number of slip systems with decreasing temperature.

2. ✔ Decreased dislocation mobility at low temperature.

3. ✖ Increase in stacking fault energy.

4. ✖ Presence of graphite flakes.

Question Number : 42 Question Id : 8616631142 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A plate contains an edge crack of length 5 mm. If fracture toughness is 30 MPa$\sqrt{m}$, determine the critical stress for fracture.

Options :

1. ✖ 210 MPa

2. ✖ 270 MPa

3. ✖ 260 MPa

4. ✔ 240 MPa

Question Number : 43 Question Id : 8616631143 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Solid solution strengthening is more effective when:

Options :

1. ✖ Solute atoms are similar in size to solvent atoms

2. ✔ Solute atoms differ significantly in size

3. ✖ Solute is present only at grain boundaries

4. ✖ Solute is insoluble in solvent

Question Number : 44 Question Id : 8616631144 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option

Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In precipitation hardening, when precipitates are incoherent and strong obstacles, dislocations bypass them by the Orowan mechanism. The strengthening contribution is proportional to:

Options :

1. ✖ Precipitate volume fraction only

2. ✖ Grain size

3. ✖ Precipitate size (direct)

4. ✔ Precipitate spacing (inverse)

Question Number : 45 Question Id : 8616631145 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

. Which of the following is/are not Maxwell relation?

(1) $\left(\frac{\delta S}{\delta p}\right)_T = \left(\frac{\delta V}{\delta T}\right)_p$

(2) $\left(\frac{\delta T}{\delta p}\right)_S = \left(\frac{\delta V}{\delta S}\right)_p$

(3) $\left(\frac{\delta S}{\delta V}\right)_T = \left(\frac{\delta p}{\delta T}\right)_V$

(4) $\left(\frac{\delta T}{\delta V}\right)_S = \left(\frac{\delta p}{\delta S}\right)_V$

Options :

1. ✔ 1 and 4

2. ✖ 1 and 3

3. ✖ 2 and 3

4. ✖ 2 and 4

Question Number : 46 Question Id : 8616631146 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Given:
Density of Al = 2700 kg/m^3, atomic weight of Al = 27, Density of Al_2O_3 = 3700, kg/m^3
The Pilling-Bedworth ratio for the oxidation of Al is

Options :

1. ✖ 0.57

2. ✖ 0.74

3. ✔ 1.38

4. ✖ 3.12

Question Number : 47 Question Id : 8616631147 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The diffusivity of carbon in γ (gamma) iron at 1173 K and 1273 K are 5.90×10^{-12} and 1.94×10^{-11} m^2/s, respectively.
Calculate the diffusivity of carbon in γ (gamma) iron at 1373 K in m^2/s is

Options :

1. ✖ 3.4×10^{-11}

2. ✖ 4.4×10^{-11}

3. ✔ 5.4×10^{-11}

4. ✖ 6.4×10^{-11}

Question Number : 48 Question Id : 8616631148 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In a furnace, with heating element temperature at 1700 °C, the dominant mechanism of heat transfer will be

Options :

1. ✖ Conduction

2. ✔ Radiation

3. ✖ Natural Convection

4. ✖ Forced Convection

Question Number : 49 Question Id : 8616631149 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The melting point and latent heat of fusion of copper are 1356 k and 13 kJ/mol, respectively. Assume that the specific heats of solid and liquid are same. The free energy change for the liquid to solid transformation at 1250 K in kJ/mol is

Options :

1. ✖ -4

2. ✖ -3

3. ✖ -2

4. ✔ -1

Question Number : 50 Question Id : 8616631150 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The activity of copper in the impure copper is 0.5 at 298 K. the minimum voltage required to refine impure copper to pure copper using an electrolyte having Cu^{2+} ions at 298 K is

Options :

1. ✖ 0.9 mV

2. ✔ 9 mV

3. ✖ 90 mV

4. ✖ 900 mV

Question Number : 51 Question Id : 8616631151 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

At 1200 °C the standard Gibbs energy of thermal decomposition of one mole of wustite into Fe and O_2 is 168 kJ. given for the reaction $2CO + O_2 \leftrightarrow 2CO_2$ the standard Gibbs energy is -310 kJ, what is the equivalent $\frac{p_{CO}}{p_{CO_2}}$?

