Andhra Pradesh State Council of Higher Education

Notations :

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

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

Question Paper Name :	Metallurgy 30th April 2026 Shift 1
Subject Name :	Metallurgy
Creation Date :	2026-04-30 12:28:35
Duration :	120
Number of Questions :	120
Total Marks :	120
Display Marks:	No
Change Font Color :	No
Change Background Color :	No
Change Theme :	No
Help Button :	No
Show Reports :	No
Show Progress Bar :	No

Metallurgy

Group Number :	1
Group Id :	75207662
Group Maximum Duration :	0
Group Minimum Duration :	120
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	120

Metallurgy

Section Id :	75207662
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	120
Number of Questions to be attempted :	120
Section Marks :	120
Section Negative Marks :	0
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	75207662
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 1 Question Id : 7520767321 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The first law of thermodynamics is based on the principle of:

Options :

1. ✔ Energy conservation

2. ✖ Entropy increase

3. ✖ Heat transfer

4. ✖ Irreversibility

Question Number : 2 Question Id : 7520767322 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Ellingham diagrams are mainly used to determine:

Options :

1. ✖ Phase equilibrium

2. ✔ Oxide stability

3. ✖ Reaction kinetics

4. ✖ Diffusion coefficients

Question Number : 3 Question Id : 7520767323 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The equilibrium constant of a reaction depends mainly on:

Options :

1. ✖ Pressure

2. ✔ Temperature

3. ✖ Volume

4. ✖ Catalyst

Question Number : 4 Question Id : 7520767324 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Diffusion governed by concentration gradient follows

Options :

1. ✖ Newton's law

2. ✔ Fick's law

3. ✖ Hooke’s law

4. ✖ Faraday’s law

Question Number : 5 Question Id : 7520767325 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Bernoulli’s equation relates

Options :

1. ✖ heat and work

2. ✖ stress and strain

3. ✖ diffusion and temperature

4. ✔ pressure and velocity

Question Number : 6 Question Id : 7520767326 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Reaction order describes dependence of rate on

Options :

1. ✔ concentration

2. ✖ temperature

3. ✖ pressure

4. ✖ catalyst

Question Number : 7 Question Id : 7520767327 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

High temperature corrosion mainly involves

Options :

1. ✖ diffusion of gases only

2. ✖ mechanical wear

3. ✖ plastic deformation

4. ✔ oxidation reactions

Question Number : 8 Question Id : 7520767328 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The driving force for diffusion is

Options :

1. ✖ temperature gradient

2. ✖ pressure gradient

3. ✔ chemical potential gradient

4. ✖ magnetic field

Question Number : 9 Question Id : 7520767329 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Aqueous corrosion of metals generally involves

Options :

1. ✔ electrochemical reactions

2. ✖ mechanical wear

3. ✖ thermal decomposition

4. ✖ magnetic interaction

Question Number : 10 Question Id : 7520767330 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Radiation heat transfer occurs through

Options :

1. ✖ molecular collision

2. ✖ electron transfer

3. ✖ fluid flow

4. ✔ electromagnetic waves

Question Number : 11 Question Id : 7520767331 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Diffusion in solids is faster when

Options :

1. ✖ pressure decreases

2. ✖ grain size increases

3. ✔ temperature increases

4. ✖ density increases

Question Number : 12 Question Id : 7520767332 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Diffusion in metals generally increases with

Options :

1. ✖ decreasing temperature

2. ✖ increasing pressure

3. ✖ increasing density

4. ✔ increasing temperature

Question Number : 13 Question Id : 7520767333 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which type of corrosion protection involves connecting the metal to be protected to a more reactive "sacrificial" metal?

Options :

1. ✖ Anodic protection

2. ✔ Cathodic protection

3. ✖ Passivation

4. ✖ Galvanizing

Question Number : 14 Question Id : 7520767334 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The Pourbaix diagram represents the metal's:

Options :

1. ✖ Mechanical strength vs. temperature

2. ✔ Potential–pH stability regions

3. ✖ Electrical conductivity vs strength

4. ✖ Magnetic domain formation

Question Number : 15 Question Id : 7520767335 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The Arrhenius expression for diffusion coefficient (D) is:

Options :

1. ✔ $D = D_0 e^{(-Q/RT)}$

2. ✖ $D = D_0 e^{(Q/RT)}$

3. ✖ $D = D_0 T e^{(-Q/RT)}$

4. ✖ $D = D_0 + Q/RT$

Question Number : 16 Question Id : 7520767336 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following is an example of convection?

