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 :	Chemical Engineering 30th April 2026 Shift 1
Subject Name :	Chemical Engineering
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

Chemical Engineering

Group Number :	1
Group Id :	75207655
Group Maximum Duration :	0
Group Minimum Duration :	120
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	120

Chemical Engineering

Section Id :	75207655
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 :	75207655
Question Shuffling Allowed :	Yes
Is Section Default? :	No

Question Number : 1 Question Id : 7520766481 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The vapour pressure of the solute in dilute solutions is proportional to the model fraction of the solute in the liquid. This relationship is known as _____

Options :

1. ✖ Gas law

2. ✖ Dalton's law

3. ✔ Henry's law

4. ✖ Amagat's law

Question Number : 2 Question Id : 7520766482 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

One hundred kilograms of a dilute waste acid containing 30.0% sulphuric acid is to be fortified to 50.0% sulphuric acid using concentrated sulphuric acid of strength 96%. How many kilograms of concentrated sulphuric acid are required for this process?

Options :

1. ✖ 33.88 kg

2. ✔ 43.48 kg

3. ✖ 68.54 kg

4. ✖ 50.86 kg

Question Number : 3 Question Id : 7520766483 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A pressure of 1 torr is equal to _____

Options :

1. ✖ 1m H_2O

2. ✖ $1kgf/m^2$

3. ✔ 1mm Hg

4. ✖ $1\ N/m^2$

Question Number : 4 Question Id : 7520766484 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For a system to be in equilibrium at a given temperature and pressure ___

Options :

1. ✖ the entropy must be a minimum

2. ✖ the enthalpy must be a minimum

3. ✖ the internal energy must be a minimum

4. ✔ the Gibbs free energy must be a minimum

Question Number : 5 Question Id : 7520766485 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The purpose of a purge stream in a recycle process is to:

Options :

1. ✖ Increase conversion of reactants

2. ✔ Prevent accumulation of inerts

3. ✖ Cool down the recycle stream

4. ✖ Increase the feed flow rate

Question Number : 6 Question Id : 7520766486 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For an ideal gas at 300 K and 2 atm, if the temperature is raised to 600 K at constant pressure, the volume will:

Options :

1. ✔ Doubles

2. ✖ Halves

3. ✖ Remains same

4. ✖ Quadruples

Question Number : 7 Question Id : 7520766487 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The fugacity of a pure ideal gas is equal to:

Options :

1. ✖ Its activity

2. ✔ Its pressure

3. ✖ RT/V

4. ✖ Its molar volume

Question Number : 8 Question Id : 7520766488 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The second law of thermodynamics states that for any spontaneous process:

Options :

1. ✖ Entropy of the system decreases

2. ✔ Entropy of the universe increases

3. ✖ Entropy of the universe remains constant

4. ✖ Enthalpy of the system increases

Question Number : 9 Question Id : 7520766489 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Excess properties in thermodynamics are defined as:

Options :

1. ✖ Difference between actual and residual property

2. ✔ Difference between actual and ideal solution property

3. ✖ Sum of pure component properties

4. ✖ Property at infinite dilution

Question Number : 10 Question Id : 7520766490 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The activity coefficient 'gamma' = 1 implies:

Options :

1. ✔ Ideal solution behaviour

2. ✖ Maximum positive deviation

3. ✖ Maximum negative deviation

4. ✖ Azeotropic behaviour

Question Number : 11 Question Id : 7520766491 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

According to First law of thermodynamics for a flow process the total work done by the turbine can be approximated by_____

Options :

1. ✔ the enthalpy change of the steam

2. ✖ the entropy change of the steam

3. ✖ free energy change of the steam

4. ✖ kinetic energy change of the steam

Question Number : 12 Question Id : 7520766492 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Absolute humidity of air is 0.02 kg water vapour/ kg dry air. Assuming the average molecular weight of air to be 29. What is the mole percent of water vapour in air? (approximately)

Options :

1. ✖ 10%

2. ✖ 4.2%

3. ✔ 3.2%

4. ✖ 2%

Question Number : 13 Question Id : 7520766493 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

If fanning friction factor is f then the Blasius (or) Darcy friction factor is____

Options :

1. ✔ $4f$

2. ✖ $3f/4$

3. ✖ $f/4$

4. ✖ $4f/3$

Question Number : 14 Question Id : 7520766494 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Diaphragm pumps are used for_____ pumping

Options :

1. ✖ low pressure

2. ✖ high pressure

3. ✔ toxic (or) corrosive liquid

4. ✖ vacuum pressure

Question Number : 15 Question Id : 7520766495 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Two spheres of equal density and different diameters fall through a liquid with an unknown density and an unknown viscosity. The diameter of the large sphere is twice the diameter of the small sphere. Assume particle Reynolds number is less than one for both spheres. What is the ratio of terminal velocities of large sphere to small sphere?

