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Notations :

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

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

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Metallurgy

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Metallurgy

Section Id :	83189662
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Question Number : 1 Question Id : 8318967321 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The Gibbs free energy of a reaction is minimized when the system is at equilibrium. Which of the following conditions must hold at equilibrium?

Options :

1. ✖ The reaction quotient is greater than the equilibrium constant.

2. ✔ The reaction quotient is equal to the equilibrium constant.

3. ✖ The chemical potentials of all components are equal.

4. ✖ The Gibbs free energy is positive.

Question Number : 2 Question Id : 8318967322 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

What is the use of the Ellingham diagram in metallurgy?

Options :

1. ✖ To calculate the boiling point of different metals.

2. ✖ To predict the solubility of gases in metals.

3. ✔ To determine the temperature at which a metal oxide can be reduced.

4. ✖ To visualize phase changes in metal alloys.

Question Number : 3 Question Id : 8318967323 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In a second-order reaction, the rate of the reaction is proportional to:

Options :

1. ✔ The square of the concentration of the reactant

2. ✖ The concentration of the reactant

3. ✖ The concentration of the reactant raised to the third power

4. ✖ The inverse of the concentration of the reactant

Question Number : 4 Question Id : 8318967324 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following statements is true regarding phase equilibrium in a binary alloy system?

Options :

1. ✖ The phase diagram of a binary alloy system typically includes solid, liquid and gas phases.

2. ✖ At the eutectic composition in a binary alloy system, the system consists of a single phase.

3. ✖ The liquid phase is always more stable than the solid phase in a binary system.

4. ✔ The eutectic temperature is the lowest temperature at which the solid phase forms.

Question Number : 5 Question Id : 8318967325 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following conditions is necessary for a metallurgical reaction to be spontaneous at a given temperature?

Options :

1. ✖ The reaction must have a negative entropy change.

2. ✖ The enthalpy change must be negative.

3. ✔ The Gibbs free energy change must be negative.

4. ✖ The reaction must involve an increase in temperature.

Question Number : 6 Question Id : 8318967326 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In a diffusion process, if the concentration of a species is higher at the surface of a material, the diffusion flux will:

Options :

1. ✔ Increase with time

2. ✖ Remain constant

Decrease with time

3. ✖

Be zero

4. ✖

Question Number : 7 Question Id : 8318967327 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The first law of thermodynamics is related to:

Options :

Entropy

1. ✖

Enthalpy

2. ✖

Conservation of energy

3. ✔

Free energy

4. ✖

Question Number : 8 Question Id : 8318967328 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following diagrams is used to predict oxide stability?

Options :

1. ✖ Phase diagram

2. ✖ TTT diagram

3. ✔ Ellingham diagram

4. ✖ Lever rule diagram

Question Number : 9 Question Id : 8318967329 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Activity of a pure element in its standard state is:

Options :

1. ✖ 0

2. ✔ 1

3. ✖ ∞

4. ✖ -1

Question Number : 10 Question Id : 8318967330 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The rate-limiting step is the:

Options :

1. ✖ Fastest step

2. ✔ Slowest step

3. ✖ Initial step

4. ✖ Final step

Question Number : 11 Question Id : 8318967331 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

For an ideal solution, volume of mixing is _____.

Options :

1. ✖ Negative

2. ✖ Infinity

3. ✔ Zero

4. ✖ Fractional

Question Number : 12 Question Id : 8318967332 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

All adiabatic processes are known as _____.

Options :

1. ✔ Isoentropic

2. ✖ Isothermal

3. ✖ Isochore

4. ✖ Isobar

Question Number : 13 Question Id : 8318967333 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Henry's law is applicable to _____ solutions.

Options :

1. ✖ Ideal

2. ✖ Regular

3. ✔ Very dilute

4. ✖ Solid

Question Number : 14 Question Id : 8318967334 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

C_p, the heat capacity at constant pressure is given by:

Options :

1. $(\partial H / \partial T)p$ ✔

2. $(\partial E / \partial T)p$ ✖

3. $(\partial A / \partial T)p$ ✖

4. $(\partial G / \partial T)p$ ✖

Question Number : 15 Question Id : 8318967335 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

For ideal solutions, activity of a component is _____ mole fraction.

Options :

1. ✔ Equal to

2. ✖ Greater than

3. ✖ Lesser than

4. ✖ Not related to

Question Number : 16 Question Id : 8318967336 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Chemical potential of a system is regarded as _____.