Options :

1. ✖ 0.03

2. ✖ 1.01

3. ✖ 1.85

4. ✔ 2.89

Question Number : 52 Question Id : 8616631152 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The effect of temperature and pressure on chemical equilibrium can be predicted by

Options :

1. ✖ Van't Hoff equation

2. ✔ Le Chatelier's principle

3. ✖ Law of mass action

4. ✖ clausius –Clapeyron equation

Question Number : 53 Question Id : 8616631153 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Radiography technique of detecting defects is based on the principle of

(1) diffraction (2) reflection

(3) interference (4) absorption

Options :

1. ✖ only 2

2. ✖ 2 and 4

3. ✔ Only 4

4. ✖ 1, 2, 3 and 4

Question Number : 54 Question Id : 8616631154 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Match the suitability of non-destructive testing method in Group I for the detection of defects listed in Group II Group I Group II

(P) Magnetic particle inspection	(1) Surface crack in martensitic stainless steels
(Q) X-ray radiography	(2) Surface crack in austenitic stainless steels
(R) Dye penetrant test	(3) Hairline crack in aluminium
(S) Ultrasonic testing	(4) Inclusions in steels

Options :

1. ✖ P-2, Q-4, R-3, S-1

2. ✖ P-4, Q-2, R-1, S-3

3. ✖ P-3, Q-1, R-2, S-4

4. ✔ P-1, Q-4, R-2, S-3

Question Number : 55 Question Id : 8616631155 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Which one of the following techniques are not applicable for detecting internal flaws in a ceramic material?

1. Liquid penetration test
2. Radiography
3. Ultrasonic testing
4. Eddy current testing

Options :

1. ✖ 1 and 3

2. ✖ 3 and 4

3. ✖ 2 and 4

4. ✔ 1 and 4

Question Number : 56 Question Id : 8616631156 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

For dye penetrant test, identify the wrong statement/statements

1. pre and post-cleaning of parts are not required
2. internal defects can be detected
3. surface oxides helps in crack identification
4. Dye with low contact angle is required

Options :

1. ✔ 1,2 and 3

2. ✖ 2, 3 and 4

3. ✖ 1 and 2 only

4. ✖ 4 only

Question Number : 57 Question Id : 8616631157 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

match the following

(P) Magnetic particle inspection	(1) Capillary action
(Q) X-ray radiography	(2) piezoelectric transducer
(R) Dye penetrant test	(3) leakage flux
(S) Ultrasonic testing	(4) phosphor screen

Options :

1. ✖ P-2, Q-4, R-3, S-1

2. ✖ P-4, Q-2, R-1, S-3

3. ✔ P-3, Q-4, R-1, S-2

4. ✖ P-1, Q-4, R-2, S-3

Question Number : 58 Question Id : 8616631158 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

"Fill factor" is associated with
1. Magnetic particle testing
2. Eddy Current testing
3. Radiography testing
4. Ultrasonic testing

Options :

1. ✖ 1,2 and 3

2. ✖ 2, 3 and 4

3. ✖ 1 only

4. ✔ 2 only

Question Number : 59 Question Id : 8616631159 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Which statement is true about Eddy Current Testing
1. Alternating current is required in eddy current testing.
2. Direct current is required in eddy current testing.
3. Conducting surface is required
4. Test frequency determines the depth of penetration

Options :

1. ✖ 2,3 and 4

2. ✔ 1, 3 and 4

3. ✖ 1 only

4. ✖ 2 only

Question Number : 60 Question Id : 8616631160 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

What are the characteristic of penetrant materials?
1. Spread easily over surface being inspected
2. Be drawn into surface breaking defects by capillary action
3. Remain in the defect but remove easily from the surface of the part
4. highly visible or fluoresce brightly to produce easy to see indications

Options :