Options :

1. ✖ 1

2. ✖ 2

3. ✔ 4

4. ✖ 0.5

Question Number : 16 Question Id : 7520766496 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The "power required is proportional to the square root of the product size" is_____

Options :

1. ✖ Kick's law

2. ✔ Bond's law

3. ✖ Rittinger's law

4. ✖ Work index

Question Number : 17 Question Id : 7520766497 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Differential settling methods utilize the difference in _____

Options :

1. ✖ densities

2. ✔ terminal velocities

3. ✖ viscosities

4. ✖ particle sizes

Question Number : 18 Question Id : 7520766498 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Arrange the following equipment in decreasing order of the average particle size produced by each of them,

Options :

1. ✖ ball mill, fluid energy mill, jaw crusher

2. ✖ fluid energy mill, ball mill, jaw crusher

3. ✔ jaw crusher, ball mill, fluid energy mill

4. ✖ fluid energy mill, jaw crusher, ball mill

Question Number : 19 Question Id : 7520766499 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The filter medium resistance has dimensions of_____

Options :

1. ✖ ML^{-1}

2. ✔ L^{-1}

3. ✖ $M^{-1}L^{-1}$

4. ✖ $M^{-1}L$

Question Number : 20 Question Id : 7520766500 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

An example of dilatent fluid is _____

Options :

1. ✖ non-colloidal solution

2. ✖ rubber latex

3. ✔ quick sand

4. ✖ Sewage emulsion

Question Number : 21 Question Id : 7520766501 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In continuous fluidization,

Options :

1. ✖ there is no entrainment of solids

2. ✔ solids are completely entrained

3. ✖ velocity of the fluid is small

4. ✖ pressure drop is less than that of batch fluidisation

Question Number : 22 Question Id : 7520766502 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A particle attains its terminal settling velocity when _____

Options :

1. ✔ buoyancy force + drag force = gravity force

2. ✖ drag force = buoyancy force

3. ✖ gravity force + drag force = buoyancy force

4. ✖ gravity force - drag force = buoyancy force

Question Number : 23 Question Id : 7520766503 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The relationship between fanning friction factor (f) and Reynolds number (N_{Re}) in laminar flow is

Options :

1. ✖ $f = \frac{0.079}{N_{Re}^{0.2}}$

2. ✖ $f = \frac{0.316}{N_{Re}^{0.2}}$

3. ✔ $f = \frac{16}{N_{Re}}$

4. ✖ $f = \frac{64}{N_{Re}}$

Question Number : 24 Question Id : 7520766504 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In a cyclone separator, particles are separated due to:

Options :

1. ✖ Gravity and buoyancy

2. ✔ Centrifugal force and drag

3. ✖ Electrostatic attraction

4. ✖ Magnetic force

Question Number : 25 Question Id : 7520766505 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Screen efficiency in size separation depends on:

Options :

1. ✖ Feed rate and screen aperture only

2. ✔ Aperture size, feed rate, and particle shape

3. ✖ Density of particles only

4. ✖ Moisture content only

Question Number : 26 Question Id : 7520766506 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Shell balance in fluid mechanics is used to derive:

Options :

1. ✔ Velocity profiles in laminar flow

2. ✖ Turbulent flow models

3. ✖ Critical Reynolds number

4. ✖ Pump characteristic curves

Question Number : 27 Question Id : 7520766507 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For a Venturi meter, the flow rate is proportional to:

Options :

1. ✔ $\sqrt{(\Delta P)}$

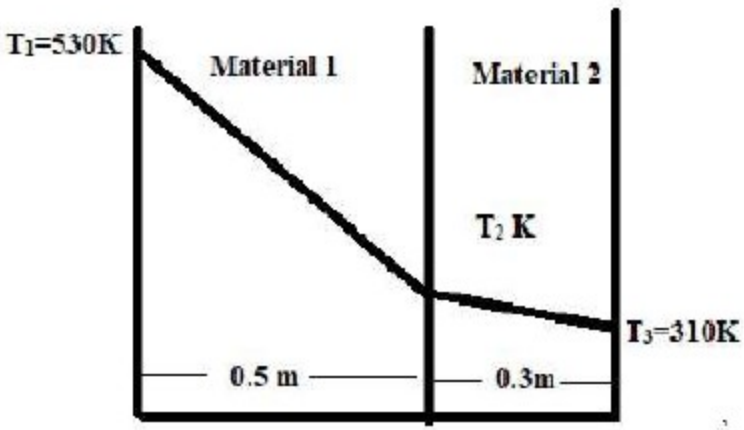
2. ✖ ΔP

3. ✖ ΔP^2

4. ✖ $\Delta P^{1/3}$

Question Number : 28 Question Id : 7520766508 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

At steady state the temperature profile in a laminated system appears as in figure. What is the thermal conductivity of material 2 if steady state flux is 12.6×10^3 W/m^2 and conductivity of material 1 is 52 W/mK ?



