Andhra Pradesh State Council of Higher Education

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Chemical Engineering (CH)

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Chemical Engineering (CH)

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Question Number : 1 Question Id : 2999654441 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The rank of the matrix $\begin{bmatrix} 2 & -1 & 3 & 1 \\ 1 & 4 & -2 & 1 \\ 5 & 2 & 4 & 3 \end{bmatrix}$ is

Options :

1. 3

2. 2

3. 1

4. 4

Question Number : 2 Question Id : 2999654442 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Let $(x) = \dfrac{x\,|x|}{2}$, then the CORRECT statement among the following is

Options :

1. f is not differentiable at $x = 0$

2. f is differentiable at all points of $\mathbb{R}$

3. f is not continuous at $x = 0$

4. f is not differentiable at $x = 1$

Question Number : 3 Question Id : 2999654443 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The particular integral of $(D^2 - 2D + 4)y = e^x \cos x$ is

Options :

1. $\dfrac{1}{2} e^x \cos x$

$\frac{1}{2} e^x \sin x$

2.

$e^x \cos x$

3.

$2e^x \sin x$

4.

Question Number : 4 Question Id : 2999654444 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The Laplace transform of

$$f(t) = \frac{1 - e^{-t}}{t} \qquad \text{is}$$

Options :

$\log\left(1 - \frac{1}{s}\right)$

1.

$\frac{1}{2}\log\left(1 - \frac{1}{s}\right)$

2.

$\log\left(1 + \frac{1}{s}\right)$

3.

$\frac{1}{2}\log\left(1 + \frac{1}{s}\right)$

4.

Question Number : 5 Question Id : 2999654445 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If the function $'x'$ is one solution of the linear differential equation

$$x^2 y'' - xy' + y = 0, \quad x > 0,$$

then the other linearly-independent solution is

Options :

1. x^2

2. $\ln x$

3. $x \ln x$

4. $x^2 \ln x$

Question Number : 6 Question Id : 2999654446 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The Laurent's series of the function $f(z) = z^2 . e^{\frac{1}{z}}$ converges for _____.

Options :

1. $|z| = 0$

2. $|z| < 0$

3. $|z| > 0$

4. $|z| < 2$

Question Number : 7 Question Id : 2999654447 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The number of ways in which five people can be lined up to set on a bus is

Options :

1. 24

2. 120

3. 60

4. 80

Question Number : 8 Question Id : 2999654448 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Quartile deviation is equal to

Options :

$\frac{3}{2}$ (Standard deviation)

1.

$\frac{1}{2}$ (Mean deviation)

2.

$\frac{2}{3}$ (Standard deviation)

3.

$\frac{2}{3}$ (Mean deviation)

4.

Question Number : 9 Question Id : 2999654449 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The solution $y(1.1)$ of the initial value problem

$$\frac{dy}{dx} = x - y, \quad y(1) = 1, \quad h = 0.1$$

using the 2nd order Runge – Kutta method is

Options :

1.005

1.

1.104

2.

1.004

3.

1.106

4.

Question Number : 10 Question Id : 2999654450 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following methods can be applied to evaluate

$$I = \int_0^{10} \text{Sin}(x) + 2\,\text{Cos}(x)\,dx \quad \text{with } h=2$$

Options :

1. Trapezoidal rule

2. Simpson's 1/3 rule

3. Simpson's 3/8 rule

4. Weddle's rule

1.6 kg of an organic compound on combustion gave 4.4 kg of CO_2. The percentage of C in the organic compound is about

Options :

1. 30%

2. 45%

3. 60%

4. 75%

Recycle ratio for a process is given by

Options :

1. kg of fresh feed/ kg of recycle stream.

2. kg of (fresh + recycle) feed/kg of recycle stream.

3. kg of recycle stream/kg of fresh feed.

4. kg of recycle stream/kg of (fresh + recycle) feed.

What should be the internal energy (kJ/kg) of dry saturated steam at 100°C? Data from steam tables at 100°C: $p = 1.01325$ bar, $v_g = 1.673$ m^3/kg and $h_g = 2676$ kJ/kg.