1. ✖ 1,2 and 3

2. ✔ 1,2, 3 and 4

3. ✖ 1, 3 and 4

4. ✖ 2 only

Question Number : 61 Question Id : 8616631161 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Materials that are commonly inspected using Liquid Penetration Method is
1. Metals
2. Ceramics
3. Rubber
4. plastics

Options :

1. ✖ 1,2 and 3

2. ✖ 1, 3 and 4

3. ✖ 1, 2 and 4

4. ✔ 1,2, 3 and 4

Question Number : 62 Question Id : 8616631162 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The Angle between line vector and the Burgers vector of an edge dislocation is

Options :

1. ✖ 0^o

2. ✔ 90^o

3. ✖ 120^o

4. ✖ 180^o

Question Number : 63 Question Id : 8616631163 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The engineering stress-strain curve for ceramic material is

Options :

1. ✖ Parabolic

2. ✖ Exponential

3. ✖ Logarithmic

4. ✔ Linear

Question Number : 64 Question Id : 8616631164 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A property that cannot obtained from tensile test is
(1) Young's modulus
(2) Yield Strength
(3) Ultimate tensile strength
(4) Endurance limit

Options :

1. ✖ 1,2 and 4

2. ✖ 1,2, 3 and 4

3. ✖ 1 only

4. ✔ 4 only

Question Number : 65 Question Id : 8616631165 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

If volume of a material does not change during deformation, then the Poisson's ratio should be

Options :

1. ✖ 0.25

2. ✖ 0.5

3. ✖ 0.67

4. ✔ 1.00

Question Number : 66 Question Id : 8616631166 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Identify the true statement
(1) The Burger vector and dislocation line are parallel to each other for screw dislocation
(2) Burger vector and dislocation line is perpendicular to each other for edge dislocation
(3) Screw dislocation glide parallel to its Burgers vector
(4) Edge dislocation glide parallel to its Burgers vector

Options :

1. ✔ 1,2 and 3

2. ✖ 1,2, 3 and 4

3. ✖ 1,2 and 4

4. ✖ 4 only

Question Number : 67 Question Id : 8616631167 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A cylindrical Specimen of an isotropic metal (E = 200 GPa) is elastically deformed in tension. Length of this cylinder before deformation is 100 mm and the diameter is 10 mm. After the deformation, they are 100.1 mm and 9.996 mm respectively. The shear modulus "G" of this metal is
Given: $E = 2G(1 + \nu)$

Options :

1. ✔ 71.43 GPa

2. ✖ 76.92 GPa

3. ✖ 83.33 GPa

4. ✖ 100.00 GPa

Question Number : 68 Question Id : 8616631168 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A dislocation free single crystal of aluminum has a theoretical shear strength of about (Given G = 28 GPa)

Options :

1. ✖ 28.0 GPa

2. ✔ 4.5 GPa

3. ✖ 0.56 GPa

4. ✖ 0.07 GPa

Question Number : 69 Question Id : 8616631169 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Identify the correct statement
(1) The von-Mises criterion depends upon the coordinate system as the individually stress components change with the coordinate system for the same externally applied load
(2) Both Tresca and von-Mises criteria are independent of the hydrostatic stress.
(3) According to the von-Mises criterion, yielding commences when the maximum shear stress reaches a critical value
(4) According to Tresca yield criteria, yielding commences on plane equally inclined to the external principal stress directions

Options :

1. ✖ 1,2 and 3

2. ✖ 1, 3 and 4

3. ✖ 2 and 4

4. ✔ 1 and 4

Question Number : 70 Question Id : 8616631170 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Movement of jogs can produce

Options :

1. ✔ Vacancies

2. ✖ Stacking fault

3. ✖ Grain boundary sliding

4. ✖ grain boundary migration

Question Number : 71 Question Id : 8616631171 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

A tilt boundary consists of the following dislocation arrangement

Options :

1. ✖ a cros-grip of screw dislocation on intersecting slip planes

2. ✔ a wall of like sign edge dislocation on parallel slip planes

3. ✖ a row of disclinations

4. ✖ alternate sign of edge dislocations on parallel slip planes

Question Number : 72 Question Id : 8616631172 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Classification of metal forming process into hot and cold working is based on which following parameters?
1. stacking fault energy
2. Recrystallization temperature
3. solidus temperature
4. Transformation Temperature

Options :

1. ✖ 3 only

2. ✖ 1,2,3 and 4

3. ✔ 2 only

4. ✖ 2 and 3 only

Question Number : 73 Question Id : 8616631173 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Alternating current is preferred in tungsten inert gas welding of aluminium alloys, because
1. it helps removing aluminium oxide
2. direct current results in erratic arc
3. it helps improving ductility of welds
4. it reduces cost.