Options :

1. ✖ 25.4 W/mK

2. ✖ 106.315 W/mK

3. ✔ 38.3 W/mK

4. ✖ 102.3 W/mK

Question Number : 29 Question Id : 7520766509 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A sphere of radius R is in motionless fluid (no forced or natural convection).The surface temperature of the sphere is T_R and the bulk temperature T_∞.What is the Nusselt number for this situation?

Options :

1. ✖ 0

2. ✖ 0.5

3. ✔ 2

4. ✖ ∞

Question Number : 30 Question Id : 7520766510 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Prandtl number is the ratio of _____

Options :

1. ✖ thermal diffusivity to mass diffusivity

2. ✔ momentum diffusivity to thermal diffusivity

3. ✖ mass diffusivity to thermal diffusivity

4. ✖ thermal diffusivity to momentum diffusivity

Question Number : 31 Question Id : 7520766511 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The thermal conductivity is minimum for _____

Options :

1. ✖ Copper

2. ✖ Water

3. ✖ Silver

4. ✔ Air

Question Number : 32 Question Id : 7520766512 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following dimensionless number is associated with free convection?

Options :

1. ✖ Prandtl number

2. ✔ Grashof number

3. ✖ Peclet number

4. ✖ Reynolds number

Question Number : 33 Question Id : 7520766513 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

"Wavelength corresponding to the maximum energy is inversely proportional to the absolute temperature" is known as _____

Options :

1. ✖ Kirchhoff's law

2. ✖ Stefan Boltzman law

3. ✔ Wein's displacement law

4. ✖ Raoult's law

Question Number : 34 Question Id : 7520766514 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In a counter-current heat exchanger, compared to co-current flow:

Options :

1. ✖ LMTD is lower

2. ✔ LMTD is higher

3. ✖ Heat transfer area required is larger

4. ✖ Exit temperatures cannot cross

Question Number : 35 Question Id : 7520766515 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In natural convection, the driving force for fluid motion is:

Options :

1. ✖ Pressure gradient imposed externally

2. ✔ Buoyancy due to density differences caused by temperature

3. ✖ Viscous shear

4. ✖ Mechanical stirring

Question Number : 36 Question Id : 7520766516 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For condensation of a pure vapor on a vertical surface, the Nusselt theory predicts:

Options :

1. ✖ Constant film thickness

2. ✔ Film thickness increasing from top to bottom

3. ✖ Turbulent flow throughout

4. ✖ Film thinning from top to bottom

Question Number : 37 Question Id : 7520766517 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The heat flux (from outside to inside) across an insulating wall with thermal conductivity k = 0.04 W/m K and thickness 0.16m is 10 W/ m^2. The temperature of the inside wall is -5°C. The outside wall temperature is_____ °C.

Options :

1. ✔ 35

2. ✖ 43.75

3. ✖ 81.25

4. ✖ 48.25

Question Number : 38 Question Id : 7520766518 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The hydrodynamic and thermal boundary layer will merge, when_____

Options :

1. ✔ Prandtl number is one

2. ✖ Schmidt number tends to infinity

3. ✖ Nusselt number tends to infinity

4. ✖ Archimedes number is greater than 10,000

Question Number : 39 Question Id : 7520766519 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

According to penetration theory, the mass transfer coefficient is proportional to__

Options :

1. ✖ Diffusivity

2. ✖ $(\text{Diffusivity})^2$

3. ✔ $(\text{Diffusivity})^{0.5}$

4. ✖ $(\text{Diffusivity})^{1.5}$

Question Number : 40 Question Id : 7520766520 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Psychrometric ratio for air-water mixture over the temperature usually come across is approximately_____

Options :

1. ✔ 1

2. ✖ 0.5

3. ✖ ∞

4. ✖ 0

Question Number : 41 Question Id : 7520766521 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Heat energy required to increase the temperature of unit mass of gas and its accompanying vapour by one degree at constant pressure is known as_____

Options :

1. ✖ Enthalpy

2. ✖ Specific heat

3. ✔ Humid heat

4. ✖ Grosvenor humidity

Question Number : 42 Question Id : 7520766522 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Moisture contained by a substance in excess of equilibrium moisture is called___

Options :

1. ✖ unbound moisture

2. ✖ critical moisture

3. ✖ bound moisture

4. ✔ free moisture

Question Number : 43 Question Id : 7520766523 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Milk powder is made from milk by drying in a:

Options :

1. ✖ Rotary drier

2. ✔ Spray drier

3. ✖ Drum drier

4. ✖ Spouted bed drier

Question Number : 44 Question Id : 7520766524 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The temperature at which a vapor-gas mixture becomes saturated when cooled at constant total pressure out of contact with a liquid is called:

Options :

1. ✗ Bubble point

2. ✓ Dew point

3. ✗ Wet bulb temperature

4. ✗ Dry bulb temperature

Question Number : 45 Question Id : 7520766525 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In a binary gas mixture at low pressures, the diffusion coefficient is _____

Options :