Options :

1. 2500.3500

2. 2502.5708

3. 2506.4833

4. 2509.7645

For any irreversible process the net entropy change is _____.

Options :

1. zero

2. positive

3. negative

4. unity

If the vapour is assumed to behave as an ideal gas then Kirchhoff's relation is given by

Options :

1. $\dfrac{dP}{dT} = C_{pg} - C_{pf}$

2. $$\frac{dP}{dT} = C_{pf} - C_{pg}$$

3. $$\frac{d(\Delta h_v)}{dT} = C_{pg} - C_{pf}$$

4. $$\frac{dP}{dT} = C_{pf} + C_{pg}$$

Question Number : 16 Question Id : 2999654456 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

1 kg of saturated aqueous solution of a highly soluble component A at 60°C is cooled to 25°C. The solubility limits of A are 0.6 kg A/kg water at 60°C and 0.2 kg A/kg water at 25°C. The amount of A that crystallizes is _____Kg.

Options :

1. 0.4

2. 0.25

3. 0.2

4. 0.175

Question Number : 17 Question Id : 2999654457 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The maximum adiabatic flame temperature is attained when the fuel is burnt with

Options :

1. theoretically required amount of air.

2. more than theoretically required amount of air.

3. less than theoretically required amount of air.

4. theoretically required amount of oxygen.

An ideal chemical solution is one which obeys

Options :

1. Raoult's law

2. Amagat's law

3. Charles law

4. Dalton's law

An automobile tyre is inflated to a pressure of 195 kPa at 273 K, if the pressure inside the tyre is not exceeding 250 kPa. The maximum temperature to which tyre is heated _____. (Assume Ideal behavior).

Options :

1. 400 K

2. 450 K

3. 300 K

4. 350 K

For a spontaneous irreversible process, entropy change(ΔS) of _____.

Options :

1. system always increases

2. system always decreases

3. universe always increases

4. universe always decreases

Question Number : 21 Question Id : 2999654461 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Degrees of freedom of triple point is ____ .

Options :

1. Zero

2. One

3. Two

4. Three

Question Number : 22 Question Id : 2999654462 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Pure carbon is completely burnt in oxygen. The flue gas analysis is 60% CO_2, 20% CO and 20% O_2. The percent excess oxygen used is _____ .

Options :

1. 0

2. 20

3. 5

4. 10

Question Number : 23 Question Id : 2999654463 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Compression is the characteristic action of _____.

Options :

1. grinders

2. crushers

3. fluid energy mills

4. cutting machines

For a Carnot refrigerator operating between 47 °C and 27 °C, the coefficient of performance is _____.

Options :

1. 19.88

2. 1.35

3. 1.74

4. 15.00

Equilibrium constant depends on _____.

Options :

1. Temperature

2. Equilibrium Pressure

3. Catalyst Concentration

4. Composition of product

The equivalent diameter of an annulus comprising of inner pipe of I.D. 4.8 cm and outer pipe of I.D. 9.8 cm. The thickness of inner pipe is 4 mm. The equivalent diameter of the given annulus is _____.

Options :

1. 4.8 cm

2. 4.6 cm

3. 4.2 cm

4. 4.4 cm

Applying a pressure drop across a capillary results in a volumetric flow rate Q under laminar flow conditions. The flow rate for the same pressure drop, in a capillary of the same length but double the diameter is _____.

Options :

1. Q/16

2. 2Q

3. Q/4

4. 16Q

Which of the following materials is most commonly used filter aid in filtration process?

Options :

1. rice husk

2. plastic powder

3. coal powder

4. diatomaceous silica

_____ is constant for incompressible fluid.

Options :

1. Temperature

2. Density

3. Pressure

4. Velocity

Starch in water is _____.

Options :

1. Bingham plastic fluid

2. Pseudo plastic fluid

3. Dilatant fluid

4. Newtonian fluid

Question Number : 31 Question Id : 2999654471 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In cyclone separator, separation factor is defined as ratio of

Options :

1. Gravitational force to Centrifugal force.

2. Centrifugal force to gravitational force.

3. Mass of particle collected at top to at bottom.

4. Mass of particle collected at bottom to at top.

Question Number : 32 Question Id : 2999654472 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

S-type pitot tube is used for monitoring the _____.

