Question Paper Preview

Question Paper Name: Chemical Engineering 12th May 2017 Shift 1
Subject Name: Chemical Engineering
Duration: 120

Chemical Engineering

Display Number Panel: Yes
Group All Questions: No

Question Number : 1 Question Id : 871112841 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If $A = \begin{pmatrix} 1 & 0 \\ 0 & 3 \end{pmatrix}$, then the determinant of $A^3 =$

Options :

1. 3
2. 9
3. 27
4. 8

Question Number : 2 Question Id : 871112842 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Let $f(x, y) = x \sin y + e^x \cos y$, $x = t^2 + 1$, $y = t^2$. Then the value of $(\frac{\partial f}{\partial t})$ at $t = 0$ is

Options :

1. $e + 1$
2. 0
3. $e - 1$
4. $e^2 + 1$

Question Number : 3 Question Id : 871112843 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Let S be the surface bounding the region $(x^2 + y^2) \leq 1$, $x \geq 0$, $y \geq 0$, $|z| \leq 1$ and $\mathbf{n}$ be the unit outer normal to S. Then

$$\iint [\sin^2 x\boldsymbol{i} + 2y\boldsymbol{j} - z(1 + \sin 2x)\boldsymbol{k}] \cdot \mathbf{n} ds =$$

Options :

1. 1
2. $\pi/2$
3. π
4. 2π

Question Number : 4 Question Id : 871112844 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The solution of $y\,(2\,xy + 1)\,dx - xdy = 0$ is

Options :

1. $x + yx^2 = c$
2. $y + xy^2 = c$
3. $x/y + x^2 = c$
4. $y/x + y^2 = c$

Question Number : 5 Question Id : 871112845 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The inverse Laplace transform of $\frac{1}{s(s^2+1)}$ is

Options :

1. $1 - \cos t$
2. $1 + \cos t$
3. $1 - \sin t$
4. $1 + \sin t$

Question Number : 6 Question Id : 871112846 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The fixed points of $f(z) = \frac{2\,iz + 5}{z - 2i}$ are

Options :

1. $1 \pm i$
2. $1 \pm 2i$
3. $2i \pm 1$
4. $i \pm 1$

Question Number : 7 Question Id : 871112847 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

X and Y are two random variables with the same standard deviation and correlation coefficients. Then the coefficient of correlation between X and X +Y is

Options :

1. $r/2$
2. $1 + r/2$
3. $\frac{1+r}{2}$
4. $\sqrt{\frac{1+r}{2}}$

Question Number : 8 Question Id : 871112848 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a binomial distribution the sum and the product of the mean and variance are 25/3 and 50/3 respectively. The distribution is

Options :

1. $(4/5 + 1/5)^{15}$
2. $(2/3 + 1/3)^{15}$
3. $(¾ + ¼)^{15}$
4. $(½ + ½)^{15}$

Question Number : 9 Question Id : 871112849 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The interval in which the non-linear equation $x^3 - 2x - 5 = 0$ has a real root is

Options :

1. $(0, 1)$
2. $(-1, 0)$
3. $(2, 3)$
4. $(-2, 3)$

Question Number : 10 Question Id : 871112850 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If $y' = -y$, $y(0) = 1$, by the Euler's method, the value of $y(0.1)$ with $h = 0.1$ is

Options :

1. 0. 984
2. 0.98
3. 0.99
4. 0.994

Question Number : 11 Question Id : 871112851 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a mixture of benzene vapor and nitrogen gas at a total pressure of 900 mm Hg, if the absolute humidity of benzene is 0.2 kg benzene/kg nitrogen, the partial pressure of benzene in mm Hg is

Options :

1. 180
2. 60.3
3. 720
4. 200

Question Number : 12 Question Id : 871112852 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For a particular binary system, the excess Gibbs energy is given by, $\frac{G^E}{RT} = Ax_1x_2$. Activity coefficient for species '1' is given as:

Options :