1. ✓ inversely proportional to pressure

2. ✗ proportional to square of the pressure

3. ✗ independent of pressure

4. ✗ directly proportional to the pressure

Question Number : 46 Question Id : 7520766526 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The diffusivity of A in B is $2x10^{-5}$ m^2/s. For a stagnant film of thickness 2mm with $C_{A1} = 0.05$ mol/m^3 and $C_{A2} = 0.01$ mol/m^3, the molar flux is ___

Options :

1. ✔ $4x10^{-4}$ $mol/m^2.s$

2. ✖ $4x10^{-5}$ $mol/m^2.s$

3. ✖ $4x10^{-3}$ $mol/m^2.s$

4. ✖ $2x10^{-4}$ $mol/m^2.s$

Question Number : 47 Question Id : 7520766527 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The term knuckle radius, is associated with _____

Options :

1. ✖ flat heads

2. ✔ torispherical heads

3. ✖ hemispherical heads

4. ✖ conical heads

Question Number : 48 Question Id : 7520766528 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In an absorption column, the gas enters at $y_1 = 0.10$ and exits at $y_2 = 0.01$. The solvent enters pure ($x_2 = 0$). Using a liquid-gas ratio (L/G) of 2, the exit liquid mole fraction x_1 is:

Options :

1. ✔ 0.045

2. ✖ 0.09

3. ✖ 0.05

4. ✖ 0.02

Question Number : 49 Question Id : 7520766529 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In liquid-liquid extraction, the distribution coefficient D is defined as:

Options :

1. ✔ Concentration in extract / Concentration in raffinate

2. ✖ Concentration in feed / Concentration in solvent

3. ✖ Mole fraction in heavy phase / light phase

4. ✖ Activity coefficient ratio

Question Number : 50 Question Id : 7520766530 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In adsorption, the Langmuir isotherm assumes:

Options :

1. ✖ Multi-layer adsorption

2. ✔ Monolayer adsorption with uniform surface energy

3. ✖ BET theory applies

4. ✖ Freundlich equation is valid

Question Number : 51 Question Id : 7520766531 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The McCabe-Thiele method for distillation is valid, when_____

Options :

1. ✖ Molal overflow is non-constant

2. ✔ constant molal overflow (CMO) is assumed

3. ✖ feed is always saturated liquid

4. ✖ relative volatility varies with composition

Question Number : 52 Question Id : 7520766532 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For the isothermal gas-phase reaction $A \rightarrow 3B$, the fractional change in volume of the system between no conversion and complete conversion is ____

Options :

1. ✖ 1

2. ✔ 2

3. ✖ 3

4. ✖ 2/3

Question Number : 53 Question Id : 7520766533 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For the constant-density systems, the performance equations are identical for____

Options :

1. ✔ Batch reactor and plug flow reactor

2. ✖ Batch reactor and back mix reactor

3. ✖ Plug flow reactor and back mix reactor

4. ✖ Batch reactor, plug flow reactor and back mix reactor

Question Number : 54 Question Id : 7520766534 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The dimensions of the rate constant for reaction 2A → B are litre/ (mol.min), the order of the reaction is _____

Options :

1. ✖ zero

2. ✔ two

3. ✖ three

4. ✖ one

Question Number : 55 Question Id : 7520766535 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The dispersion number for plug flow must be _____

Options :

1. ✖ infinity

2. ✖ < 2100

3. ✔ Zero

4. ✖ < 2

Question Number : 56 Question Id : 7520766536 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

There is strong pore resistance, when the Thiele Modulus is _____

Options :

1. ✖ less than 0.4

2. ✖ equal to one

3. ✔ greater than two

4. ✖ greater than one

Question Number : 57 Question Id : 7520766537 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A first-order liquid-phase reaction ($k = 0.1\ min^{-1}$) is carried out in a CSTR at 80% conversion. The space time required is:

Options :

1. ✔ 40 min

2. ✖ 16 min

3. ✖ 10 min

4. ✖ 80 min

Question Number : 58 Question Id : 7520766538 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The conversion for a first-order reaction in a PFR compared to CSTR (same volume) is:

Options :

1. ✖ Same

2. ✖ Lower in PFR

3. ✔ Higher in PFR

4. ✖ Dependent only on temperature

Question Number : 59 Question Id : 7520766539 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Residence time distribution (RTD) function $E(t)$ satisfies:

Options :

1. ✖ $\int_0^\infty E(t)dt = 0$

2. ✔ $\int_0^\infty E(t)dt = 1$

3. ✖ $\int_0^\infty tE(t)dt = 0$

4. ✖ $E(t) = F(t)$

Question Number : 60 Question Id : 7520766540 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

At high Thiele modulus ($\phi >> 1$), the effectiveness factor (η)approaches:

Options :

1. ✖ 1

2. ✖ 0

3. ✔ $3/\phi$ (for sphere)

4. ✖ Φ

Question Number : 61 Question Id : 7520766541 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Non-isothermal plug flow reactor design requires solving simultaneously:

Options :