Options :

1. velocity of ambient air.

2. velocity of stack gas.

3. flow of water in closed channel.

4. flow of effluent water in open channel.

Question Number : 33 Question Id : 2999654473 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

What will happen to the head developed by the pump, when the flow rate is increased?

Options :

1. Increase

2. Decrease

3. Constant

4. Increase initially and then decrease

In a parallel plate Electro Static Precipitator (ESP) of a power plant, ratio of collection area to volume of precipitator is _____.

Options :

1. square of the distance between the plates.

2. square root of the distance between the plates.

3. directly proportional to the distance between the plates.

4. inversely proportional to the distance between the plates.

Apparent viscosity for pseudo plastic fluids _____ with increasing shear rate.

Options :

1. increase

2. decrease

3. do not change

4. increase and then decrease

The work index in Bond's law for crushing of solids has the following dimensions.

Options :

1. kW/ton

2. kWh/ton

3. kW ton

4. ton/kW

Size analysis was carried out on a sample of gravel. The data for mass fraction (x_f) and average particle diameter (D_{pi}) of the fraction is given in the table below:

x_f	0.2	0.3	0.5
D_{pi}(mm)	5	10	20

The mass mean diameter of the sample is

Options :

1. 13 mm

2. 11 mm

3. 12 mm

4. 14 mm

Grinding of tough fibrous material is done by

Options :

1. Jaw crusher

2. Hammer mill

3. Ball mill

4. Gyratory crusher

Question Number : 39 Question Id : 2999654479 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Bernoulli's equation strictly applies to

Options :

1. compressible fluids

2. perfect fluids

3. turbulent fluids

4. gases only

Question Number : 40 Question Id : 2999654480 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Power required to drive a ball mill with a particular ball load is proportional to the diameter of the ball mill D as

Options :

1. D

2. $1/D$

3. $D^{2.5}$

4. $D^{1/2}$

Question Number : 41 Question Id : 2999654481 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Convective heat transfer co-efficient in case of fluid flowing in tubes is not affected by the tube length/diameter ratio, if the flow is in the _____ zone.

Options :

1. viscous-sublayer

2. laminar

3. transition

4. highly turbulent

Fouling factor

Options :

1. does not provide a safety factor for design.

2. accounts for additional conductance to fouling coefficient.

3. accounts for additional conductance to heat flow.

4. accounts for additional resistances to heat flow.

Emissivity of a polished surface is _____.

Options :

1. high

2. very low

3. 1

4. about 0.8

The left face of a one dimensional slab of thickness 0.2 m is maintained at 100 °C and the right face is exposed to air at 20 °C. The thermal conductivity of the slab is 1.0 W/(m-K) and the heat transfer coefficient from the right face is 10 W/(m² K). At steady state, the temperature of the right face is _____ .

Options :

1. 46.6°C

2. 54.2°C

3. 68.3°C

4. 76.8°C

Question Number : 45 Question Id : 2999654485 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For turbulent flow in a tube, the heat transfer coefficient is obtained from Dittus-Boelter equation. If the tube diameter (D) is changed to 0.75 D and the flow rate is increased by a factor of 1.5, then the Nusselt number will change by a factor of

Options :

1. 1.74

2. 6.1

3. 2.0

4. 10.4

Question Number : 46 Question Id : 2999654486 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The ratio of the diffusivity of momentum to thermal diffusivity is

Options :

1. Prandtl Number

2. Biot Number

3. Reynolds number

4. Peclet number

Question Number : 47 Question Id : 2999654487 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Below the critical Peclet number, the value of Nusselt number is ____.

Options :

1. 7

2. 100

3. 23

4. 45

Question Number : 48 Question Id : 2999654488 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Two rods of the same material have diameters in the ratio 1:2 and lengths in the ratio 2:1. If the temperature difference between their ends is the same, the ratio of heats conducted by them in a given line is

Options :

1. 1:4

2. 4:1

3. 1:8

4. 8:1

An electrically heated element is submerged in a pool of water at its saturation temperature. As the temperature of the heating element is increased the maximum heat transfer coefficient is observed _____.