1. $\ln\gamma_1 = Ax_1^2$
2. $\ln\gamma_1 = Ax_2^2$
3. $\ln\gamma_1 = Ax_1x_2^2$
4. $\ln\gamma_1 = Ax_1^2x_2$

Question Number : 13 Question Id : 871112853 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Mollier diagram is a plot of

Options :

1. temperature vs. enthalpy
2. temperature vs. entropy
3. entropy vs. enthalpy

4. temperature vs. internal energy

Question Number : 14 Question Id : 871112854 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

At standard conditions,

$$N_2 + 2O_2 \rightleftharpoons 2NO_2;\ \Delta G^\circ = 100\ kJ/mole$$

$$NO + \tfrac{1}{2}\ O_2 \rightleftharpoons NO_2;\ \Delta G^\circ = -35\ kJ/mole$$

The standard free energy of formation of NO in kJ/mole is

Options :

1. 15
2. 30
3. 85
4. 170

Question Number : 15 Question Id : 871112855 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A vapor whose partial pressure is less than its equilibrium vapor pressure is called the _____ vapor.

Options :

1. saturated
2. superheated
3. unsaturated
4. dry gaseous

Question Number : 16 Question Id : 871112856 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If $Z = 1 + \frac{BP}{RT}$, then $\frac{G^R}{RT}$ is given by

Options :

1. $\frac{B}{RT}$
2. $\frac{BP}{RT}$
3. $\frac{P}{RT}$

4. $\frac{RT}{BP}$

Question Number : 17 Question Id : 871112857 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A cyclic engine exchanges heat with two reservoirs maintained at 100° C and 300° C respectively. The maximum work (in J) that can be obtained from 1000 J of heat extracted from the hot reservoir is

Options :

1. 333
2. 349
3. 667
4. 651

Question Number : 18 Question Id : 871112858 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

As pressure approaches zero, the ratio of fugacity to pressure (f / P) for a gas approaches

Options :

1. Unity.
2. Zero.
3. Indeterminate value.
4. Infinity.

Question Number : 19 Question Id : 871112859 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Carbon black is produced by decomposition of methane

$$CH_4(g) \rightarrow C(g) + 2H_2(g)$$

The single pass conversion of methane is 60%. If fresh feed is pure methane and 25% of the methane exiting the reactor is recycled, then the molar ratio of fresh feed stream to recycle stream is_____.

Options :

1. 0.9
2. 9
3. 10
4. 90

Question Number : 20 Question Id : 871112860 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In The system, liquid water in equilibrium with a mixture of water vapour and nitrogen has _____ degrees of freedom.

Options :

1. 4
2. 3
3. 0
4. 2

Question Number : 21 Question Id : 871112861 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Methane is completely burned with air. The maximum possible volume % of CO_2 on dry basis in the final gas is

Options :

1. 11.7
2. 21.0
3. 44.0
4. 28.0

Question Number : 22 Question Id : 871112862 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Entropy of an ideal gas is

Options :

1. a function of temperature only
2. a function of pressure only
3. a function of temperature as well as pressure
4. independent of temperature and pressure

Question Number : 23 Question Id : 871112863 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For a steady state system,

Options :

1. the rate of input is zero
2. the rate of generation is zero
3. the rate of consumption is zero
4. the rate of accumulation is zero

Question Number : 24 Question Id : 871112864 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

1000 kg of wet solids are to be dried from 60% to 20% moisture (by weight). The mass of moisture removed in kg is

Options :

1. 520
2. 200
3. 400
4. 500

Question Number : 25 Question Id : 871112865 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

"For any closed system formed initially from given masses of prescribed chemical species, the equilibrium state is completely determined when any two independent variables are fixed" is known as

Options :

1. Gibb's theorem
2. Phase rule
3. Duhem's theorem
4. Lewis/Randall rule

Question Number : 26 Question Id : 871112866 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For steady laminar flow of Newtonian fluids in pipes, the ratio of average velocity to maximum velocity is equal to

Options :

1. 0.5
2. 1.0
3. 1.5
4. 2.0

Question Number : 27 Question Id : 871112867 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A fluid energy mill is used for _____.