1. ✖ Only the mole balance equation

2. ✔ Mole balance and energy balance simultaneously

3. ✖ Only the energy balance

4. ✖ Mole balance and momentum balance

Question Number : 62 Question Id : 7520766542 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In a non-ideal reactor modeled by the dispersion model, Peclet number represents:

Options :

1. ✔ Ratio of convection to dispersion

2. ✖ Ratio of diffusion to reaction rate

3. ✖ Ratio of reaction to heat transfer

4. ✖ Ratio of mass transfer to reaction

Question Number : 63 Question Id : 7520766543 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For series reactions A → B → C, maximum concentration of intermediate B in a PFR occurs when:

Options :

1. ✖ Rate of formation of B = Rate of decomposition of B

2. ✖ $dC_B/dt = 0$

3. ✖ $k_1 = k_2$

4. ✔ Rate of formation of B = Rate of decomposition of B and $dC_B/dt = 0$

Question Number : 64 Question Id : 7520766544 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Choose the option that correctly matches in Group 1 with those in Group 2

Group 1	Group 2
(P) coking	(I) prolonged exposure of catalyst to high temperature
(Q) poisoning	(II) deposition of carbonaceous material on catalyst surface
(R) sintering	(III) irreversible chemisorption of molecules on active sites of catalyst

Options :

1. ✖ (P) – (III), (Q) – (I), (R) – (II)

2. ✔ (P) – (II), (Q) – (III), (R) – (I)

3. ✖ (P) – (II), (Q) – (I), (R) – (III)

4. ✖ (P) – (I), (Q) – (III), (R) – (II)

Question Number : 65 Question Id : 7520766545 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

At a given temperature K_1,K_2 and K_3 are the equilibrium constants for the following reactions 1, 2 and 3 respectively:

$CH_4(g) + H_2O(g) = CO(g) + 3H_2(g)$ __(1)

$COg) + H_2O(g) = CO_2(g) + H_2(g)$ ___(2)

$CH_4(g) + 2H_2O(g) = CO_2(g) + 4H_2(g)$ ___(3)

Then the K_1,K_2 and K_3 are related as

Options :

1. ✖ $K_3 = (K_1\ K_2)^{0.5}$

2. ✖ $K_3 = K_1 + K_2$

3. ✔ $K_3 = K_1 K_2$

4. ✖ $K_3 = (K_1 K_2)^2$

Question Number : 66 Question Id : 7520766546 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A typical example of a physical system with under-damped characteristics is a__

Options :

1. ✔ U-tube manometer

2. ✖ two tank non-interacting system

3. ✖ CSTR with first-order reaction

4. ✖ thermocouple kept immersed in a liquid-filled thermowell

Question Number : 67 Question Id : 7520766547 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

During Joule-Thomson expansion of gases ____

Options :

1. ✖ enthalpy remains constant

2. ✖ entropy remains constant

3. ✖ temperature remains constant

4. ✔ pressure remains constant

Question Number : 68 Question Id : 7520766548 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Consider the following equation $2s^4 + s^3 + 3s^2 + 5s + 10 = 0$; How many roots does this equation have in the right half of s-plane?

Options :

1. ✖ One

2. ✔ Two

3. ✖ Three

4. ✖ Four

Question Number : 69 Question Id : 7520766549 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following is most suitable to measure a temperature of 2500^0C?

Options :

1. ✖ platinum resistance thermometer

2. ✖ mercury in glass thermometer

3. ✖ constant volume hydrogen thermometer

4. ✔ radiation pyrometer

Question Number : 70 Question Id : 7520766550 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The second order system with the transfer function $1/(s^2+2s+1)$ is a

Options :

1. ✖ Underdamped system

2. ✖ Overdamped system

3. ✖ Undamped system

4. ✔ Critically damped system

Question Number : 71 Question Id : 7520766551 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following is an example for an unbounded input?

Options :

1. ✖ Step function

2. ✖ Sinusoidal function

3. ✔ Ramp function

4. ✖ Impulse function

Question Number : 72 Question Id : 7520766552 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Phase lag of a first order system is given by _____

Options :

1. ✖ $\tan^{-1}(\omega\tau)$

2. ✔ $\tan^{-1}(-\omega\tau)$

3. ✖ $\tan^{-1}(2\omega\tau)$

4. ✖ $\tan^{-1}(-2\omega\tau)$

Question Number : 73 Question Id : 7520766553 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A proportional-integral (PI) controller eliminates:

Options :

1. ✔ Offset at steady state

2. ✖ Oscillation in the closed-loop response

3. ✖ Derivative kick

4. ✖ Dead time effects

Question Number : 74 Question Id : 7520766554 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Feed-forward control is used to:

Options :

1. ✖ Eliminate feedback from the process

2. ✔ Compensate for measurable disturbances before they affect the output

3. ✖ Replace the need for a sensor

4. ✖ Tune the PID controller automatically

Question Number : 75 Question Id : 7520766555 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The unit step response of a first-order system reaches 63.2% of its final value at time:

Options :

1. ✖ 2τ

2. ✔ τ (one time constant)