Options :

1. in the free convection regime

2. between the nucleate boiling and partial nucleate boiling mixed with unstable film boiling regimes

3. in the incipient nucleate boiling regime

4. in the stable film boiling regime without radiation

The advantage of backward feeding over forward feeding in multiple effect evaporator units is that

Options :

1. heat sensitive materials can be handled.

2. there is no additional cost of pumping.

3. most concentrated liquor is at highest temperature.

4. equal heat transfer coefficients exist in various effects.

In distillation column design, if $q > 1$, then it is _____.

Options :

1. Cold feed

2. Feed at bubble point

3. Feed partially vapour

4. Feed superheated vapour

Question Number : 52 Question Id : 2999654492 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Molecular diffusion induced by external field is called as

Options :

1. Forced diffusion

2. Thermal diffusion

3. Eddy diffusion

4. Conductive diffusion

Question Number : 53 Question Id : 2999654493 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The ratio of the kinematic viscosity to the molecular diffusivity is known as

Options :

1. Prandtl number

2. Schmidt number

3. Fourier number

4. Peclet number

Question Number : 54 Question Id : 2999654494 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Molecular diffusion is due to _____.

Options :

1. activation energy of molecules

2. potential energy of molecules

3. thermal motion of molecules

4. pressure energy of molecules

Question Number : 55 Question Id : 2999654495 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In mass transfer equipment, cascading of stages is done to

Options :

1. increase the extent of mass transfer above that which is possible with a single co-current process.

2. increase the extent of mass transfer above that which is possible with a single counter-current process.

3. reduce operating expenses.

4. reduce initial cost.

Question Number : 56 Question Id : 2999654496 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

From Fick's first law of diffusion we have, $J_A = -D_{AB} \dfrac{\partial C_A}{\partial x}$, the negative sign indicates

Options :

1. Flux decreases with increasing D_{AB}.

2. Flux decreases with increasing concentration gradient.

3. Flux is in the opposite direction of concentration gradient.

4. Flux is in the opposite direction of the bulk movement.

Thiele modulus is given by

Options :

1. rate of reaction/ rate of mass transfer.

2. rate of mass transfer/rate of reaction.

3. rate of absorption/rate of adsorption.

4. rate of reaction/ heat of reaction.

At minimum reflux ratio, the number of plates becomes

Options :

1. 0

2. Infinite

3. 1

4. Independent on reflux ratio

Cox chart is needed in the design of _____.

Options :

1. absorber

2. extractor

3. evaporator

4. distillation column

Dryer used in paper industry is _____ dryer.

Options :

1. rotary

2. cylinder

3. spray

4. tunnel

What is the value of Lewis number when mass diffusivity in a mixture equals the thermal diffusivity?

Options :

1. 1

2. < 1

3. ∞

4. > 1

In a single stage extraction process, 12 kg of pure solvent S (containing no solute A) is mixed with 36 kg of feed F containing A at a mass fraction $x_F = 0.2$. The mixture splits into an extract phase E and a raffinate phase R, containing A at $x_E = 0.5$ and $x_R = 0.05$ respectively. The total mass of the extract phase is

Options :

1. 8.62 kg

2. 11.56 kg

3. 10.67 kg

4. 7.2 kg

Question Number : 63 Question Id : 2999654503 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For a reversible reaction $A \Leftrightarrow B$, if K is the equilibrium constant, the equilibrium conversion is

Options :

1. $(K + 1)/K$

2. $(K + 1)K$

3. $K/(K - 1)$

4. $K/(K + 1)$

Question Number : 64 Question Id : 2999654504 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

In the enriching section of the continuous distillation column

Options :

1. more volatile component transfers from vapor to liquid.

2. less volatile component transfers from liquid to vapor.

3. more volatile component transfers from liquid to vapor.

4. less volatile component transfers from vapor to liquid.

If diffusivity value of NH_3 - Air system at 1 atm and 35°C is 2.15×10^{-5} m^2/s, what is the diffusivity value at 2 atm and 75°C?