Options :

1. ✔ Partial molar property

2. ✖ Colligative Property

3. ✖ State function

4. ✖ Electrochemical property

Question Number : 17 Question Id : 8318967337 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The order of a reaction can be determined from:

Options :

1. ✖ Heat change

2. ✖ Stoichiometry

3. ✔ Experimental data

4. ✖ Ellingham diagram

Question Number : 18 Question Id : 8318967338 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

For the reaction $A+B \rightarrow$ Products, the rate law is $r=k[A]^{1/2}[B]^2$. What is the order of the reaction?

Options :

1. ✖ 1.5

2. ✔ 2.5

3. ✖ 2

4. ✖ 3

Question Number : 19 Question Id : 8318967339 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Equilibrium constant of any reaction is _____ at constant temperature.

Options :

1. ✖ Negative

Positive

2. ✖

Fraction

3. ✖

Constant

4. ✔

Question Number : 20 Question Id : 8318967340 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following is true for a reaction to be zero-order?

Options :

The rate of reaction is independent of the concentration of reactants.

1. ✔

The rate constant has units of mol/L

2. ✖

The rate increases with the concentration of reactants

3. ✖

The reaction is independent of temperature

4. ✖

Question Number : 21 Question Id : 8318967341 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

According to Fick's law of diffusion, the diffusion flux is proportional to

Options :

The concentration gradient

1. ✔

The temperature gradient

2. ✖

The pressure gradient

3. ✖

The velocity of the fluid

4. ✖

Question Number : 22 Question Id : 8318967342 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In a fluid flowing over a flat plate, the Reynolds number (Re) determines:

Options :

1. ✖ The rate of mass transfer

2. ✔ Whether the flow is laminar or turbulent

3. ✖ The pressure drop in the fluid

4. ✖ The temperature distribution

Question Number : 23 Question Id : 8318967343 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The diffusion mechanism that involves atoms moving through vacancies in a solid is called:

Options :

1. ✖ Interstitial diffusion

2. ✔ Vacancy diffusion

3. ✖ Grain boundary diffusion

4. ✖ Surface diffusion

Question Number : 24 Question Id : 8318967344 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In radiation heat transfer, the Stefan-Boltzmann constant (σ) is used in the equation for:

Options :

1. ✖ Thermal diffusivity

2. ✖ The rate of heat loss by convection

The total radiation emitted by a black body

3. ✔

The rate of heat transfer by conduction

4. ✖

Question Number : 25 Question Id : 8318967345 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

What is the primary cause of surface tension in a liquid?

Options :

The cohesive forces between the molecules of the liquid

1. ✔

The gravitational pull on the liquid molecules

2. ✖

The adhesive forces between the liquid and the container

3. ✖

The chemical reactions occurring at the surface of the liquid

4. ✖

Question Number : 26 Question Id : 8318967346 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following metals is most susceptible to stress corrosion cracking (SCC) in chloride environments?

Options :

1. ✖ Carbon steel

2. ✖ Copper

3. ✖ Titanium

4. ✔ Austenitic stainless steel

Question Number : 27 Question Id : 8318967347 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following is a common method used for the concentration of sulfide ores?

Options :

1. ✖ Magnetic separation

2. ✖ Leaching

3. ✔ Froth flotation

4. ✖ Gravity separation

Question Number : 28 Question Id : 8318967348 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Comminution refers to:

Options :

1. ✖ Electrolytic refining

2. ✖ Chemical separation

3. ✔ Crushing and grinding of ores

Melting of ores

4. ✖

Question Number : 29 Question Id : 8318967349 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following is a pyro-metallurgical process?

Options :

Electrolysis

1. ✖

Roasting

2. ✔

Ion exchange

3. ✖

Leaching

4. ✖

Question Number : 30 Question Id : 8318967350 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The process of agglomeration is primarily used to:

Options :

1. ✖ Increase ore porosity

2. ✖ Improve floatability

3. ✔ Prepare fine particles for furnace use

4. ✖ Reduce slag volume

Question Number : 31 Question Id : 8318967351 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In size classification of ore particles, which equipment is commonly used?

Options :

1. ✖ Rotary kiln

2. ✖ Froth column

3. ✔ Cyclone separator

4. ✖ Ball mill

Question Number : 32 Question Id : 8318967352 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which method is most suitable for extraction of aluminium from bauxite?