Options :

1. cutting

2. grinding

3. ultragrinding

4. crushing

Question Number : 28 Question Id : 871112868 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A tube mill compared to a ball mill

Options :

1. has a higher length/ diameter ratio

2. produces a coarser product

3. has a higher diameter/ length ratio

4. uses much larger balls

Question Number : 29 Question Id : 871112869 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following minerals has minimum Rittinger's number?

Options :

1. Galena

2. Pyrite

3. Quartz

4. Calcite

Question Number : 30 Question Id : 871112870 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Energy requirement (per unit mass of material crushed / ground) is highest for

Options :

1. Jaw crusher

2. Rod mill

3. Ball mill

4. Fluid energy mill

Question Number : 31 Question Id : 871112871 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The sphericity of a cylinder of 1 cm diameter and length of 3 cm is

Options :

1. 0.9

2. 0.8

3. 0.6

4. 0.5

Question Number : 32 Question Id : 871112872 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For a fluidized bed, with the increase in expansion of the bed, up to solids carry over from the bed, the pressure drop across the bed

Options :

1. increases rapidly

2. decreases rapidly

3. first decreases and then increases

4. remains constant

Question Number : 33 Question Id : 871112873 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In screen analysis, notation – 5 mm/ +10 mm means passing through

Options :

1. 10 mesh screen and retained on 5 mm screen

2. 5 mm mesh screen and retained on 10 mm screen

3. both 5 mm and 10 mm screens

4. neither 5 mm nor 10 mm screen

Question Number : 34 Question Id : 871112874 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which fluid does not experience shearing stress during flow?

Options :

1. Pseudoplastic

2. Dilatant

3. Newtonian

4. Inviscid

Question Number : 35 Question Id : 871112875 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The work required for crushing a given mass of material is constant for a given reduction ratio irrespective of the initial size. This is given by

Options :

1. Kick's Law

2. Rittinger's Law

3. Bond's Law

4. Michael's Law

Question Number : 36 Question Id : 871112876 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Froth flotation is best suitable for the recovery of

Options :

1. Potassium chloride

2. Gold

3. Iron ore

4. Platinum

Question Number : 37 Question Id : 871112877 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For fluid rotating at a constant angular velocity about vertical axis as a rigid body, the pressure varies as the

Options :

1. square of the radial distance

2. radial distance linearly

3. inverse of radial distance

4. square root of the radial distance

Question Number : 38 Question Id : 871112878 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A gravity decanter is used for separation of

Options :

1. two immiscible liquids of same density

2. two miscible liquids of same density

3. two miscible liquids of different density

4. two immiscible liquids of different density

Question Number : 39 Question Id : 871112879 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Equivalent diameter for flow through a square channel of side s is

Options :

1. s/4

2. s

3. 4s

4. s/2

Question Number : 40 Question Id : 871112880 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following is the best for high pressure requirements?

Options :

1. Reciprocating pump

2. Centrifugal pump

3. Peristaltic pump

4. Diaphragm pump

Question Number : 41 Question Id : 871112881 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

When some liquid nitrogen spills on the floor of a laboratory, the droplets move briskly that they appear to be dancing before they disappear. This phenomenon

Options :

1. is related to pool boiling

2. is related to film boiling

3. is related to nucleate boiling

4. is not related to boiling

Question Number : 42 Question Id : 871112882 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The thermal radiative flux from a surface of emissivity of 0.4 is 22.68 kW/m^2. The approximate surface temperature (K) is _____.

Options :

1. 800

2. 700

3. 1000

4. 1200

Question Number : 43 Question Id : 871112883 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The presence of small amounts of non-condensable gas in a condensing vapor

Options :

1. increases the rate of condensation

2. reduces the rate of condensation

3. does not affect the rate of condensation

4. increases the condensing film coefficient

Question Number : 44 Question Id : 871112884 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Consider the following statements and identify which of them is/are CORRECT?