Options :

1. 0.895×10^{-5} m^2/sec

2. 1.291×10^{-5} m^2/sec

3. 3.58×10^{-5} m^2/sec

4. 5.162×10^{-5} m^2/sec

A distillation column separates 10,000 kg/h of a benzene-toluene mixture as shown in the figure below. In the figure, X_F, X_D, and X_W represent the weight fraction of benzene in the feed, distillate, and residue, respectively.
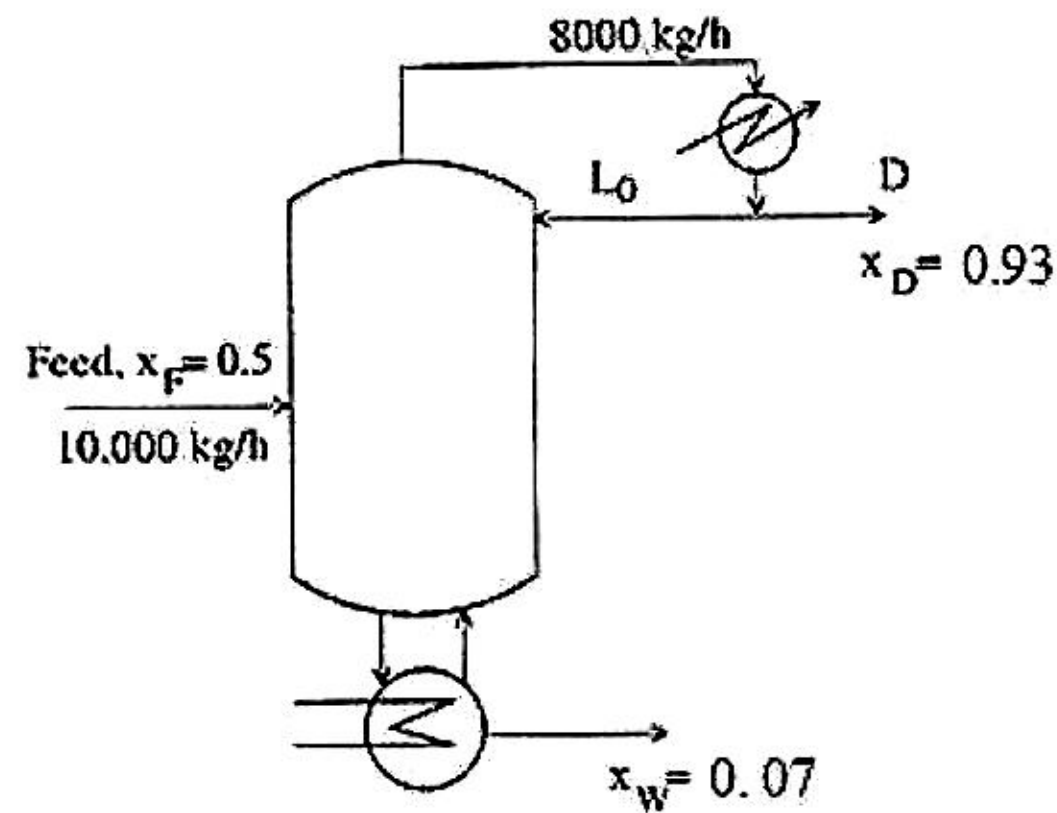
The reflux ratio is _____.

Options :

1. 0.5

2. 0.6

3. 1.0

4. 2.0

The reason for preferring packed towers over plate towers in distillation practice is that the packed tower operation gives _____.

Options :

1. low pressure drop and high hold up

2. high pressure drop and low hold up

3. low pressure drop and low hold up

4. high pressure drop and high hold up

Question Number : 68 Question Id : 2999654508 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A sample of wool containing 40% moisture has an equilibrium moisture content of 12.5% in contact with air of RH 50%. The critical moisture content is 20%. All moisture contents are on dry basis. How much water can be removed by drying the sample in a current of air of 50% RH?

Options :

1. 50%

2. 7.5%

3. 27.5%

4. 37.5%

Question Number : 69 Question Id : 2999654509 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

If Y is the absolute humidity of air-water mixture, the mole fraction of water vapor in the mixture is

Options :

1. $\dfrac{Y}{\dfrac{18}{29}+Y}$

2. $\dfrac{Y}{1+Y}$

3. $\dfrac{1}{1+Y}$

$$\frac{\frac{18}{29}Y}{\frac{18}{29}+Y}$$

4.