Options :

1. ✖ Roasting

2. ✔ Electrolytic reduction

3. ✖ Magnetic separation

4. ✖ Froth flotation

Question Number : 33 Question Id : 8318967353 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The main reducing agent in a blast furnace is:

Options :

1. ✔ Carbon monoxide

2. ✖ Hydrogen

3. ✖ Limestone

4. ✖ Coke ash

Question Number : 34 Question Id : 8318967354 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Zinc is commonly extracted using:

Options :

1. ✖ Electrolysis directly

Roasting followed by electrolysis

2. ✖

Roasting and reduction

3. ✔

Smelting with carbon

4. ✖

Question Number : 35 Question Id : 8318967355 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In steelmaking, slag primarily functions to:

Options :

Improve thermal conductivity

1. ✖

Remove impurities

2. ✔

Add carbon

3. ✖

Increase viscosity

4. ✖

Question Number : 36 Question Id : 8318967356 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Ladle metallurgy involves:

Options :

Ore crushing

1. ✖

Secondary steel refining

2. ✔

Electrolysis

3. ✖

Ore concentration

4. ✖

Question Number : 37 Question Id : 8318967357 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which element is commonly used for desulphurization in ladle metallurgy?

Options :

1. ✔ Calcium

2. ✖ Oxygen

3. ✖ Aluminium

4. ✖ Carbon

Question Number : 38 Question Id : 8318967358 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following processes is used for the extraction of copper from low-grade ores?

Options :

1. ✖ Electro-refining

2. ✖ Liquation

3. ✖ Roasting

4. ✔ Bioleaching

Question Number : 39 Question Id : 8318967359 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following conditions favour dephosphorization in steel making?

Options :

1. ✖ Acid slag and oxidizing atmosphere

2. ✔ Basic slag and oxidizing atmosphere

3. ✖ Acid slag and reducing atmosphere

4. ✖ Basic slag and reducing atmosphere

Question Number : 40 Question Id : 8318967360 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In LD process, silicon removal takes place before carbon removal since:

Options :

1. ✖ % Si in hot metal is less than % C

2. ✔ SiO_2 is thermodynamically more stable than CO under LD conditions

3. ✖ LD slag is acidic

4. ✖ Activity of silicon is higher than activity of carbon in hot metal

Question Number : 41 Question Id : 8318967361 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

High top pressure in the blast furnace:

Options :

1. ✔ Increases the silicon content in hot metal

2. ✖ Increases the sulphur content in hot metal

3. ✖ Increases the phosphorous content in hot metal

4. ✖ Decreases the silicon content in hot metal

Question Number : 42 Question Id : 8318967362 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

If the contact angle between a mineral and water is 0°, the mineral will

Options :

1. ✔ Be completely wetted by water

Be partly wetted by water

2. ✖

Not be wetted by water

3. ✖

Float in water

4. ✖

Question Number : 43 Question Id : 8318967363 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Match the following processes with their physical principles.

(A) Flotation	(1) difference in specific gravity
(B) Jigging	(2) difference in hydrophobicity
(C) Heavy media separation	(3) differential lateral movement
(D) Tabling	(4) differential initial acceleration

Options :

1. ✖ A-3, B-1, C-4, D-2

2. ✖ A-2, B-4, C-3, D-1

3. ✖ A-3, B-1, C-4, D-3

4. ✔ A-2, B-4, C-1, D-3

Question Number : 44 Question Id : 8318967364 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In refining process, _____ of a system works against the refiner.

Options :

1. ✖ Enthalpy

2. ✖ Gibbs free energy

3. ✔ Entropy

4. ✖ Internal energy

Question Number : 45 Question Id : 8318967365 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Forsterite is a mineral of:

Options :

1. ✖ Co

2. ✖ Fe

3. ✖ Ni

4. ✔ Mg

Question Number : 46 Question Id : 8318967366 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The Rhombohedral crystal structure has (where a, b, c are lattice parameters and α, β, γ are their angles):

Options :

1. ✖ $a = b = c, \alpha = \beta = \gamma = 90^0$

2. ✖ $a \neq b \neq c, \alpha \neq \beta \neq \gamma \neq 90^0$

3. ✖ $a \neq b = c, \alpha \neq \beta = \gamma = 90^0$

4. ✔ $a = b = c, \alpha = \beta = \gamma \neq 90^0$

Question Number : 47 Question Id : 8318967367 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The relationship between spread out film(S) and the radius of the powder camera(R) in Debye-Scherrer powder diffraction is (Where θ is the angle):