Options :

1. ✖ Heat moving through a metal rod

2. ✖ Sunlight warming the Earth

3. ✖ Heat in a vacuum

4. ✔ Water circulating in a pot on the stove

Question Number : 17 Question Id : 7520767337 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Rusting of iron occurs due to formation of

Options :

1. ✔ $Fe_2O_3 \cdot nH_2O$

2. ✖ FeO

3. ✖ Fe_3O_4

4. ✖ $Fe(OH)_4$

Question Number : 18 Question Id : 7520767338 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

According to the second law, which of the following is impossible?

Options :

1. ✖ Melting of ice at 0°C

2. ✔ 100% conversion of heat to work

3. ✖ Expansion of gas into a vacuum

4. ✖ Reversible adiabatic expansion

Question Number : 19 Question Id : 7520767339 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In a galvanic couple, which metal acts as anode?

Options :

1. ✖ The more noble metal

2. ✔ The less noble metal

3. ✖ Both equally

4. ✖ Depends on current

Question Number : 20 Question Id : 7520767340 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A perfect black body:

Options :

1. ✖ Reflects all incident radiation

2. ✔ Absorbs all incident radiation

3. ✖ Transmits all radiation

4. ✖ Scatters all light

Question Number : 21 Question Id : 7520767341 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which factor increases the rate of diffusion in solids?

Options :

1. ✖ Lower temperature

2. ✔ Higher temperature

3. ✖ Higher atomic radius

4. ✖ Presence of impurities

Question Number : 22 Question Id : 7520767342 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Comminution energy requirement is quantitatively estimated using:

Options :

1. ✖ Stokes' law

2. ✖ Raoult's law

3. ✖ Darcy's law

4. ✔ Bond's law

Question Number : 23 Question Id : 7520767343 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The Boudouard reaction ($C + CO_2 \rightleftharpoons 2CO$) in smelting is:

Options :

1. ✖ Exothermic at all temperatures

2. ✔ Endothermic at high temperatures, favouring CO formation

3. ✖ Exothermic at high temperatures

4. ✖ Irreversible

Question Number : 24 Question Id : 7520767344 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The slag's basicity index (B) in pyrometallurgy is defined as:

Options :

1. ✖ $(SiO_2 + Al_2O_3)/(CaO + MgO)$

2. ✖ $(CaCO_3 + CaO)/(Fe_2O_3)$

3. ✖ $(Fe_2O_3 + FeO)/(CaO + MgO)$

4. ✔ $(CaO + MgO)/(SiO_2 + Al_2O_3)$

Question Number : 25 Question Id : 7520767345 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The Parkes Process is a refining technique used to remove the following impurities from crude lead

Options :

1. ✖ Nickel and Zinc

2. ✖ Copper and Iron

3. ✔ Silver and Gold

4. ✖ Bismuth and Antimony

Question Number : 26 Question Id : 7520767346 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The particle Reynolds number (Re) in fluid classification is given by:

Options :

1. ✔ $Re = (\rho dV)/\mu$

2. ✖ $Re = (\mu V)/\rho$

3. ✖ $Re = (\rho gV)/\sigma$

4. ✖ $Re = (\rho^2 V)/\mu^2$

Question Number : 27 Question Id : 7520767347 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which refining method is most suitable for zinc?

Options :

1. ✔ Vacuum distillation

2. ✖ Electro refining

3. ✖ Fire refining

4. ✖ Zone refining

Question Number : 28 Question Id : 7520767348 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The main combustible component in most common fuels (solid, liquid and gas) is

Options :

1. ✖ Oxygen

2. ✖ Nitrogen

3. ✖ Argon

4. ✔ Carbon and Hydrogen

Question Number : 29 Question Id : 7520767349 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following refractories is best for handling molten steel with high oxygen activity?