Question Number : 70 Question Id : 2999654510 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Drying of milk is usually carried out in a _____.

Options :

1. spray dryer

2. rotary dryer

3. tunnel dryer

4. tray dryer

Question Number : 71 Question Id : 2999654511 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The initial concentration of A in a first order reaction, A→ B is 1.0 mole/lit. The reaction rate constant is 0.022 min^{-1}. The time required, in minutes, for 75% conversion of A is

Options :

1. 63

2. 54

3. 48

4. 72

Question Number : 72 Question Id : 2999654512 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which is the most suitable instrument to measure high vacuum?

Options :

1. Dead weight gauge

2. Pirani gauge

3. Barometer

4. Bourdon pressure gauge

Question Number : 73 Question Id : 2999654513 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For a first order system, the phase lag of a sinusoidal response is _____.

Options :

1. 90°

2. 120°

3. 180°

4. 30°

Question Number : 74 Question Id : 2999654514 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Conversion is independent on initial concentration for _____ order reaction.

Options :

1. 0th

2. 1st

3. 2nd

4. 3rd

The relationship between Thiele modulus(ϕ) and Internal Effectiveness Factor(η) for first order reaction is _____ .

Options :

1. $\eta = 1/\phi(\phi \coth(\phi)-1)$

2. $\eta = 1/\phi^2(\phi \coth(\phi)-1)$

3. $\eta = 3/\phi(\phi \coth(\phi)-1)$

4. $\eta = 3/\phi^2(\phi \coth(\phi)-1)$

Variation of Heat of reaction with temperature at constant pressure or at constant volume is known as

Options :

1. Fourier's Law

2. Hess's Law

3. Kirchoff's Law

4. Laplace Law

An isothermal gas phase reaction A $\rightarrow$ 5B is conducted by taking 50% A and 50% inerts. The value of ε is

Options :

1. 1

2. 2

3. 3

4. 4

Choose the correct statement from the following.

(i) The effectiveness factor is smaller when an endothermic reaction is conducted under non-isothermal conditions compared to that at isothermal conditions.

(ii) The effectiveness factor is larger when an endothermic reaction is conducted under non-isothermal conditions compared to that at isothermal conditions.

Options :

1. Both statements (i) and (ii) are correct.

2. Statement (i) is correct but ii) is wrong.

3. Statement (i) is wrong but (ii) is correct.

4. Both statements (i) and (ii) are wrong.

The conversion of a reactant, undergoing a first order reaction, at a time equal to twice the half life of the reaction is

Options :

1. 0.75

2. 0.88

3. 0.60

4. 0.55

_____ catalyst is used in Oxo Process.

Options :

1. Cobalt carbonyl

2. ZnO

3. TiO_2

4. BiOCl

For an exothermic reaction the equilibrium constant

Options :

1. remains unaffected with change in temperature.

2. decreases with increase in temperature.

3. increases with increase in temperature.

4. decreases with increase in pressure.

For a system prepared by partially decomposing $CaCO_3$ into an evacuated space, the number of degrees of freedom is

Options :

1. 0

2. 1

3. 2

4. 3

A police man standing and controlling the traffic is an example for

Options :

1. an open loop control

2. a feed forward control

3. a feedback control

4. a closed loop control

A series first order reaction $A \rightarrow R \rightarrow S$ ($K_1 = 2K_2$) is carried out in an isothermal batch reactor with 1 mole of pure A per liter, determine the maximum concentration of R that can be obtained.

Options :

1. 0.25

2. 0.5

3. 0.75

4. 1.0

The catalytic cracking of heavy oil has the following advantages.