Options :

1. ✖ $R = 4S\theta$

2. ✔ $S = 4R\theta$

3. ✖ $R = S\theta$

4. ✖ $S = R\theta$

Question Number : 48 Question Id : 8318967368 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In X-ray diffraction analysis, the condition for BCC crystal where the reflection are allowed is (where h, k, l are miller indices)

Options :

1. ✔ $h + k + l$ is even

2. ✖ h, k, l are all odd

3. ✖ $(h + k + l)/4$ is odd

4. ✖ $h^2 + k^2 + l^2 = 0$

Question Number : 49 Question Id : 8318967369 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

An example of Secondary bond is:

Options :

1. ✖ Covalent bond

2. ✖ Metallic bond

3. ✔ Vander Waals bond

4. ✖ Ionic bond

Question Number : 50 Question Id : 8318967370 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

If the mean bond length increases with temperature in material, then the material exhibits:

Options :

1. ✖ Thermal stability

2. ✔ Thermal expansion

3. ✖ Thermal contact

4. ✖ Thermal conductivity

Question Number : 51 Question Id : 8318967371 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following elements/compound has high bonding energy?

Options :

1. ✖ Silicon

2. ✔ Diamond

3. ✖ Germanium

Silicon Carbide

4. ✖

Question Number : 52 Question Id : 8318967372 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

An example of long chain polymer which exhibit unique rubbery behaviour is:

Options :

Plastics

1. ✖

Elastomers

2. ✔

Fibres

3. ✖

thermosets

4. ✖

Question Number : 53 Question Id : 8318967373 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The polymer used as sound proofing in refrigerators and buildings is:

Options :

1. ✖ Polypropylene

2. ✖ Polyvinylchloride

3. ✖ Polyethylene

4. ✔ Polystyrene

Question Number : 54 Question Id : 8318967374 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following is a peritectic reaction?

Options :

1. ✖ $Solid_1 + Solid_2$ gives $Solid_3$

2. ✖ Liquid gives solid$_1$ +Solid$_2$

3. ✖ Solid$_1$ gives Solid $_2$ + Solid$_3$

4. ✔ Liquid + Solid$_1$ gives Solid$_2$

Question Number : 55 Question Id : 8318967375 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Razor blades are made of:

Options :

1. ✖ Medium carbon steel

2. ✖ Mild steel

3. ✔ High carbon steel

4. ✖ Pure Iron

Question Number : 56 Question Id : 8318967376 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

To produce malleable cast iron, the silicon content must be:

Options :

1. ✔ 1%

2. ✖ 2.5%

3. ✖ 5%

4. ✖ 10%

Question Number : 57 Question Id : 8318967377 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following is in the decreasing order of hardness in Rockwell C-scale?

Options :

1. ✖ Bainite, Martensite, Fine Pearlite, Coarse Pearlite

2. ✔ Martensite, Bainite, Fine Pearlite, Coarse Pearlite

3. ✖ Coarse Pearlite, Fine Pearlite, Bainite, Martensite

4. ✖ Martensite, Bainite, Coarse Pearlite, Fine Pearlite

Question Number : 58 Question Id : 8318967378 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

For an ASTM grain size number of 8, approximately how many grains would be visible per square inch at a magnification of 100×_____.

Options :

1. ✖ 64 grains/in^2

2. ✖ 100 grains/in^2

3. ✔ 128 grains/in^2

4. ✖ 256 grains/in²

Question Number : 59 Question Id : 8318967379 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The structure of a polymer depends on:

Options :

1. ✖ Crystal size

2. ✔ Chain structure and crosslinking

3. ✖ Grain size

4. ✖ Surface finish

Question Number : 60 Question Id : 8318967380 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The incubation of period at nose temperature region of TTT diagram of eutectoid steel is shorter than below and above nose regions. This is due to:

Options :

1. ✖ Slow cooling rate

2. ✖ More diffusion

3. ✔ Optimum nucleation and diffusion

4. ✖ Less nucleation

Question Number : 61 Question Id : 8318967381 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Pearlitic content of normalized steel is slightly higher than slowly cooled steel, because:

Options :

1. ✔ Cooling rate shifts the eutectic point towards left side

2. ✖ Cooling rate increase the carbon concentration

3. ✖ More diffusion due to faster cooling

4. ✖ Cooling rate reduce the nucleation sites

Question Number : 62 Question Id : 8318967382 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Spheriodal grey cast iron (SG Iron) will be produced by:

Options :

1. ✖ Controlling carbon content

2. ✔ Inoculation with Mg

3. ✖ Malleabilisation treatment

Controlling Carbon Equivalent

4. ✖

Question Number : 63 Question Id : 8318967383 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The (α+β) Ti alloys are solution treated in the:

Options :

α region

1. ✖

β region

2. ✖

(α+β) region

3. ✔

γ region

4. ✖

Question Number : 64 Question Id : 8318967384 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Addition of Pb in Brass improves:

Options :

1. ✔ Machinability

2. ✖ Strength

3. ✖ Toughness

4. ✖ Ductility

Question Number : 65 Question Id : 8318967385 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The strength of grain boundary and grains are equal:

Options :

1. ✔ At equi cohesive temperature

2. ✖ Above equi cohesive temperature

3. ✖ Below equi cohesive temperature

4. ✖ At recrystallisation temperature

Question Number : 66 Question Id : 8318967386 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The Larson-Miller parameter is used to:

Options :

1. ✖ Estimate the fatigue life of materials under variable loading

2. ✔ Predict the creep rupture life of materials at high temperatures

3. ✖ Determine the fracture toughness of materials

4. ✖ Assess the impact resistance of materials

Question Number : 67 Question Id : 8318967387 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

According to Griffith's theory, the critical condition for crack propagation in a brittle material is when the energy release rate G equals:

Options :

1. ✖ The strain energy density at the crack tip.

2. ✖ The total strain energy in the material.

3. ✔ The surface energy per unit area of the crack.

4. ✖ The elastic modulus of the material

Question Number : 68 Question Id : 8318967388 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In which crystal structure is dislocation motion most difficult due to limited slip systems?

Options :

1. ✖ FCC

2. ✖ BCC

3. ✔ HCP

4. ✖ SC

Question Number : 69 Question Id : 8318967389 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Strain hardening in metals leads to:

Options :

1. ✖ A decrease in dislocation density

2. ✖ An increase in Porosity

3. ✔ An increase in hardness and strength

A reduction in grain size

4. ✖

Question Number : 70 Question Id : 8318967390 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In a compression test, a ductile material specimen typically exhibits:

Options :

Necking and fracture is observed

1. ✖

Brittle fracture occur

2. ✖

Significant elongation takes place

3. ✖

Significant shortening and bulging take place

4. ✔

Question Number : 71 Question Id : 8318967391 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Stage II creep is characterized by:

Options :

1. ✖ Accelerating strain rate

2. ✔ Constant strain rate

3. ✖ Decelerating strain rate

4. ✖ No strain

Question Number : 72 Question Id : 8318967392 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following is a key characteristic of hot working processes?

Options :

1. ✖ Material is worked below its recrystallization temperature

2. ✔ Material is worked above its recrystallization temperature

3. ✖ Material does not undergo significant plastic deformation

4. ✖ Material retains its shape and structure after deformation

Question Number : 73 Question Id : 8318967393 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In rolling, the term "frictional shear stress" is used to describe which of the following?

Options :

1. ✖ The resistance of the workpiece to deformation during rolling

2. ✖ The pressure exerted by the rolls on the material

3. ✔ The tangential force at the work-roll interface causing plastic deformation

4. ✖ The normal stress experienced by the workpiece as it enters the roll gap

Question Number : 74 Question Id : 8318967394 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Fiber strengthening is effective in:

Options :

1. ✖ Isotropic materials

2. ✔ Anisotropic materials with aligned fibers

3. ✖ Materials with high dislocation density

4. ✖ Materials with fine grain size

Question Number : 75 Question Id : 8318967395 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Critical resolved shear stress is zero when slip plane is _____ degree to loading axis.

Options :

1. ✖ 0

2. ✖ 45

3. ✔ 90

4. ✖ 60

Question Number : 76 Question Id : 8318967396 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The co efficient of friction increases by 5 times when a slab is hot rolled in a specific mill. The maximum possible reduction

Options :

1. ✖ increases by 5 times

2. ✔ increases by 25 times

3. ✖ decreases by 5 times

4. ✖ decreases by 25 times

Question Number : 77 Question Id : 8318967397 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which type of dislocation has the Burgers vector parallel to the dislocation line?