Options :

1. ✖ Carbon-based refractories

2. ✔ Magnesia-carbon

3. ✖ Silica

4. ✖ Fireclay

Question Number : 30 Question Id : 7520767350 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The froth flotation method is mainly used for

Options :

1. ✖ oxide ores

2. ✖ carbonate ores

3. ✔ sulphide ores

4. ✖ silicate ores

Question Number : 31 Question Id : 7520767351 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Gravity separation processing method depends on the difference in

Options :

1. ✖ colour

2. ✖ temperature

3. ✖ reactivity

4. ✔ density

Question Number : 32 Question Id : 7520767352 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Agglomeration processes include

Options :

1. ✔ pelletizing and sintering

2. ✖ roasting and smelting

3. ✖ leaching and refining

4. ✖ casting and forging

Question Number : 33 Question Id : 7520767353 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Bayer process is used for extraction of

Options :

1. ✖ Alumina

2. ✖ Zinc

3. ✔ Aluminum

4. ✖ Copper

Question Number : 34 Question Id : 7520767354 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Titanium extraction commonly involves

Options :

1. ✔ Kroll process

2. ✖ Hall process

3. ✖ Bayer process

4. ✖ Mond process

Question Number : 35 Question Id : 7520767355 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following part is attached with an iron blast furnace to purge Hot Blast air?

Options :

1. ✖ Ventury scrubber

2. ✔ Tuyeres

3. ✖ Bleeder valves

4. ✖ Barrel

Question Number : 36 Question Id : 7520767356 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Pig iron contains around

Options :

1. ✖ ~ 2.1 wt% Carbon

2. ✖ ~ 6.7 wt% Carbon

3. ✖ ~ 0.77 wt% Carbon

4. ✔ ~ 4.0 wt% Carbon

Question Number : 37 Question Id : 7520767357 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Vacuum metallurgy is used to remove

Options :

1. ✖ oxides

2. ✖ slag

3. ✖ carbon

4. ✔ dissolved gases

Question Number : 38 Question Id : 7520767358 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

AOD process is mainly used in

Options :

1. ✖ Copper production

2. ✖ Aluminium refining

3. ✔ Stainless steel refining

4. ✖ Zinc extraction

Question Number : 39 Question Id : 7520767359 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Metallurgical coke acts mainly as

Options :

1. ✖ Oxidizing agent

2. ✖ Catalyst

3. ✔ Reducing agent

4. ✖ Flux

Question Number : 40 Question Id : 7520767360 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Activation polarization is controlled by

Options :

1. ✖ temperature

2. ✔ charge transfer kinetics

3. ✖ fluid flow

4. ✖ diffusion

Question Number : 41 Question Id : 7520767361 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following represents a semi-crystalline polymer?

Options :

1. ✔ Polyethylene

2. ✖ Polycarbonate

3. ✖ Epoxy

4. ✖ Bakelite

Question Number : 42 Question Id : 7520767362 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The ratio of interplanar spacing for (100):(110):(111) planes in a cubic lattice is

Options :

1. ✔ $1 : 1/\sqrt{2} : 1/\sqrt{3}$

2. ✖ $1 : \sqrt{2} : \sqrt{3}$

3. ✖ $\sqrt{3} : \sqrt{2} : 1$

4. ✖ $1 : 2 : 3$

Question Number : 43 Question Id : 7520767363 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which property increases the thermal conductivity of metals?

Options :

1. ✖ Higher density

2. ✖ Smaller grain size

3. ✖ Lower atomic mass

4. ✔ Greater number of free electrons

Question Number : 44 Question Id : 7520767364 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following alloys cannot be strengthened by heat treatment?

Options :

1. ✖ Al-Cu-Mg

2. ✖ Cu-Be

3. ✔ 70-30 Brass (Cu-Zn)

4. ✖ Al-Zn-Mg-Cu

Question Number : 45 Question Id : 7520767365 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which substance is known for very high thermal conductivity at room temperature?