Options :

1. ✖ 2 only

2. ✖ 1 and 2 only

3. ✔ 1 only

4. ✖ 1, 2,3 and 4

Question Number : 74 Question Id : 8616631174 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The casting process that require expandable moulds are
1. Investment casting
2. Low pressure casting
3. Shell Moulding
4. Slush casting

Options :

1. ✖ 1, 2, 3 and 4

2. ✖ 2 and 3

3. ✖ 1 and 4

4. ✔ 1 and 3

Question Number : 75 Question Id : 8616631175 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The order of increasing weldability among the following steels is

1. Fe-0.6%C
2. Fe-0.4%C
3. HSLA

Options :

1. ✔ $1 \rightarrow 2 \rightarrow 3$

2. ✖ $3 \rightarrow 2 \rightarrow 1$

3. ✖ $2 \rightarrow 3 \rightarrow 1$

4. ✖ $1 \rightarrow 3 \rightarrow 2$

Question Number : 76 Question Id : 8616631176 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Sand casting defects are

1. Blow Holes
2. Misruns
3. Cold Shuts
4. Scabs

Options :

1. ✖ 1,2 and 3

2. ✖ 1, 3 and 4

3. ✖ 2, 3 and 4

4. ✔ 1,2,3 and 4

Question Number : 77 Question Id : 8616631177 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In the powder metallurgy processing the objective of pressing before sintering is to

Options :

1. ✖ squeeze out the moisture around the powder particles

2. ✖ further refine the grain size

3. ✖ break up the oxides around the particles

4. ✔ compacting the powder particles into mechanical and atomic closeness

Question Number : 78 Question Id : 8616631178 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Casting-associated terms are

1. Pattern
2. Core
3. Sprue
4. Flash

Options :

1. ✔ 1,2, 3 and 4

2. ✖ 1,2 and 3

3. ✖ 2, 3 and 4

4. ✖ 1, 2 and 4

Question Number : 79 Question Id : 8616631179 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The freezing ranges of the copper alloys X and Y are 1070-1050 °C and 1000-850 °C, respectively. Then, a combination of two of the following statements correctly reflect the observations made during their casting

1. Alloy X exhibit coring, segregation and hot tearing
2. Alloy X exhibit sound casting with reasonable uniform composition
3. Alloy Y exhibit coring, segregation and hot tearing
4. Alloy Y exhibit sound casting with reasonable uniform composition

Options :

1. ✔ 2 and 3

2. ✖ 1 and 4

3. ✖ 1 and 3

4. ✖ 2 and 4

Question Number : 80 Question Id : 8616631180 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In submerged arc welding, a heat input of 4kJ/mm is used; if the welding speed is doubled then the welding heat input

Options :

1. ✖ increases by a factor of 2

2. ✖ remains unaffected

3. ✔ decreases by a factor of 2

4. ✖ increases by a factor of 2

Question Number : 81 Question Id : 8616631181 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In the consumable electrode shielded metal arc welding process, which of the following observations are correct

1. The weld composition does not depend on the basicity of the slag
2. Basic flux is used to achieve low hydrogen content and low inclusion content in the weld metal
3. Reverse polarity of direct current source is used to weld thin sheet
4. Coated electrodes are classified by tensile strength of the weld metal depo

Options :

1. ✖ 1 and2

2. ✖ 1 and 3

3. ✔ 2 and 4

4. ✖ 3 and 4

Question Number : 82 Question Id : 8616631182 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Role of collector in flotation is

Options :