Options :

1. ✖ Edge

2. ✔ Screw

3. ✖ Mixed

4. ✖ Partial

Question Number : 78 Question Id : 8318967398 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Stress fields around dislocations cause:

Options :

1. ✖ Ductility increase

2. ✔ Lattice distortion

3. ✖ Phase transformation

4. ✖ Grain refinement

Question Number : 79 Question Id : 8318967399 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The multiplication of dislocations is explained by:

Options :

1. ✖ Twinning mechanism

2. ✖ Griffith theory

3. ✔ Frank-Read source

4. ✖ Edge slip

Question Number : 80 Question Id : 8318967400 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Partial dislocations are associated with:

Options :

1. ✔ FCC metals

2. ✖ BCC metals

3. ✖ HCP metals

4. ✖ Ceramics only

Question Number : 81 Question Id : 8318967401 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Fracture toughness is a measure of:

Options :

1. ✖ Strength

2. ✖ Hardness

3. ✔ Resistance to crack propagation

4. ✖ Ductility

Question Number : 82 Question Id : 8318967402 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Slip occurs on planes with:

Options :

1. ✖ Maximum bond strength

2. ✖ Highest energy

3. ✔ Highest atomic density

4. ✖ Random orientation

Question Number : 83 Question Id : 8318967403 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Irwin modified the Griffith's theory and introduced the concept of:

Options :

1. ✔ Stress intensity factor.

Plastic zone size.

2. ✖

Energy release rate.

3. ✖

Crack tip opening displacement

4. ✖

Question Number : 84 Question Id : 8318967404 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The strain rate sensitivity of flow stress for occurrence of super-plasticity is in the range of:

Options :

1. ✔ 0.3-0.6

0.01-0.1

2. ✖

0.1-0.2

3. ✖

4. ✖ 0

Question Number : 85 Question Id : 8318967405 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The stress ratio for completely reversed fatigue cycle is:

Options :

1. ✖ 1

2. ✖ 0.5

3. ✔ -1

4. ✖ -0.5

Question Number : 86 Question Id : 8318967406 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following gating ratio is normally followed for Al alloys:

Options :

1. ✖ 1 : 0.75 : 0.5

2. ✖ 2 : 1 : 0.5

3. ✖ 4 : 3 : 1

4. ✔ 1 : 2 : 2

Question Number : 87 Question Id : 8318967407 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Usual casting method for making dental crowns:

Options :

1. ✖ Sand casting

2. ✖ Die casting

3. ✖ Continuous casting

Investment casting

4. ✔

Question Number : 88 Question Id : 8318967408 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Compression ratio is defined as:

Options :

Ratio of green density to apparent density

1. ✔

Ratio of height to diameter

2. ✖

Ratio of sintered strength to green strength

3. ✖

Ratio of apparent density to tap density

4. ✖

Question Number : 89 Question Id : 8318967409 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Sinterability of aluminium is poor, because:

Options :

soft nature of powder

1. ✖

poor compressibility

2. ✖

presence of inherent oxide

3. ✔

higher thermal conductivity

4. ✖

Question Number : 90 Question Id : 8318967410 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In cored structure:

Options :

There are no composition fluctuations from core to the tip

1. ✖

There are composition fluctuations from core to the tip

2. ✔

3. ✖ Equiaxed structure

4. ✖ Dentritic segregation

Question Number : 91 Question Id : 8318967411 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Catastrophic oxidation occurs in metals which exhibit:

Options :

1. ✖ Parabolic kinetics

2. ✖ Cubic kinetics

3. ✔ Linear kinetics

4. ✖ Logarithmic kinetics

Question Number : 92 Question Id : 8318967412 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Meehanite is the proprietary name for a patented series of high duty cast irons inoculated with:

Options :

1. ✖ Magnesium

2. ✖ Manganese

3. ✖ Ferro silicon

4. ✔ Calcium silicate

Question Number : 93 Question Id : 8318967413 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Earing is common defect in:

Options :

1. ✔ Deep drawing

2. ✖ Rolling

Extrusion

3. ✖

Forging

4. ✖

Question Number : 94 Question Id : 8318967414 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Fine and spherical powder particles offer poor compressibility and good sinterability. This is due to:

Options :

Interparticle friction and more contact points

1. ✔

Narrow distribution and high compression

2. ✖

More strength and less porosity

3. ✖

Good flow rate and less friction

4. ✖

Question Number : 95 Question Id : 8318967415 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Densification of green compacts during sintering is predominantly by:

Options :

1. Adhesion mechanism ✖

2. Recrystallization ✖

3. Volume diffusion ✔

4. Surface diffusion ✖

Question Number : 96 Question Id : 8318967416 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The following technique is most probably recommended for consolidation of nanostructured and amorphous powders:

Options :

1. ✖ Hot pressing

2. ✖ Metal injection moulding

3. ✖ Cold isostatic pressing

4. ✔ Spark Plasma sintering

Question Number : 97 Question Id : 8318967417 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Pourbiax diagrams are graphical plots of _____.