3. ✖ 0.5τ

4. ✖ 3τ

Question Number : 76 Question Id : 7520766556 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Dead time (transport delay) in a process control system causes:

Options :

1. ✖ Improved stability

2. ✔ Reduced gain margin and increased difficulty of control

3. ✖ Elimination of offset

4. ✖ Increased process time constant

Question Number : 77 Question Id : 7520766557 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The frequency at which maximum AR occurred is called

Options :

1. ✖ Corner frequency

2. ✖ Cross over frequency

3. ✔ Resonant frequency

4. ✖ Cyclic frequency

Question Number : 78 Question Id : 7520766558 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Bode diagram consists of two graphs:

where *AR* is Amplitude Ratio, ω-Frequency, Ø-Phase Angle

Options :

1. ✔ log (*AR*) versus log (ω) and phase angle (Ø) versus log (ω)

2. ✖ log (AR) versus ω and log (Ø) versus ω

3. ✖ log (ω) versus AR and Ø versus log (ω)

4. ✖ ω versus AR and Ø versus ω

Question Number : 79 Question Id : 7520766559 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A wet solid is to be dried from 80 % to 10% moisture, wet basis. The moisture to be evaporated, per 1000 kg of dried product is

Options :

1. ✖ 630 kg

2. ✔ 3890 kg

3. ✖ 700 kg

4. ✖ 3500 kg

Question Number : 80 Question Id : 7520766560 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Choose the option that correctly pairs the given measurement devices with the quantities they measure.

	Measurement device		Measured quantity
I.	Bourdon gauge	A.	Temperature
II.	Orifice plate meter	B.	Concentration
III.	Pyrometer	C.	Pressure
IV.	Colorimeter	D.	Flow rate
V.	Pirani gauge	E.	Liquid level

Options :

1. ✖ I-E, II-C, III-D, IV-B, V-A

2. ✔ I-C, II-D, III-A, IV-B ,V-E

3. ✖ I-C, II-D, III-E, IV-A, V-D

4. ✖ I-D, II-C, III-A, IV-E, V-C

Question Number : 81 Question Id : 7520766561 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A system with gain margin close to unity or a phase margin close to zero is_____

Options :

1. ✔ Relatively stable

2. ✖ Oscillatory

3. ✖ Stable

4. ✖ Highly stable

Question Number : 82 Question Id : 7520766562 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Lewis number of air water mixture is defined as:

Options :

1. ✖ Pr.Sc

2. ✖ Pr/Sc

3. ✔ Sc/Pr

4. ✖ Re.Sc

Question Number : 83 Question Id : 7520766563 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Time constant for U-tube manometer is given by

Options :

1. ✔ $\sqrt{(L/2g)}$

2. ✖ $\sqrt{(2Lg)}$

3. ✖ $2g\sqrt{L}$

4. ✖ $L\sqrt{2g}$

Question Number : 84 Question Id : 7520766564 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For the liquid phase reaction A → P, in a series of experiments in a batch reactor, the half-life $t_{1/2}$ was found to be inversely proportional to the square root of the initial concentration of A. The order of the reaction is

Options :

1. ✔ 3/2

2. ✖ 1

3. ✖ +1/2

4. ✖ -1/2

Question Number : 85 Question Id : 7520766565 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For a chemical reaction, the ratio of rate constant at 500K to that at 400K is 2.5.

Given R = 8.314 J $mol^{-1}K^{-1}$, the value of activation energy (in kJ/mol) is_____

Options :

1. ✖ 10.5

2. ✖ 12.0

3. ✔ 15.2

4. ✖ 18.4

Question Number : 86 Question Id : 7520766566 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

If the area under the curve of $1/-r_A$ versus X_A for PFR used to carry out a reaction is

5 m^3s/mol, then the ratio of change in volume to molar feed rate is_____

Options :

1. ✔ 5

2. ✖ 10

3. ✖ 15

4. ✖ 20

Question Number : 87 Question Id : 7520766567 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following is not employed in the commercial production of linear poly vinyl chloride?

Options :

1. ✖ Emulsion polymerisation

2. ✖ Suspension polymerisation

3. ✖ Addition polymerisation

4. ✔ Condensation polymerisation

Question Number : 88 Question Id : 7520766568 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In the straight-line depreciation method, depreciation is

Options :

1. ✖ increasing every year

2. ✖ decreasing every year

3. ✔ constant every year

4. ✖ zero after first year

Question Number : 89 Question Id : 7520766569 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

An investment of Rs.1000 is carrying an interest of 10% compounded quarterly. The value of the investment at the end of five years will be

Options :

1. ✔ $1000(1+0.1/4)^{20}$

2. ✖ $1000(1+0.1)^{20}$

3. ✖ $1000(1+0.1/4)^{5}$

4. ✖ $1000(1+0.1/2)^{5}$

Question Number : 90 Question Id : 7520766570 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following is correct statement of payout time?

Options :

1. ✖ Payout period and the economic life of a project are the same.