1. ✔ to form a water repelling film on the mineral surface

2. ✖ to create and stabilize the forth

3. ✖ to act as surfactant

4. ✖ to collect the minerals according to their specific gravity

Question Number : 83 Question Id : 8616631183 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In Kroll process
(1) Metal halides are reduced by magnesium
(2) Metal oxides are reduced by calcium
(3) Metallic titanium or titanium sponge is produced
(4) Metallic Magnesium is produced

Options :

1. ✖ 1 and 2

2. ✖ 2 and 3

3. ✖ 3 and 4

4. ✔ 1 and 3

Question Number : 84 Question Id : 8616631184 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

The Al_2O_3 contents of cryolite in Hall-Heroult's cell is maintained between

Options :

1. ✖ 1 – 2 %

2. ✖ 18 – 20 %

3. ✖ 12 – 15 %

4. ✔ 6 – 12 %

Question Number : 85 Question Id : 8616631185 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

One ton of chalcopyrite containing 2% copper is floated to obtain a concentrate containing 25 & copper. If the mass of the concentrate is 60 kg, the percent of copper in the tailing is

Options :

1. ✖ 0.834 %

2. ✖ 0.642 %

3. ✖ 0.983 %

4. ✔ 0.532 %

Question Number : 86 Question Id : 8616631186 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In the blast furnace, as the oxygen percentage in the air blast increases
1. the adiabatic flame temperature increases
2. the blast furnace productivity decreases
3. coke rate decreases
4. the adiabatic flame temperature decreases

Options :

1. ✔ 1 and 3

2. ✖ 2 and 3

3. ✖ 3 and 4

4. ✖ 1 and 4

Question Number : 87 Question Id : 8616631187 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Liquid steel contains initially 0.05 mass % P and this has to be reduced to 0.01 mass % using basic slag. The equilibrium distribution ratio of P between slag and metal is $L_P = \frac{(\%P)_{slag}}{[\%P]_{metal}} = 80$. Assuming that initially the slag does not contain any phosphorus, then the minimum weight of slag (ton) required per ton of steel is

Options :

1. ✖ 0.005

2. ✔ 0.05

3. ✖ 0.025

4. ✖ 0.10

Question Number : 88 Question Id : 8616631188 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Deoxidation of liquid steel with ferrosilicon produces spherical silica particles. The particles of 5 μm diameter take 3000 min to float up through a 2 m height of liquid steel. For particles of 50 μm diameter to float up through the same height, the time required in minute is

Options :

1. ✔ 30

2. ✖ 300

3. ✖ 960

4. ✖ 3000

Question Number : 89 Question Id : 8616631189 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

What is the volume % solids in pulp containing 65 wt % solids? Average specific gravity of solids is 2.70

Options :

1. ✖ 72.9 %

2. ✖ 65 %

3. ✖ 59.3 %

4. ✔ 40.7 %

Question Number : 90 Question Id : 8616631190 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Cyclones are primarily used for

Options :

1. ✖ Comminution

2. ✖ Concentration

3. ✖ Dewatering

4. ✔ Classification

PART B

Question Number : 91 Question Id : 8616631191 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In the question below given four statements followed by three Conclusions number I, II and III. You have to take the given statements to be true even if they seem to be at variance from commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follows from the given statements desire gardening commonly known facts.

Statements: Some plates are spoons.
All spoons are forks.
All forks are bowls.
Some bowls are utensils.

Conclusions: I. Some plates are bowls.
II. All spoons are bowls.
III. Some forks are utensils.

Options :

1. ✖ Only I follows

2. ✖ Only II follows

3. ✖ Only I and III follow

4. ✔ Only I and II follow

Question Number : 92 Question Id : 8616631192 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option

Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

From the given answer figures, select the one in which the question figure is hidden/embedded.