P) The temperature profile in case of 1-dimensional heat transfer through a slab of constant thermal conductivity is linear.

Q) For the same heat transfer rate in slabs, the slope of the temperature gradient in insulating materials is smaller than in non-insulating materials.

Options :

1. P only

2. Q only

3. P and Q

4. Neither P nor Q

Question Number : 45 Question Id : 871112885 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Consider a medium in spherical coordinate system in which the heat conduction equation is given in its simplest form as

$$\frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\frac{\partial T}{\partial r}\right)+\frac{1}{r^2 sin^2\theta}\frac{\partial^2 T}{\partial \emptyset^2}=\frac{1}{\alpha}\frac{\partial T}{\partial t}$$

Which of the following is CORRECT with respect to a heat transfer problem with the above governing equation?

Options :

1. Heat transfer is transient, one-dimensional with constant thermal conductivity of the medium.

2. Heat transfer is transient, two-dimensional with constant thermal conductivity of the medium.

3. Heat transfer is transient, three-dimensional with constant thermal conductivity of the medium

4. Heat transfer is transient, two-dimensional with variable thermal conductivity of the medium.

Question Number : 46 Question Id : 871112886 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A cold fluid is heated from 40°C to 130°C by steam at 150°C. The LMTD in parallel flow is

Options :

1. Lower than the LMTD in counter flow

2. Greater than the LMTD in counter flow

3. Equal to the LMTD in counter flow

4. Zero

Question Number : 47 Question Id : 871112887 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The critical radius r of insulation on a pipe is given by

Options :

1. $r = 2k/h$

2. $r = k/h$

3. $r = k / (2h)$

4. $r = h/k$

Question Number : 48 Question Id : 871112888 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

What type of tube pitch is recommended for a shell and tube heat exchanger which has shell side fouling?

Options :

1. Square pitch – 90°

2. Triangular pitch – 60°

3. Triangular pitch – 90°

4. Square pitch – 45°

Question Number : 49 Question Id : 871112889 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Baffles are provided in heat exchangers to

Options :

1. increase pressure drop

2. decrease pressure drop

3. increase rate of heat transfer

4. decrease vibrations

Question Number : 50 Question Id : 871112890 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Heat transfer coefficient in a helical coil compared to that in a straight pipe

Options :

1. is always lower

2. is always higher

3. is always same

4. can be higher or lower

Question Number : 51 Question Id : 871112891 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

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

Options :

1. D_{AB}

2. $D_{AB}^{1.5}$

3. $D_{AB}^{0.5}$

4. D_{AB}^{-1}

Question Number : 52 Question Id : 871112892 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

At the azeotropic composition of a binary mixture the relative volatility is

Options :

1. 0
2. >1
3. <1
4. 1

Question Number : 53 Question Id : 871112893 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Lewis number = 1 signifies

Options :

1. $Pr = Sc$
2. $Pr = Re$
3. $Sc = Re$
4. $Nu = Sh$

Question Number : 54 Question Id : 871112894 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

When both the fluids flow cocurrently in an absorber, the slope of the operating line is

Options :

1. negative
2. positive
3. ∞
4. 0

Question Number : 55 Question Id : 871112895 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If moisture content of a solid on dry basis is X then the same on wet basis is

Options :

1. $\frac{X}{X+1}$
2. $\frac{X}{1-X}$
3. $\frac{1+X}{X}$

4. $\frac{1-X}{X}$

Question Number : 56 Question Id : 871112896 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The dimensionless group in mass transfer that is equivalent to Prandtl number in heat transfer is

Options :

1. Nusselt number

2. Schmidt number

3. Sherwood number

4. Stanton number

Question Number : 57 Question Id : 871112897 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If the slope of feed line is 0.83, the physical condition of feed is

Options :

1. Saturated liquid

2. Superheated vapor

3. Partially vaporized

4. Saturated vapor

Question Number : 58 Question Id : 871112898 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The Chilton -Colburn analogy for mass transfer states that