Options :

1. ✖ current Vs voltage

2. ✔ Potential Vs pH

3. ✖ pH Vs current

4. ✖ potential Vs time

Question Number : 98 Question Id : 8318967418 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following is the major drawback of using X-rays compared to gamma rays for inspecting thick materials in Radiography Test?

Options :

1. ✖ X-rays require a higher energy source than gamma rays

2. ✖ X-rays produce more secondary radiation, which can be hazardous

3. ✖ X-rays can only be used for surface inspections

4. ✔ X-rays have a higher attenuation rate in dense materials

Question Number : 99 Question Id : 8318967419 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following is a defect in the rolling process?

Options :

1. Flash ✖

2. Alligatoring ✔

3. Surface porosity ✖

4. Wrinkling ✖

Question Number : 100 Question Id : 8318967420 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following is NOT a part of a typical gating system in sand casting?

Options :

1. ✖ Sprue

2. ✖ Runner

3. ✖ Ingate

4. ✔ Chaplets

Question Number : 101 Question Id : 8318967421 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

What is the main problem when welding stainless steels, particularly in the HAZ (Heat-Affected Zone)?

Options :

1. ✔ Formation of carbides at grain boundaries

2. ✖ Decrease in hardness

3. ✖ Increased toughness

4. ✖ Formation of excessive martensite

Question Number : 102 Question Id : 8318967422 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

What is the effect of increasing the riser-to-casting volume ratio?

Options :

1. ✖ Improved casting yield

2. ✖ Increased casting yield

3. ✔ Decreased casting yield

4. ✖ No effect on casting yield

Question Number : 103 Question Id : 8318967423 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Correct Marks : 1 Wrong Marks : 0

The wax pattern in investment casting is removed by:

Options :

1. ✔ Burning it out in a furnace

2. ✖ Immersing it in a hot acid bath

3. ✖ Mechanical breaking

4. ✖ Dissolving it in a solvent

Question Number : 104 Question Id : 8318967424 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Correct Marks : 1 Wrong Marks : 0

Which of the following types of penetrant is most commonly used for detecting very fine surface cracks in non-porous materials?

Options :

1. ✔ Fluorescent penetrant

Visible penetrant

2. ✖

Water-soluble penetrant

3. ✖

Oil-based penetrant

4. ✖

Question Number : 105 Question Id : 8318967425 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Permanent mould casting is best suited for which of the following production areas?

Options :

Low-volume production of large parts with intricate features

1. ✖

Mass production of large parts with simple geometries

2. ✖

High-precision casting of metals with high melting points

3. ✖

4. ✔ High-volume production of small, complex parts with high dimensional accuracy

Question Number : 106 Question Id : 8318967426 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

In shell moulding, the binder used to hold the sand grains together is:

Options :

1. ✖ Clay

2. ✖ Sodium silicate

3. ✔ Thermoplastic resin

4. ✖ Silica gel

Question Number : 107 Question Id : 8318967427 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

What is the relationship between the frequency of the sound waves and the ability to detect smaller defects in Ultrasonic testing?

Options :

1. ✖ Higher frequency waves detect larger defects

2. ✖ Lower frequency waves detect smaller defects

3. ✔ Higher frequency waves detect smaller defects

4. ✖ There is no relationship between frequency and defect size

Question Number : 108 Question Id : 8318967428 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

How brazing is differ from welding?

Options :

1. ✔ The base metal is heated to a temperature below its melting point

2. ✖ The filler metal and base metal are both heated above their melting points

3. ✖ The filler metal is melted at a higher temperature than the base metal

4. ✖ Both the base metal and filler metal remain below their melting points

Question Number : 109 Question Id : 8318967429 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Which of the following is a common defect in wire drawing processes, particularly when excessive friction is present at the die-workpiece interface?