2. ✖ Payout period is affected by the variations in earnings after the recovery of the investment

3. ✖ Payout period is not important for business decision making

4. ✔ Payout period is the length of time over which the earnings on a project equal the investment

Question Number : 91 Question Id : 7520766571 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Cetane number is important test for:

Options :

1. ✖ Gasoline

2. ✖ Kerosene

3. ✔ High speed diesel oil

4. ✖ Fuel oil

Question Number : 92 Question Id : 7520766572 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In cost estimation, the six-tenths rule relates cost to equipment capacity by:

Options :

1. ✔ Cost proportional to Capacity^0.6

2. ✖ Cost proportional to Capacity^1.0

3. ✖ Cost proportional to Capacity^0.4

4. ✖ Cost proportional to Capacity^1.6

Question Number : 93 Question Id : 7520766573 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In distillation column design, the minimum reflux ratio corresponds to:

Options :

1. ✖ Minimum number of theoretical stages

2. ✔ Infinite number of theoretical stages

3. ✖ Maximum feed rate

4. ✖ Minimum reboiler duty

Question Number : 94 Question Id : 7520766574 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A plant purchased equipment costing $500,000 in 2010 (CEPCI = 550). If the CEPCI in 2024 is 800, the estimated current cost of the same equipment is:

Options :

1. ✔ $727,273

2. ✖ $500,000

3. ✖ $343,750

4. ✖ $800,000

Question Number : 95 Question Id : 7520766575 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For a packed bed reactor, the presence of a long tail in the residence time distribution curve is an indication of _____

Options :

1. ✖ ideal plug flow

2. ✖ by pass

3. ✔ dead zone

4. ✖ channeling

Question Number : 96 Question Id : 7520766576 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For an isothermal second order aqueous phase reaction A → B, the ratio of the time required for 90% conversion to the time required for 45% conversion is _____

Options :

1. ✖ 2

2. ✖ 4

3. ✔ 11

4. ✖ 22

Question Number : 97 Question Id : 7520766577 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In liquid-liquid extraction, what is the primary purpose of using a solvent?

Options :

1. ✖ To increase the solubility of solutes

2. ✔ To separate desired components from a mixture based on differences in solubility

3. ✖ To facilitate phase separation of the components

4. ✖ To speed up the chemical reaction between components

Question Number : 98 Question Id : 7520766578 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

From Arrhenius law, $\mathbf{k = k_0 e^{-E/RT}}$, a plot of ln(k) versus **1/T** gives straight line with a slope of _____

Options :

1. ✖ E/R

2. ✖ R/E

3. ✔ –E/R

4. ✖ –R/E

Question Number : 99 Question Id : 7520766579 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Order of the system of transfer function $(2s + 1)/(5 s^2 + 2s + 1)$ is _____

Options :

1. ✖ first order

2. ✔ 2nd order

3. ✖ 3^{rd} order

4. ✖ no order

Question Number : 100 Question Id : 7520766580 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In the CONTACT PROCESS for manufacturing sulphuric acid, the reaction converting SO_2 to SO_3 is _____

Options :

1. ✔ Exothermic and reversible

2. ✖ Endothermic and reversible

3. ✖ Exothermic and irreversible

4. ✖ Endothermic and irreversible

Question Number : 101 Question Id : 7520766581 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Gypsum is added to clinker during cement manufacture to ____

Options :

1. ✖ make the cement impervious

2. ✖ bind the particles of calcium silicate

3. ✔ decrease the rate of setting of cement

4. ✖ to facilitate the formation of colloidal gel

Question Number : 102 Question Id : 7520766582 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Poly Tetra Fluoro Ethylene (PTFE) is known as:

Options :

1. ✖ Bakelite

2. ✖ polypropylene

3. ✖ polyethylene

4. ✔ Teflon

Question Number : 103 Question Id : 7520766583 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Tetra ethyl lead is added to gasoline to _____

Options :

1. ✖ reduce gum formation

2. ✔ increase its octane number

3. ✖ reduce the pour point

4. ✖ increase its smoke point

Question Number : 104 Question Id : 7520766584 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The Haber-Bosch process for ammonia synthesis operates at:

Options :

1. ✖ Low pressure (1-5 atm) and high temperature (800 ^{0}C)

2. ✔ High pressure (150-300 atm) and moderate temperature (400-500 ^{0}C)

3. ✖ Atmospheric pressure and 200 ^{0}C

4. ✖ High pressure (500 atm) and low temperature (100 ^{0}C)

Question Number : 105 Question Id : 7520766585 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

In the Chlor-alkali process, the main products are:

Options :

1. ✖ HCl and NaOH

2. ✔ Cl_2, H_2, and NaOH

3. ✖ NaCl and H_2O

4. ✖ Cl_2 and NaCl

Question Number : 106 Question Id : 7520766586 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which solvent is used for removing benzene from coke-oven gas?