Options :

1. $St * Sc^{1/3} = f/8$

2. $St * Sc^{2/3} = f/2$

3. $St * Sc^{3/2} = f/2$

4. $St * Sc^{2/3} = f/8$

Question Number : 59 Question Id : 871112899 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The operating line for an absorber is curved when plotted in terms of

Options :

1. mole fractions

2. mole ratios

3. partial pressure

4. mass fractions

Question Number : 60 Question Id : 871112900 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The apex of an equilateral-triangular co-ordinate (in ternary liquid system) represents

Options :

1. a pure component

2. a binary mixture

3. a ternary mixture

4. an insoluble binary system

Question Number : 61 Question Id : 871112901 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Moisture contained by a substance in excess of the equilibrium moisture is called

Options :

1. unbound moisture

2. free moisture

3. critical moisture

4. bound moisture

Question Number : 62 Question Id : 871112902 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a binary gas mixture, the diffusivity of A in B equals the diffusivity of B in A, when

Options :

1. A diffuses through B, but B does not diffuse through A

2. A and B diffuse by equi-molar counter pattern

3. the variations in concentrations of A do not cause appreciable change in volumes of A and B in the mixture

4. the densities of A and B do not change during the diffusion

Question Number : 63 Question Id : 871112903 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In the enriching section of the continuous distillation column

Options :

1. more volatile component transfers from vapour to liquid

2. less volatile component transfers from liquid to vapour

3. less volatile component transfers from vapour to liquid

4. more volatile component transfers from liquid to vapour

Question Number : 64 Question Id : 871112904 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The time required for obtaining a given conversion in a batch reactor at constant pressure and also at constant volume was found to be the same. Then the order of the reaction is:

Options :

1. Zero

2. One

3. Two

4. Three

Question Number : 65 Question Id : 871112905 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The activation energies of a forward reaction E_f and its backward reaction E_b in case of an exothermic reversible reaction and endothermic reversible reaction are related respectively as

Options :

1. $E_f > E_b$ and $E_f > E_b$

2. $E_f < E_b$ and $E_f < E_b$

3. $E_f < E_b$ and $E_f > E_b$

4. $E_f > E_b$ and $E_f < E_b$

Question Number : 66 Question Id : 871112906 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The Thiele Modulus can be defined as a ratio of rates of

Options :

1. surface reaction to external diffusion

2. external diffusion to surface reaction

3. surface reaction to internal diffusion

4. internal diffusion to surface reaction

Question Number : 67 Question Id : 871112907 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The overall order of the reaction for which rate constant has units of $(mol/lit)^{-3/2}\ s^{-1}$ is

Options :

1. $-3/2$

2. $1/2$

3. $3/2$

4. $5/2$

Question Number : 68 Question Id : 871112908 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If there is no correspondence between rate law and stoichiometry, the reaction is called

Options :

1. Non-elementary reaction

2. Elementary reaction

3. Zero order reaction

4. First order reaction

Question Number : 69 Question Id : 871112909 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a batch reactor, 40% of reactant is consumed in 240 seconds. The reaction follows second order kinetics. How much time will be required to achieve 80% conversion?

Options :

1. 23.98 minutes

2. 26 minutes

3. 27 minutes

4. 22.39 minutes

Question Number : 70 Question Id : 871112910 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For a certain first order reaction, reaction rate constant is $0.0018\ s^{-1}$. What is the value of the half life time of the reaction?