Options :

1. ✖ Silicon

2. ✖ Teflon

3. ✔ Graphene

4. ✖ Iron

Question Number : 46 Question Id : 7520767366 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The material with a band gap of 0 eV is

Options :

1. ✔ Metal

2. ✖ Semiconductor

3. ✖ Insulator

4. ✖ Dielectric

Question Number : 47 Question Id : 7520767367 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The effective number of atoms in a body-centered cubic (BCC) unit cell is

Options :

1. ✖ 1

2. ✔ 2

3. ✖ 4

4. ✖ 8

Question Number : 48 Question Id : 7520767368 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In martempering, the steel is quenched to a temperature:

Options :

1. ✖ At Ms

2. ✖ Below Mf

3. ✖ Just below Ac3

4. ✔ Just above Ms

Question Number : 49 Question Id : 7520767369 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The following elements forms an isomorphous phase diagram

Options :

1. ✔ Cu-Ni

2. ✖ Cu-Sn

3. ✖ Pb-Sn

4. ✖ Ni-Zn

Question Number : 50 Question Id : 7520767370 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In a TTT diagram, increasing alloying elements generally causes:

Options :

1. ✖ Leftward shift of C-curve

2. ✔ Rightward shift of C-curve

3. ✖ No change

4. ✖ Steeper C-curve

Question Number : 51 Question Id : 7520767371 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The d-spacing of an FCC lattice in [110] plane if lattice parameter (a)=3.60 A is:

Options :

1. ✔ 2.55 A

2. ✖ 1.80 A

3. ✖ 0.39 A

4. ✖ 5.09 A

Question Number : 52 Question Id : 7520767372 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The BCC lattice has systematic extinction rules where reflections only occur if the sum of the indices is

Options :

1. ✖ h+k+l=odd

2. ✔ h+k+l=even

3. ✖ h+k=l

4. ✖ h+l=k

Question Number : 53 Question Id : 7520767373 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following elements, when alloyed in steel, is known to significantly lower the Martensite Start Temperature, thereby potentially increasing the amount of retained austenite after quenching?

Options :

1. ✖ Aluminum

2. ✖ Vanadium

3. ✖ Silicon

4. ✔ Nickel

Question Number : 54 Question Id : 7520767374 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which alloying element is typically added to tool steels to achieve secondary hardening during tempering?

Options :

1. ✖ Silicon

2. ✖ Nickel

3. ✖ Copper

4. ✔ Molybdenum

Question Number : 55 Question Id : 7520767375 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The mechanism of Nabarro-Herring creep involves

Options :

1. ✔ Vacancy diffusion through the lattice

2. ✖ Diffusion along grain boundaries only

3. ✖ Dislocation motion

4. ✖ Cross-slip of dislocations

Question Number : 56 Question Id : 7520767376 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The process of carburization of steel, where carbon is diffused into the surface, is an example of

Options :

1. ✖ steady-state diffusion

2. ✔ non-steady-state diffusion

3. ✖ isothermal diffusion

4. ✖ chemical equilibrium

Question Number : 57 Question Id : 7520767377 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The main controlling factor for hardenability is:

Options :

1. ✖ Carbon content

2. ✔ Alloying elements and cooling rate

3. ✖ Grain boundary structure

4. ✖ Quench medium

Question Number : 58 Question Id : 7520767378 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The Burgers vector in a perfect dislocation represents

Options :

1. ✖ Grain boundary direction

2. ✔ Magnitude and direction of lattice distortion

3. ✖ Crystal orientation

4. ✖ Slip plane normal

Question Number : 59 Question Id : 7520767379 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Austempering produces

Options :

1. ✖ Martensite

2. ✔ Bainite

3. ✖ Ferrite

4. ✖ Cementite

Question Number : 60 Question Id : 7520767380 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Nanomaterials have particle size in the range

Options :

1. ✖ >100 μm

2. ✔ 1–100 nm

3. ✖ 1–100 μm

4. ✖ <1 nm

Question Number : 61 Question Id : 7520767381 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Vickers hardness uses

Options :

1. ✖ Tungsten ball

2. ✖ Steel ball

3. ✔ Diamond pyramid

4. ✖ Diamond cone

Question Number : 62 Question Id : 7520767382 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Rockwell hardness measures

Options :

1. ✔ Indentation depth

2. ✖ Indentation diameter

3. ✖ Indentation area

4. ✖ Impact energy

Question Number : 63 Question Id : 7520767383 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Creep occurs under