Question Figure:

Options :

1. ✔ 

2. ✖ 

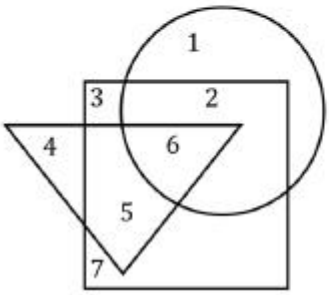
3. ✖ 

4. ✖ 

Question Number : 93 Question Id : 8616631193 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

When a survey was made regarding the preferences in the watching of TV channel, a few said that they watch only ZEE TV channel, the others liked only Sun TV channel, while others Asianet TV channel. A small percentage said that they watch all the three TV channels. In the figure given below the circle indicates the Asianet TV channel, the square Z TV and the triangle the Sun TV channel. Which number in the figure indicates the fact that some people watch all the three TV channels?



Options :

1. ✖ 2

2. ✖ 5

3. ✔ 6

4. ✖ 3

Question Number : 94 Question Id : 8616631194 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

If 27 March, 1995 was a Mon day, then what days of the week was 1 November, 1995?

Options :

1. ✖ Monday

2. ✖ Sunday

3. ✖ Tuesday

4. ✔ Wednesday

Question Number : 95 Question Id : 8616631195 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Ashok started walking towards South. After walking 50 metres he took a right turn and walked 30 metres. He then took a right turn and walked 100 metres. He again took a right turn and walked 30 metres and stopped. How far and in which direction was he from the starting point?

Options :

1. ✖ 50 metres South

2. ✖ 150 metres North

3. ✖ 180 metres East

4. ✔ 50 metres North

Question Number : 96 Question Id : 8616631196 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In a certain code language 'ROUTINE' is written as 'VMRGFLI'. How will be 'CRUELTY' written in that code language?

Options :

1. ✖ VPVCZRL

2. ✖ VPCVZRL

3. ✖ WPCVZRL

4. ✔ BGOVFIX

Question Number : 97 Question Id : 8616631197 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Thirty-six vehicles are parked in a parking lot in a single row. After the first car, there is one scooter. After the second car, there are two scooters. After the third car, there are three scooters and so on. Work out the number of scooters in the second half of the row.

Options :

1. ✖ 10

2. ✖ 12

3. ✔ 15

4. ✖ 17

Question Number : 98 Question Id : 8616631198 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

In the following number series, a wrong number is given. Find out that wrong number.
10, 11, 24, 75, 303, 1525,9156

Options :

1. ✖ 24

2. ✖ 1525

3. ✖ 75

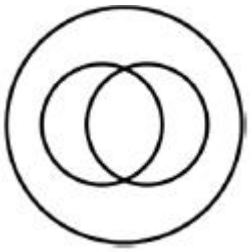
4. ✔ 303

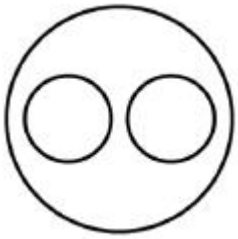
Question Number : 99 Question Id : 8616631199 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

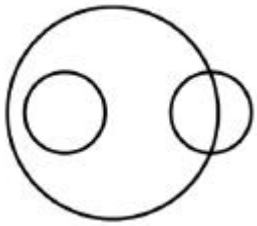
Correct Marks : 3 Wrong Marks : 1

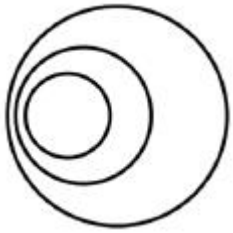
Which of the following figures represents the relation between 'Sparrows', 'Birds' and 'Crows'?

Options :

1. ✖ 

2. ✔ 

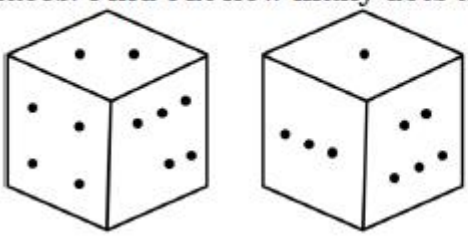
3. ✖ 

4. ✖ 

Question Number : 100 Question Id : 8616631200 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : Normal Option Orientation : Vertical

Correct Marks : 3 Wrong Marks : 1

Study the two different positions of a cube given below with dots from 1 to 6 marked on its faces. Find out how many dots are there on the face opposite to that containing 4 dots.



Options :

1. ✖ 1

2. ✖ 2

3. ✔ 3

4. ✖ 5