Options :

1. 490 s

2. 390 s

3. 590 s

4. 385 s

Question Number : 71 Question Id : 871112911 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Match the following group I with group II

Group I	Group II
(P) porous catalyst	(1) selectivity
(Q) parallel reactions	(2) shrinking core model
(R) Non-ideal tubular reactor	(3) Thiele modulus
(S) gas-solid non catalytic reaction	(4) Dispersion number

Options :

1. P-1, Q-4, R-2, S-3

2. P-1, Q-3, R-2, S-4

3. P-3, Q-1, R-4, S-2

4. P-3, Q-4, R-1, S-2

Question Number : 72 Question Id : 871112912 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For the reaction $P + 2Q \rightarrow 3R$, molor rate of consumption of P is

Options :

1. Double that of Q

2. Same as that of Q

3. Half of that of Q

4. 2/3 of that of Q

Question Number : 73 Question Id : 871112913 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Collision theory states that the rate constant k is proportional to

Options :

1. T

2. $T\, e^{-E/RT}$

3. $e^{-E/RT}$

4. $T^{½}\, e^{-E/RT}$

Question Number : 74 Question Id : 871112914 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Reactions with _____ activation energy and at _____ temperatures are more temperature sensitive.

Options :

1. high, high

2. low, low

3. low, high

4. high, low

Question Number : 75 Question Id : 871112915 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

When the reaction occurs in the diffusion controlled region, the apparent activation energy as measured is only _____ the true value.

Options :

1. Half

2. Twice

3. Equal

4. One and half

Question Number : 76 Question Id : 871112916 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The rate of reaction varies exponentially with temperature, when the rate controlling step is

Options :

1. internal diffusion or surface reaction only

2. internal diffusion or external diffusion only

3. external diffusion or surface reaction only

4. internal diffusion or external diffusion or surface reaction

Question Number : 77 Question Id : 871112917 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For perfect mixed flow, the dispersion number must be

Options :

1. Zero
2. < 2100
3. > 2100
4. infinity

Question Number : 78 Question Id : 871112918 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If Damkohler number, Da = 3, then what is the conversion in PFR for second order liquid phase irreversible reaction ($2A \rightarrow R$)?

Options :

1. 30%
2. 60%
3. 75%
4. 95%

Question Number : 79 Question Id : 871112919 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Servo problem means

Options :

1. load changing
2. set point changing
3. both load and set point changing
4. neither load nor set point changing

Question Number : 80 Question Id : 871112920 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Ionisation gauge is used to measure

Options :

1. Vacuum
2. Temperature
3. Composition
4. Flow rate

Question Number : 81 Question Id : 871112921 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The unit of magnitude measurement in Bode plot is

Options :

1. No units
2. Degree
3. Decibel
4. Decade

Question Number : 82 Question Id : 871112922 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The stability of a system that has the characteristic equation $s^4 + 5s^3 + 3s^2 + 1 = 0$, is

Options :

1. stable
2. unstable
3. marginally stable
4. indeterminable

Question Number : 83 Question Id : 871112923 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which one of the following transfer functions, upon a unit step change in disturbance at t = 0, will show a stable time domain response with negative initial slope (i.e., slope at t = 0)?

Options :

1. $G(s) = \frac{1}{s+1} - \frac{2}{s+4}$
2. $G(s) = \frac{1}{s+1} + \frac{2}{s+4}$
3. $G(s) = \frac{1}{s+1} + \frac{2}{s-4}$
4. $G(s) = \frac{1}{s-1} + \frac{2}{s-4}$

Question Number : 84 Question Id : 871112924 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The offset introduced by proportional controller with gain K_c in response of first order system can be reduced by

Options :

1. reducing value of K_c
2. introducing integral control
3. introducing derivative control

4. increasing value of K_c

Question Number : 85 Question Id : 871112925 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

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 : 86 Question Id : 871112926 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A rectangular tank is filled with a valve at the bottom and is used for storing a liquid. The area of cross-section of the tank is 10 m^2 and the flow resistance of the valve is 0.1 s/m^2. The time constant of the tank will be

Options :

1. 1
2. 10
3. 100
4. 200

Question Number : 87 Question Id : 871112927 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The step response of a first- order system is

Options :

1. underdamped
2. critically damped
3. overdamped
4. undamped

Question Number : 88 Question Id : 871112928 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Bode diagrams are generated from output response of the system subjected to which of the following inputs?