Options :

1. Low antiknock property.

2. High quantities of aromatics could be obtained.

3. By product gas yield is high.

4. The product has considerable quantities of Sulphur.

Question Number : 86 Question Id : 2999654526 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

For a P-D controller, the transfer function is

Options :

1. $K_c \tau_D s$

2. $K_c / \tau_D s$

3. $K_c (1 + \tau_D s)$

4. $K_c (1 + 1/\tau_D s)$

Question Number : 87 Question Id : 2999654527 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The damping ratio of a second order system with the transfer function $4/(s^2+2s+4)$ is

Options :

1. 0.5

2. 2.0

3. 4.0

4. 1.0

The time constant for a first order system of mercury-in-glass thermometer (mass of mercury m, heat capacity of mercury C, film heat transfer coefficient h, and surface area of mercury bulb A) is

Options :

1. mC/hA

2. hA/mC

3. hAC/m

4. m/hAC

The reaction for this mechanism is between an adsorbed molecule and a molecule in the gas phase is called as

Options :

1. Eley-Rideal Mechanism

2. Single site mechanism

3. Dual site mechanism

4. Different site mechanism

Electric Furnace is used in _____ Synthesis.

Options :

1. Sulphur

2. Phosphorus

3. NH_3

4. Cement

Nylon synthesis is based on

Options :

1. Addition polymerization

2. Pyrolysis process

3. Condensation polymerization

4. Freezing process

Relation between Decibel and Amplitude Ratio (A.R) is

Options :

1. $Decibel = \log_{10}(A.R)$

2. $Decibel = 10 \log_{10}(A.R)$

3. $Decibel = 20 \log_e(A.R)$

4. $Decibel = 20 \log_{10}(A.R)$

The effective annual interest rate i_{eff} is expressed in terms of the nominal interest rate r compounded continuously as

Options :

1. $i_{eff} = \ln(r) - 1$

2. $i_{eff} = e^r$

3. $i_{eff} = \ln(r + 1)$

4. $i_{eff} = e^r - 1$

Question Number : 94 Question Id : 2999654534 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Off set of a control system _____.

Options :

1. varies with time

2. does not vary with time

3. varies exponentially with time

4. varies sinusoidally with time

Question Number : 95 Question Id : 2999654535 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The time constant of a unity gain, first order plus time delay process is 5 min. If the phase lag at a frequency of 0.2 rad/min is 60°, then the dead time (in minutes) is

Options :

1. $\pi/6$

2. $5\pi/12$

3. $\pi/3$

4. $\pi/12$

The Corner frequency of a first order system having transfer function of $1/(\tau s+1)$ is

Options :

1. $2/s$

2. $1/\tau$

3. $\tau/2$

4. $s/2$

Standard pipes of different schedule numbers and standard tubes of different BWG numbers are available in the market. For a pipe or tube of a given nominal diameter, which one of the following statements is true?

Options :

1. Wall thickness increases with increase in both schedule number and the BWG number.

2. Wall thickness decreases with increase in the schedule number and increases with increase in the BWG number.

3. Wall thickness decreases with increase in both schedule number and the BWG number.

4. Wall thickness increases with increase in the schedule number and decreases with increase in the BWG number.

The characteristic equation of a closed loop system using a proportional controller with gain K_c is $12 s^3 + 19 s^2 + 8 s + 1 + K_c = 0$. At the onset of instability, the value of K_c is

Options :

1. 20/3

2. 10

3. 25/3

4. 35/3

The calibration data of a thermocouple with its cold junction at 0°C are given below:

Hot junction temperature (°C) :	0	20	40	60	80	100
Thermo emf (mV) :	0.00	0.80	1.61	2.43	3.26	4.10

The hot junction of the thermocouple is placed in a bath at 80°C while its cold junction is at 20°C. What is the emf of the thermocouple?

Options :

1. 3.26 mV

2. 0.80 mV

3. 2.46 mV

4. 2.43 mV

Which of the following is correct?

Options :

1. Rate = Driving force × Resistance

2. Driving force = Rate × Resistance

3. Resistance = Rate × Driving force

4. Rate = Resistance/Driving force

When the declining- balance method is used _____.

Options :

1. the annual depreciation cost is a fixed percentage of the property value at the beginning of the particular year

2. the annual cost for depreciation is same each year

3. the value of the asset can decrease to zero at the end of the service life

4. the value of the asset decreases linearly with time

A column costs ₹5 lakh and has a useful life of 10 years. Using the double declining balance depreciation method, the book value of the column at the end of 5 years in lakh of rupees is ____.