Options :

1. ✖ low temperature and high stress

2. ✔ high temperature and constant stress

3. ✖ room temperature and cyclic stress

4. ✖ low stress and low temperature

Question Number : 64 Question Id : 7520767384 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

If diameter reduces by 50% during wire drawing, area reduces by

Options :

1. ✖ 25%

2. ✔ 75%

3. ✖ 50%

4. ✖ 10%

Question Number : 65 Question Id : 7520767385 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Lüders bands appear during

Options :

1. ✖ Fatigue

2. ✖ Fracture

3. ✖ Creep

4. ✔ Yield point elongation

Question Number : 66 Question Id : 7520767386 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Brazing temperature is

Options :

1. ✔ above 450°C

2. ✖ below 200°C

3. ✖ above melting point of base metal

4. ✖ room temperature

Question Number : 67 Question Id : 7520767387 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which is the neutral point in rolling?

Options :

1. ✔ Friction changes direction

2. ✖ Thickness is minimum

3. ✖ Temperature is highest

4. ✖ Strain is zero

Question Number : 68 Question Id : 7520767388 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Spring back occurs due to

Options :

1. ✖ grain growth

2. ✖ plastic deformation

3. ✔ elastic recovery

4. ✖ diffusion

Question Number : 69 Question Id : 7520767389 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Solidification cracking occurs due to

Options :

1. ✖ cold working

2. ✖ low temperature

3. ✖ grain growth

4. ✔ segregation and tensile stress

Question Number : 70 Question Id : 7520767390 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Rolling defect “alligatoring” causes

Options :

1. ✔ splitting along centerline

2. ✖ surface cracks

3. ✖ edge waves

4. ✖ thickness variation

Question Number : 71 Question Id : 7520767391 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Lapses in forging occur due to

Options :

1. ✔ improper metal flow

2. ✖ high temperature

3. ✖ high strain rate

4. ✖ low pressure

Question Number : 72 Question Id : 7520767392 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Cold shut occurs when

Options :

1. ✔ two metal streams fail to fuse

2. ✖ gas entrapment occurs

3. ✖ solidification shrinkage occurs

4. ✖ sand collapses

Question Number : 73 Question Id : 7520767393 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Ceramic oxide used for thermal barrier coating in Turbine blades is

Options :

1. ✖ Thoria

2. ✖ Calcium oxide

3. ✖ Magnesia

4. ✔ Zirconia

Question Number : 74 Question Id : 7520767394 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which one of the following is not related to Twin Roll Casting process?

Options :

1. ✖ Mussy zone

2. ✖ Deformation

3. ✖ Separating force

4. ✔ Coring

Question Number : 75 Question Id : 7520767395 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Resistance welding generates heat due to

Options :

1. ✖ Radiation

2. ✖ Friction

3. ✔ Electrical resistance

4. ✖ Chemical reaction

Question Number : 76 Question Id : 7520767396 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Shell moulding uses

Options :

1. ✔ resin coated sand

2. ✖ clay sand

3. ✖ cement mould

4. ✖ graphite mould

Question Number : 77 Question Id : 7520767397 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Shrinkage defects occur due to

Options :

1. ✖ gas absorption

2. ✔ volume contraction during solidification

3. ✖ high pouring temperature

4. ✖ low mould strength

Question Number : 78 Question Id : 7520767398 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The function of a riser in casting is to

Options :

1. ✖ increase cooling rate

2. ✖ remove gases

3. ✖ reduce mould temperature

4. ✔ feed molten metal during solidification

Question Number : 79 Question Id : 7520767399 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the NDT method uses for finding the internal defect of the materials?

Options :

1. ✔ Radiography

2. ✖ Visual inspection

3. ✖ Liquid Penetrating test

4. ✖ Magnetic particle testing

Question Number : 80 Question Id : 7520767400 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The dimensionless number that represents the ratio of the momentum diffusivity to mass diffusivity in a fluid is termed as

Options :

1. ✔ Schmidt number

2. ✖ Biot number

3. ✖ Reynolds number

4. ✖ Nusselt number

Question Number : 81 Question Id : 7520767401 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The Pilling-Bedworth ratio is defined as:

Options :

1. ✖ Density of oxide/ Density of metal

2. ✖ Mass of oxide/ mass of metal

3. ✔ Volume of oxide/ Volume of metal

4. ✖ Volume of metal/ Volume of oxide

Question Number : 82 Question Id : 7520767402 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following gating ratios corresponds to a pressurized gating system during casting?