Options :

1. impulse

2. step

3. ramp

4. sinusoidal

Question Number : 89 Question Id : 871112929 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For a second order system, the damping coefficient ξ is given as 0.7. The overshoot and decay ratio for this system respectively are

Options :

1. $e^{-3.07}, e^{-6.15}$

2. $e^{-5.07}, e^{-10.15}$

3. $e^{-7.07}, e^{-14.15}$

4. $e^{-9.07}, e^{-18.15}$

Question Number : 90 Question Id : 871112930 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

When two first order systems are connected in series, the overall transfer function is

Options :

1. the product of the individual transfer functions

2. the sum of the individual transfer functions

3. the ratio of the individual transfer functions

4. the difference of the individual transfer functions

Question Number : 91 Question Id : 871112931 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The economic life of a small chemical plant

Options :

1. is always more than that of a large chemical plant

2. could be more or less than that of a large chemical plant

3. is always less than that of a large chemical plant

4. is always equal to that of a large chemical plant

Question Number : 92 Question Id : 871112932 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The total capital investment for a chemical plant is Rs. 10,00,000 and the working capital is Rs. 1,00,000. If a turnover ratio is 1, the gross annual sales will be

Options :

1. Rs. 8,00,000
2. Rs. 9,00,000
3. Rs. 10,00,000
4. Rs. 11,00,000

Question Number : 93 Question Id : 871112933 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following is an accurate measure to capture the time dependence of cash flows during the project?

Options :

1. Net Present Value
2. Discounted cash-flow rate of return
3. Return on Investment
4. Payback Time

Question Number : 94 Question Id : 871112934 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following is included in the working capital?

Options :

1. Product and raw materials inventory value.
2. Equipment costs.
3. Utilities costs.
4. Consumables costs.

Question Number : 95 Question Id : 871112935 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In cost estimation, the effect of inflation on equipment cost is taken care of by using

Options :

1. cost indices
2. six-tenths rule
3. lang factor

4. turnover ratio

Question Number : 96 Question Id : 871112936 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The ratio of future work to present work, when the compounding is continuous at a rate of r per year for N years is equal to

Options :

1. $\ln(r\ N)$

2. e^{rN}

3. $e^{rN} - 1$

4. $1 + \ln(r\ N)$

Question Number : 97 Question Id : 871112937 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

When is the declining- balance method 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 decreases to zero at the end of service life

4. The value of the asset decreases linearly with time

Question Number : 98 Question Id : 871112938 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Two 30 cm diameter steel pipes are connected by

Options :

1. threaded joints

2. union coupling

3. flanges

4. sleeves

Question Number : 99 Question Id : 871112939 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Lug support is meant for

Options :

1. Large horizontal cylindrical vessels

2. Tall but empty vessels

3. Small vessels

4. Thick walled tall vessels

Question Number : 100 Question Id : 871112940 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The cost of pipe per year including capital, depreciation, interest and maintenances can be expressed as K_aD^aL, where D is the diameter of pipe, L is the length of pipe, K_a and a are constants. The power cost per year can be expressed as $K_bQ\Delta P$, where q is the flow rate, ΔP is the pressure drop K_b is a constant. The optimum pipe diameter for constant Q, f and L is proportional to

Options :

1. $Q^{3/(5+a)}$

2. $Q^{(a-1)/(a+5)}$

3. $Q^{5/(3+a)}$

4. $Q^{3/(5-a)}$

Question Number : 101 Question Id : 871112941 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Kaoline is _____.

Options :

1. a refractory material

2. a synthetic resin

3. an artificial abrasive

4. a blue pigment

Question Number : 102 Question Id : 871112942 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Poly Tetra Flouro Ethylene (PTFE) is known as

Options :

1. Bakelite

2. Teflon

3. Celluloid

4. Decron

Question Number : 103 Question Id : 871112943 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Sucrose is a disaccharide consisting of

Options :

1. glucose and glucose

2. glucose and fructose

3. glucose and galactose

4. fructose and galactose

Question Number : 104 Question Id : 871112944 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

_____ is a thermosetting plastic.

Options :

1. Polyethylene

2. Polycarbonate

3. Bakelite

4. Polyvinyl chloride

Question Number : 105 Question Id : 871112945 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of these is an oxygenate?