Options :

1. ✖ Water

2. ✖ Caustic soda

3. ✖ Soda ash

4. ✔ Hydrocarbon oil

Question Number : 107 Question Id : 7520766587 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Chloro-mines are used in water treatment for

Options :

1. ✔ disinfection and control of taste and odour

2. ✖ corrosion control

3. ✖ removing turbidity

4. ✖ control of bacteria

Question Number : 108 Question Id : 7520766588 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Glass is corroded by

Options :

1. ✔ fluorine

2. ✖ sulphuric acid

3. ✖ phosphoric acid

4. ✖ NaOH

Question Number : 109 Question Id : 7520766589 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Hemoglobin is a

Options :

1. ✖ amino acid

2. ✖ biological catalyst

3. ✖ enzyme

4. ✔ protein

Question Number : 110 Question Id : 7520766590 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Phenols are added in gasoline to

Options :

1. ✖ improve the octane number

2. ✖ reduce its viscosity

3. ✔ act as an antioxidant

4. ✖ increase its pour point

Question Number : 111 Question Id : 7520766591 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Let $A = \begin{pmatrix} -1 & 3 & 5 \\ -3 & k & 6 \\ 0 & 0 & 3 \end{pmatrix}$. If the eigenvalues of A are $3, -1+3i, -1-3i$, where $i = \sqrt{-1}$, then the value of k is _____

Options :

1. ✔ -1

2. ✖ -3

3. ✖ 0

4. ✖ 3

Question Number : 112 Question Id : 7520766592 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For What valve of k , 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 : 7520766593 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

For what values of α, the function $f(x) = \sin x \cos\frac{1}{x}, x \neq 0; f(x) = \alpha, x = 0$, is continuous at $x = 0$?

Options :

1. ✖ 2

2. ✖ 1

3. ✔ 0

4. ✖ $\frac{1}{2}$

Question Number : 114 Question Id : 7520766594 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The minimum value of the function $f(x) = x + \frac{9}{x}$, for $x > 0$, is _____

Options :

1. ✖ 0

2. ✖ 3

3. ✔ 6

4. ✖ 9

Question Number : 115 Question Id : 7520766595 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Let $\vec{v} = 4\hat{\imath} + 3\hat{k}$ be a vector, where $\hat{\imath}$, $\hat{\jmath}$ and $\hat{k}$ represent unit vectors along the axes x, y and z respectively. Then, the directional derivative of the scalar function $f(x,y,z) = 2\ln(xy) + \ln(yz) + 3\ln(zx)$ at the point $(1,1,1)$ in the direction of $\vec{v}$ is___

Options :

1. ✖ 7.2

2. ✖ 6

3. ✖ 6.2

4. ✔ 6.4

Question Number : 116 Question Id : 7520766596 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Let p and q be fixed real numbers. If the function $y(x) = C_1e^{3x} + C_2e^{-4x}$ is a solution of the differential equation $\frac{d^2y}{dx^2} + p\frac{dy}{dx} + qy = 0$; for any constants C_1 and C_2, then $p - q$ is equal to _____

Options :

1. ✖ -1

2. ✖ 7

3. ✖ -12

4. ✔ 13

Question Number : 117 Question Id : 7520766597 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Let C be a counter-clockwise circle defined as $|z| = 2$. Then, the value of the complex integral $\frac{1}{2\pi i}\oint_C \frac{z^2-1}{z^2+1} e^{-z}\, dz$ is _____

Options :

1. ✖ $\sin 1$

2. ✔ $2 \sin 1$

3. ✖ $\cos 1$

4. ✖ $2 \cos 1$

Question Number : 118 Question Id : 7520766598 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The growth of a bacterial population $y(t)$ is given by the differential equation

$\frac{dy}{dt} = k(y+3)$; where k is the growth rate constant. If $y(0) = 1$ and $y(1) = 5$,

then the value of k is ____

Options :

1. ✔ $\ln 2$

2. ✖ $\ln 4$

3. ✖ $\ln 8$

4. ✖ $\ln 12$

Question Number : 119 Question Id : 7520766599 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

If a random variable X has a Poisson distribution with parameter $\frac{1}{2}$, then

$P(X = 2) =$ ____

Options :

1. ✖ $\frac{1}{2\sqrt{e}}$

2. ✖ $\frac{1}{4\sqrt{e}}$

3. ✔ $\frac{1}{8\sqrt{e}}$

4. ✖ $\frac{1}{2}$

Question Number : 120 Question Id : 7520766600 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The irrational number $\sqrt{2}$ can be approximated by applying Newton's method to the nonlinear equation $f(x) = x^2 - 2 = 0$. What is the Newton iteration formula?

Options :

1. ✖ $x_{k+1} = x_k + \frac{x_k^2 - 2}{2x_k}$

2. ✔ $x_{k+1} = x_k - \frac{x_k^2 - 2}{2x_k}$

3. ✖ $x_{k+1} = x_k - \frac{x_k^2 - 2}{x_k}$

4. $$x_{k+1} = x_k + \frac{x_k^2 - 2}{x_k}$$