Options :

1. ✖ 1:2:2

2. ✖ 1:3:3

3. ✔ 1:0.75:0.5

4. ✖ 1:4:4

Question Number : 83 Question Id : 7520767403 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Forming limit diagram (FLD) is used for:

Options :

1. ✖ Casting design

2. ✔ Sheet metal formability analysis

3. ✖ Welding design

4. ✖ Heat treatment

Question Number : 84 Question Id : 7520767404 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Hardenability of steel is measured using which test?

Options :

1. ✖ Rockwell test

2. ✖ Brinell test

3. ✔ Jominy test

4. ✖ Izod test

Question Number : 85 Question Id : 7520767405 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which casting process is best suited for producing hollow, symmetrical parts with good surface finish and precise wall thickness, such as pipes and cylinder liners?

Options :

1. ✖ Die Casting

2. ✔ Centrifugal Casting

3. ✖ Investment Casting

4. ✖ Sand Casting

Question Number : 86 Question Id : 7520767406 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The Schiel equation models

Options :

1. ✖ growth rate during dendritic solidification

2. ✖ thermal diffusivity

3. ✖ change in interface curvature

4. ✔ solute distribution in solid along dendrite arm

Question Number : 87 Question Id : 7520767407 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The primary mechanism that draws the molten filler metal into the narrow gap between the workpieces during brazing is

Options :

1. ✖ gravity flow

2. ✖ surface tension

3. ✔ capillary action

4. ✖ viscosity gradient

Question Number : 88 Question Id : 7520767408 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The ratio of the volume of the die cavity to the volume of the green compact is called the

Options :

1. ✖ Density ratio

2. ✖ Sintering ratio

3. ✔ Compression ratio

4. ✖ Green strength index

Question Number : 89 Question Id : 7520767409 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The units of fracture toughness (K_{IC}) are

Options :

1. ✖ MPa m^2

2. ✔ MPa $m^{1/2}$

3. ✖ N/m^2

4. ✖ J/mol

Question Number : 90 Question Id : 7520767410 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following is an example of a Solid-State Welding process?

Options :

1. ✖ Submerged Arc Welding (SAW)

2. ✖ Gas Metal Arc Welding (GMAW)

3. ✖ Electron Beam Welding (EBW)

4. ✔ Friction Stir Welding (FSW)

Question Number : 91 Question Id : 7520767411 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Grain growth rate (G) is empirically related to time (t) by:

Options :

1. ✔ $G^n - G_0^n = kt$

2. ✖ $G = k/t$

3. ✖ $G = kT$

4. ✖ $G = G_0 + kt^2$

Question Number : 92 Question Id : 7520767412 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Dendrite arm spacing decreases with

Options :

1. ✖ slower cooling rate

2. ✔ gigher cooling rate

3. ✖ greater diffusion

4. ✖ increased alloy solubility

Question Number : 93 Question Id : 7520767413 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In a process carried out at constant volume, the heat absorbed (Q_v) is equal to the change in:

Options :

1. ✖ Gibbs free energy

2. ✖ Enthalpy

3. ✔ Internal energy

4. ✖ Work done

Question Number : 94 Question Id : 7520767414 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which process is fundamentally characterized by the uniform distribution of the substance throughout the bulk phase of the material?