Options :

1. Ethanol

2. Urea

3. Ammonia

4. Sulphuric acid

Question Number : 106 Question Id : 871112946 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Tallow refers to

Options :

1. Oil of animal origin

2. Oil derived from soyabean

3. Oil derived from groundnut

4. Mixture of vegetable oils

Question Number : 107 Question Id : 871112947 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Adipic acid is an intermediate in the manufacture of

Options :

1. Bakelite

2. Perspex

3. Nylon-66

4. Buna-S

Question Number : 108 Question Id : 871112948 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In petroleum refining, the process used for conversion of hydrocarbons to aromatics is called

Options :

1. catalytic cracking

2. catalytic reforming

3. hydrotreating

4. alkylation

Question Number : 109 Question Id : 871112949 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Phthalic anhydride is produced by the oxidation of

Options :

1. Naphthalene

2. Benzene

3. Toluene

4. Aniline

Question Number : 110 Question Id : 871112950 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The setting of plaster of Paris takes place with

Options :

1. loss of CO_2

2. hydrolysis

3. hydration

4. dehydration

Question Number : 111 Question Id : 871112951 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In differential distillation, the temperature of the still

Options :

1. increases

2. decreases

3. remains constant

4. cannot be predicted.

Question Number : 112 Question Id : 871112952 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Dry bulb temperature of a gas is _____.

Options :

1. less than the wet bulb temperature

2. more than the wet bulb temperature

3. equal to the wet bulb temperature

4. not related to wet bulb temperature

Question Number : 113 Question Id : 871112953 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A batch of material is dried under constant drying conditions. When drying is taking place from all the surfaces, the rate of drying during the constant rate period is

Options :

1. directly proportional to the solid thickness

2. independent of solid thickness

3. inversely proportional to the solid thickness

4. directly proportional to the square of solid thickness

Question Number : 114 Question Id : 871112954 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In distillation column design, the McCabe-Thiele procedure is inadequate and Ponchon-Savarit procedure is needed when

Options :

1. saturated feed is not used

2. an azeotrope forms

3. the latent heats of vaporization of the more and less volatile components are greatly different

4. a total condenser is used

Question Number : 115 Question Id : 871112955 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For ternary system containing two pairs of partially miscible liquids, the number of plait point(s)

Options :

1. is one

2. are two

3. are three

4. is zero

Question Number : 116 Question Id : 871112956 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

At total pressure of 725 mm Hg, the steam distillation temperature of aniline is 97° C. If the vapor pressure of H_2O is 648 mm Hg, what is the vapor pressure of aniline?

Options :

1. 77 mm Hg

2. 725 mm Hg

3. 648 mm Hg

4. 760 mm Hg

Question Number : 117 Question Id : 871112957 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In the absorption of a solute gas from a mixture containing inerts in a solvent, it has been found that the overall gas transfer coefficient is nearly equal to the individual gas film transfer coefficient. It may therefore be concluded that

Options :

1. the process is liquid film controlled

2. the gas is sparingly soluble in the solvent

3. the transfer rate can be increased substantially by reducing the thickness of the liquid film

4. the transfer rate can be increased substantially by reducing the thickness of the gas film

Question Number : 118 Question Id : 871112958 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The Knudsen diffusivity is proportional to

Options :

1. $\frac{1}{T^{0.5}}$

2. $T^{0.5}$

3. T

4. $1/T$

Question Number : 119 Question Id : 871112959 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A feedback control system under Proportional (P) control exhibits a steady state error. Is this true for all processes under P control?

Options :

1. yes

2. no

3. cannot say

4. depends on nature of the process

Question Number : 120 Question Id : 871112960 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Ratio control is a type of:

Options :

1. Feed forward control

2. Feedback control

Either of feedback and feed forward control

3.

Cascade control

4.