Options :

1. ✖ Die wear

2. ✔ Surface cracks on the wire

3. ✖ Material elongation

4. ✖ Necking of the wire

Question Number : 110 Question Id : 8318967430 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Back Scattered electrons are used in:

Options :

1. ✔ Scanning electron microscope

2. ✖ Optical microscope

3. ✖ Transmission electron microscope

4. ✖ X-ray diffraction analysis

Question Number : 111 Question Id : 8318967431 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

If $\begin{bmatrix} 2k+7 & 2k^2-5k+3 \\ 3k-3 & 15 \end{bmatrix}$ is a 2×2 symmetric matrix, then the value of k is _____

Options :

1. ✖ 4

2. ✖ -1

3. ✔ 3

4. ✖ 0

Question Number : 112 Question Id : 8318967432 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The eigenvalues of the matrix $\begin{bmatrix} 2 & 1-2i \\ 1+2i & -2 \end{bmatrix}$ are _____

Options :

1. ✖ $-3i, 3i$

2. ✔ $-3,3$

3. ✖ $-2,2$

4. ✖ $-2i, 2i$

Question Number : 113 Question Id : 8318967433 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Consider the improper integral $I = \int_{2025}^{2030} \frac{1}{(x-2025)^k} dx, k > 0$. Which of the following is true for I?

Options :

1. ✔ I is convergent if $k < 1$ and is divergent if $k \geq 1$

2. ✖ I is convergent if $k \leq 1$ and is divergent if $k > 1$

3. ✖ I is convergent if $k \geq 1$ and is divergent if $k < 1$

4. ✖ I is convergent if $k > 1$ and is divergent if $k \leq 1$

Question Number : 114 Question Id : 8318967434 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The Laplace transform of $e^{-2t}\cos(\sqrt{2}t)$ is _____

Options :

1. ✖ $\frac{s-2}{(s-2)^2+2}$, $s > 2$

2. ✖ $\frac{2}{(s+2)^2+2}$, $s > -2$

3. ✖ $\frac{\sqrt{2}}{(s+2)^2+2}$, $s > -2$

4. ✔ $\frac{s+2}{(s+2)^2+2}$, $s > -2$

Question Number : 115 Question Id : 8318967435 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

The line integral of the vector field $\vec{F} = x\hat{\imath} - 2y\hat{\jmath} + z\hat{k}$ along the straight line path from the point $(-1,2,3)$ to $(2,3,5)$, is _____

Options :

1. ✖ $\frac{-1}{2}$

2. ✔ $\frac{9}{2}$

3. ✖ $\frac{13}{2}$

4. ✖ $\frac{-7}{2}$

Question Number : 116 Question Id : 8318967436 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Consider the ordinary differential equation $x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = 0$ with $y(x)$ as a general solution. Given the values of $y(1) = 1$, $y(2) = 5$, the value of $y(3)$ is equal to _____

Options :

1. ✖ 9

2. ✔ 12

3. ✖ 15

4. ✖ -15

Question Number : 117 Question Id : 8318967437 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

If X is a continuous random variable with the probability density function

$$f(x) = \begin{cases} cx^3, & \text{if } 0 \le x \le 2 \\ 0, & \text{otherwise} \end{cases}$$, then $P\left(\frac{1}{2} < X < \frac{3}{2}\right)$ is _____

Options :

1. ✔ $\frac{5}{16}$

2. ✖ $\frac{1}{8}$

3. ✖ $\frac{5}{8}$

4. ✖ $\frac{1}{16}$

Question Number : 118 Question Id : 8318967438 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

If A and B are two mutually exclusive events with $P(B) \neq 1$, then conditional probability $P(A|\bar{B}) =$ __, where $\bar{B}$ is the complement of B

Options :

1. ✖ $\frac{1}{P(B)}$

2. ✖ $\frac{P(A)}{P(B)}$

3. ✖ $\frac{1}{1-P(B)}$

4. ✔ $\frac{P(A)}{1-P(B)}$

Question Number : 119 Question Id : 8318967439 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Evaluation of the integral $\int_2^4 x^2 dx$ using the trapezoidal rule (with two equal segments) gives a value of _____

Options :

1. ✖ 14.5

2. ✖ 22.5

3. ✔ 19.0

4. ✖ 18.6

Question Number : 120 Question Id : 8318967440 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Correct Marks : 1 Wrong Marks : 0

Let $f(x) = x^3 - x - 3$. In finding a positive real root of $f(x) = 0$ using Newton-Raphson method, if the starting guess $x_0 = 2$, then the numerical value of the root x_1 after the first iteration is _____

Options :

1. ✖ 1.5

2. ✖ 1.6

3. ✔ 1.7

4. ✖ 1.8