Options :

1. ✖ Adsorption

2. ✖ Desorption

3. ✔ Absorption

4. ✖ Chemisorption

Question Number : 95 Question Id : 7520767415 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The EDX (Energy-Dispersive X-ray) detector used with SEM/TEM provides

Options :

1. ✖ Phase contrast images

2. ✖ Diffraction data

3. ✔ Elemental composition via characteristic X-rays

4. ✖ High-temperature imaging

Question Number : 96 Question Id : 7520767416 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In ferromagnetic materials, magnetic domains:

Options :

1. ✔ Align in the direction of an external field

2. ✖ Are always randomly oriented

3. ✖ Disappear under cooling

4. ✖ Neutralize each other in all cases

Question Number : 97 Question Id : 7520767417 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The rule of mixtures for composite modulus E_c in longitudinal loading is

Options :

1. ✔ $E_c = V_m E_m + V_r E_r$

2. ✖ $E_c = E_m E_r / (E_m + E_r)$

3. ✖ $E_c = (E_m V_m^2 + E_r V_r^2)$

4. ✖ $E_c = 1/(V_m/E_m + V_r/E_r)$

Question Number : 98 Question Id : 7520767418 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following properties is most critical for a tool steel intended for high-speed machining applications?

Options :

1. ✖ High toughness

2. ✖ Low density

3. ✖ High electrical conductivity

4. ✔ Hot hardness (or red hardness)

Question Number : 99 Question Id : 7520767419 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The coordination number of atoms in an FCC crystal structure is

Options :

1. ✖ 6

2. ✖ 10

3. ✖ 4

4. ✔ 12

Question Number : 100 Question Id : 7520767420 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The atomic packing factor (APF) for BCC structure is approximately

Options :

1. ✖ 0.52

2. ✔ 0.68

3. ✖ 0.74

4. ✖ 0.60

Question Number : 101 Question Id : 7520767421 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The PCE (Pyrometric Cone Equivalent) value indicates:

Options :

1. ✖ Density

2. ✖ Thermal conductivity

3. ✔ Softening temperature

4. ✖ Porosity

Question Number : 102 Question Id : 7520767422 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The formation of a passive layer decreases corrosion rate because it

Options :

1. ✖ increases current flow

2. ✖ decreases open-circuit potential

3. ✔ reduces metal–electrolyte contact

4. ✖ promotes uniform dissolution

Question Number : 103 Question Id : 7520767423 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Reverberatory furnaces are mainly used for:

Options :

1. ✖ Pig iron production

2. ✖ Steel refining

3. ✖ Zinc distillation

4. ✔ Copper and aluminium melting

Question Number : 104 Question Id : 7520767424 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The alumina obtained from Bayer process is converted to aluminium metal by:

Options :

1. ✖ Carbon reduction in blast furnace

2. ✔ Electrolysis of molten alumina–cryolite mixture

3. ✖ Electrolysis in aqueous NaOH solution

4. ✖ Distillation under vacuum

Question Number : 105 Question Id : 7520767425 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The atomic packing factor (APF) of FCC structure is approximately

Options :

1. ✖ 0.52

2. ✖ 0.68

3. ✔ 0.74

4. ✖ 0.9

Question Number : 106 Question Id : 7520767426 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The main purpose of vulcanization of rubber is to

Options :

1. ✖ decrease elasticity

2. ✖ break crosslinks in molecular chains

3. ✖ increase crystallinity

4. ✔ introduce crosslinking to improve strength

Question Number : 107 Question Id : 7520767427 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The modulus of resilience is equal to:

Options :

1. ✔ Area under elastic region only

2. ✖ Area under entire stress–strain curve

3. ✖ Maximum stress × strain

4. ✖ Plastic work

Question Number : 108 Question Id : 7520767428 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The fracture surface in ductile fracture generally shows

Options :

1. ✖ cleavage facets

2. ✔ dimpled microvoids

3. ✖ brittle river patterns

4. ✖ transgranular mirror like regions

Question Number : 109 Question Id : 7520767429 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Heat transfer in vacuum occurs by:

Options :

1. ✖ Conduction

2. ✖ Convection

3. ✔ Radiation

4. ✖ Diffusion

Question Number : 110 Question Id : 7520767430 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Alloy A has a narrow freezing range as compared to Alloy B. Considering both alloys solidify under identical conditions, which statement is correct regarding feeding?