Options :

1. 1.21

2. 1.31

3. 1.64

4. 2.05

Breakeven point is the point where

Options :

1. fixed and variable costs intersect

2. fixed and total costs intersect

3. total and variable costs intersect

4. sales revenue and total costs intersect

Chemical engineering plant cost index is used for finding the present cost of a particular chemical plant, if the cost of similar plant at some time in the past is known. The major component of this cost index is

Options :

1. Fabricated equipment and machinery

2. Pumps and compressors

3. Process instruments and control

4. Electrical equipment & materials

Which of the following is not a component of the fixed capital for a chemical plant facility?

Options :

1. Process equipment

2. Process piping, instruments and controls

3. Plants utilities

4. Raw materials inventory

Question Number : 106 Question Id : 2999654546 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

A new piece of completely installed equipment costs ₹12,000 and it has scrap value of ₹2000 at end of its useful life. If the useful life period is 10 years and interest is compounded 6% per year. Capitalized cost _____. (Approximately).

Options :

1. ₹24650

2. ₹35640

3. ₹54210

4. ₹65270

Question Number : 107 Question Id : 2999654547 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

The ratio of average production rate for a given period to the designed production rate is called as

Options :

1. Capacity factor

2. Demand factor

3. Load factor

4. Diversity factor

_____ is calculated by dividing the present value of future cash flows by the initial cost (or initial investment) of the project.

Options :

1. The profitability index

2. Cost index

3. Critical Index

4. Cash flow index

An investment of ₹ 200 lakh is to be made for construction of a plant which will take 3 years to start production. The annual profit from operation of the plant is ₹40 lakh. What will be the payback time?

Options :

1. 8 years

2. 7 years

3. 5 years

4. 6 years

Cost incurred towards _____ in a chemical plant is a component of the utilities cost.

Options :

1. property protection

2. control laboratory

3. air

4. canteen

Question Number : 111 Question Id : 2999654551 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Which of the following gases has high calorific value?

Options :

1. Natural gas

2. Producer gas

3. Water gas

4. LPG

Question Number : 112 Question Id : 2999654552 Question Type : MCQ Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Muriatic acid is the alternate name of _____ acid.

Options :

1. sulphuric

2. nitric

3. hydrochloric

4. formic

Sugar is leached from sugar beets with _____.

Options :

1. cold water

2. hot water

3. sulphuric acid

4. lime water

Water-gas is mixed with one of the following to give carburetted water gas.

Options :

1. Carbohydrates

2. Fluorocarbons

3. Halogens

4. Hydrocarbons

Production of alcohol by fermentation of molasses is an _____ process.

Options :

1. aerobic

2. anaerobic

3. endothermic

4. sulfonation

Match the chemicals written on the left with the raw materials required to produce them mentioned on the right

I) Single Superphosphate   P) Rock phosphate + Sulfuric Acid+ Ammonia
II) Triple Superphosphate   Q) Brine
III) Diammonium Phosphate   R) Rock phosphate + Sulfuric Acid
IV) Caustic Soda   S) Rock phosphate + Phosphoric Acid

Options :

1. I-Q, II-R, III-S, IV-P

2. I-S, II-P, III-Q, IV-R

3. I-R, II-S, III-P, IV-Q

4. I-S, II-R, III-P, IV-Q

20% oleum contains _____.

Options :

1. 20 mol% SO_3 and 80 mol% H_2SO_4

2. 20 wt% H_2SO_4 and 80 wt% SO_3

3. 20 mol% H_2SO_4 and 80 mol% SO_3

4. 20 wt% SO_3 and 80 wt% H_2SO_4

Which of the following has the highest octane number?

Options :

1. Olefins

2. Aromatics

3. Paraffins

4. Naphthenes

Prilling tower is found in the manufacture of _____.

Options :

1. sugar

2. cement

3. ammonia

4. urea

A filler is not required during the manufacture of _____ paper.

Options :

1. Bond

2. Writing

3. Coloured

4. Blotting nitrogen