Options :

1. ✖ A requires more riser volume than B

2. ✔ B is more prone to micro shrinkage

3. ✖ A shows dendritic feeding difficulty

4. ✖ B shows directional solidification

Question Number : 111 Question Id : 7520767431 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Let A be a 3×3 matrix such that the characteristic polynomial of A is $f(x) = x^3 - 4x^2 - 11x + 30$. If one of the eigenvalues of A is -3, then sum of the other two eigenvalues is _____

Options :

1. ✖ -1

2. ✖ -10

3. ✖ 4

4. ✔ 7

Question Number : 112 Question Id : 7520767432 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Under which one of the following conditions does the system of equations

$$\begin{pmatrix} 1 & 2 & 4 \\ 2 & 1 & 2 \\ 1 & 2 & k-4 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 6 \\ 4 \\ k \end{pmatrix}$$

have a unique solution?

Options :

1. ✖ For every real number k

2. ✖ $k = 8$

3. ✖ $k \neq 6$

4. ✔ $k \neq 8$

Question Number : 113 Question Id : 7520767433 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

If $f(x, y) = x^3y + xy^3 + e^{xy^2}$, then $f_y(1,1)$ is

Options :

1. ✖ $2 + 2e$

2. ✖ $2 + 4e$

3. ✔ $4 + 2e$

4. ✖ $4 + 4e$

Question Number : 114 Question Id : 7520767434 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Let S be the surface of the cube bounded by $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$.

The value of the surface integral $\iint_S \vec{F} \cdot d\vec{s}$ of a vector field $\vec{F} = 4xz\hat{\imath} - y^2\hat{\jmath} + yz\hat{k}$

over the entire surface S of the cube, is ____

Options :

1. ✖ $\frac{5}{2}$

2. ✖ 1

3. ✖ $\frac{1}{2}$

4. ✔ $\frac{3}{2}$

Question Number : 115 Question Id : 7520767435 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

If y_1 and y_2 be two solutions of the differential equation $\frac{d^2y}{dx^2} + 2y = f(x)$, then $y_1 + y_2$ is also solution of

Options :

1. ✖ $\frac{d^2y}{dx^2} + 2y = 0$

2. ✔ $\frac{d^2y}{dx^2} + 2y = 2f(x)$

3. ✖ $\frac{d^2y}{dx^2} + 2y = 4f(x)$

4. ✖ $\frac{d^2y}{dx^2} + 2y = 5f(x)$

Question Number : 116 Question Id : 7520767436 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

If $F(s)$ denotes the Laplace transform of some function $f(t)$, then the Laplace transform of $e^{-at}f(t)$, where a is a real constant, is _____

Options :

1. ✖ $F(a - s)$

2. ✖ $-F(s)$

3. ✖ $F(s-a)$

4. ✔ $F(s+a)$

Question Number : 117 Question Id : 7520767437 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The solution of the differential equation

$\frac{d^3y}{dx^3} - 5\frac{d^2y}{dx^2} + 8\frac{dy}{dx} - 4y = 0$ is

Options :

1. ✔ $y = c_1e^x + (c_2 + c_3x)e^{2x}$

2. ✖ $y = c_1e^{2x} + (c_2 + c_3x)e^x$

3. ✖ $y = (c_1 + c_2x + c_3x^2)e^x$

4. ✖ $y = (c_1 + c_2x + c_3x^2)e^{2x}$

Question Number : 118 Question Id : 7520767438 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

If the density function of X equals $f(x)=\begin{cases} ce^{-2x}, & 0<x<\infty \\ 0, & x<0, \end{cases}$

then $P(X>2)$ is

Options :

1. ✖ $1-e^{-4}$

2. ✖ $1-e^{-2}$

3. ✔ e^{-4}

4. ✖ e^{-2}

Question Number : 119 Question Id : 7520767439 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Suppose that the average number of accidents occurring weekly on a particular stretch of a highway equals to 3. The probability that there is at least two accidents in a week is_____

Options :

1. ✖ $1-e^{-3}$

2. ✖ $1 - 2e^{-3}$

3. ✖ $1 - 3e^{-3}$

4. ✔ $1 - 4e^{-3}$

Question Number : 120 Question Id : 7520767440 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The Newton-Raphson method is used to find the root of the equation $f(x) \equiv x^2 - x - 1 = 0$. If the initial guess for the root is 1, then the estimate of the root after two iteration is _____

Options :

1. ✖ 2

2. ✖ 1.80

3. ✔ 1.67

4. ✖ 1.82