# Question Paper Preview

**Question Paper Name:** Chemical Engineering 12th May 2018 Shift1
**Subject Name:** Chemical Engineering
**Duration:** 120

Chemical Engineering

**Display Number Panel:** Yes
**Group All Questions:** No

**Question Number : 1 Question Id : 2203606961 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

All the eigen values of the matrix $\begin{bmatrix} 1 & 2 & 0 \\ 2 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$ lie in the disc

**Options :**

1. $|\lambda + 1| \leq 1$

2. $|\lambda - 1| \leq 1$

3. $|\lambda + 1| \leq 0$

4. $|\lambda - 1| \leq 2$

**Question Number : 2 Question Id : 2203606962 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Extremum value of $\frac{\log x}{x}$ is

**Options :**

1. e

2. 1/e

3. 1

4. $-1$

**Question Number : 3 Question Id : 2203606963 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The directional derivative of $xy^2 + yz^3$ at the point $(2, -1, 1)$ in the direction of $\mathbf{i} + 2\mathbf{j} + 2\mathbf{k}$ is

**Options :**

1. $-11/3$

2. $-3/11$

3. 0

4. 1

**Question Number : 4 Question Id : 2203606964 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

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

**Options :**

1. $x + y x^2 = c$

2. $y + x y^2 = c$

3. $x/y + x^2 = c$

4. $y/x + y^2 = c$

**Question Number : 5 Question Id : 2203606965 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The Laplace transform of $t^{-1/2}$ is

**Options :**

1. $\frac{\pi}{s}$

2. $\frac{\pi}{\sqrt{s}}$

3. $\frac{\sqrt{\pi}}{s}$

4. $\frac{\sqrt{\pi}}{\sqrt{s}}$

**Question Number : 6 Question Id : 2203606966 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The value of $\oint \frac{dz}{(z^2+4)2}$ over the closed curve : $|z - i| = 2$ is

**Options :**

1. $\pi/4$

2. $\pi/8$

3. $2\pi$

4. $\pi/16$

**Question Number : 7 Question Id : 2203606967 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Let X be a Poisson random variable such that $2\,P(X = 0) = P(X = 2)$. Then the standard deviation of X is

**Options :**

1. $4$

2. $2$

3. $\sqrt{2}$

4. $-\sqrt{2}$

**Question Number : 8 Question Id : 2203606968 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The probability density function f(x) of a continuous random variable X is defined by

$$f(x)=\begin{cases}\frac{A}{x^3}, & 5\le x\le 10\\ 0, & \text{elsewhere}\end{cases}$$

Then the value of A is

**Options :**

1. 100/3

2. 50/3

3. 200/9

4. 200/3

**Question Number : 9 Question Id : 2203606969 Question Type : MCQ Option Shuffling : Yes 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 : 2203606970 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

If h = 1 is the step size, then the value of $\int_0^4 (x^2+1)\,dx$ by Simpson's 1/3rd rule is

**Options :**

1. 9.2

2. 7. 8

3. 8.5

4. 8.44

**Question Number : 11 Question Id : 2203606971 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Which of the following are not intensive properties?

I. Pressure

II. Velocity

III. Volume

IV. Density

V. Kinetic Energy

**Options :**

1. I, II & III

2. IV & V

3. I, II & IV

4. III & V

**Question Number : 12 Question Id : 2203606972 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Air at a temperature of 20°C and 750 mm Hg pressure has a relative humidity of 70%.

What is its percentage humidity? Vapour pressure of water at 20°C is 17.5 mm Hg.

**Options :**

1. 80.30

2. 80

3. 79.17

4. 78.51

**Question Number : 13 Question Id : 2203606973 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

SI units of conductance is

**Options :**

1. W/m

2. $W/m^2$

3. W/K

4. W/m K

**Question Number : 14 Question Id : 2203606974 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

In production of sulphur trioxide, 100 kmol of $SO_2$ and 200 kmol of $O_2$ are fed to a reactor. The product stream is found to contain 80 kmol $SO_3$. Find the percentage conversion of $SO_2$.

**Options :**

1. 50

2. 60

3. 70

4. 80

**Question Number : 15 Question Id : 2203606975 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A saturated solution at 30°C contains 5 moles of solute (M.W. = 50 kg/kmol) per kg of solvent (M. W. = 20 kg/kmol). The solubility at 100°C is 10 moles of the solute per kg of the solvent. If 10 kg of the original solution is heated to 100°C, then the weight of the additional solute that can be dissolved in it, is

**Options :**

1. 0.25 kg

2. 1 kg

3. 2 kg

4. 3.34 kg

**Question Number : 16 Question Id : 2203606976 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Methane is mixed with stoichiometric proportion of oxygen and completely combusted. The number of additional specifications required to determine the product flow rate and composition is

**Options :**

1. 0

2. 1

3. 2

4. 3

**Question Number : 17 Question Id : 2203606977 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Skim milk is prepared by the removal of some of the fat from whole milk. This skim milk is found to contain 90.5% water, 3.5% protein, 5.1 % carbohydrate, 0.1% fat and 0.1% ash. If the original milk contained 4.5% fat, calculate the carbohydrate composition in the original milk assuming that fat only was removed to make the skim milk and that there are no losses in processing:

**Options :**

1. 2.6%

2. 3.3 %

3. 4.5%

4. 4.9 %

**Question Number : 18 Question Id : 2203606978 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A gas mixture contains 14 kg nitrogen, 16 kg oxygen and 17 kg ammonia. The mole fraction of oxygen is

**Options :**

1. 0.66

2. 0.33

3. 0.68

4. 0.25

**Question Number : 19 Question Id : 2203606979 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Entropy change for an irreversible process, taking into account both the system and surroundings together is _____.

**Options :**

1. positive

2. negative

3. zero

4. infinity

**Question Number : 20 Question Id : 2203606980 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

During a phase transition at constant temperature and pressure, all of the following thermodynamic properties of a closed, one-component system change except for:

**Options :**

1. Entropy

2. Enthalpy

3. Gibbs free energy

4. Internal energy

**Question Number : 21 Question Id : 2203606981 Question Type : MCQ Option Shuffling : Yes 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 : 22 Question Id : 2203606982 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Which of the following is true for virial equation of state?

**Options :**

1. Virial coefficients are universal constants

2. Virial coefficients represents three body interactions

3. Virial coefficients are function of temperature only

4. For some gases, Virial equations and ideal gas equations are the same

**Question Number : 23 Question Id : 2203606983 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A Carnot cycle consists of the following steps

**Options :**

1. Two isothermal and two isentropics

2. Two isobarics and two isothermals

3. Two isochorics and two isobarics

4. Two isothermals and two isochorics

**Question Number : 24 Question Id : 2203606984 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Solution which distill without change in composition is called

**Options :**

1. Ideal

2. Saturated

3. Supersaturated

4. Azeotropic

**Question Number : 25 Question Id : 2203606985 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The point at which all three (solid, liquid and gas) phases co-exist is known as

**Options :**

1. eutectic point

2. triple point

3. critical point

4. ice point

**Question Number : 26 Question Id : 2203606986 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The velocity profile for a Bingham Plastic fluid flowing (under laminar conditions) in a pipe is

**Options :**

1. parabolic

2. flat

3. flat near the wall and parabolic in the middle

4. parabolic near the wall and flat in the middle

**Question Number : 27 Question Id : 2203606987 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Indicate what will be the manometric reading if the Venturi meter is replaced by an Orifice meter of the same size.

**Options :**

1. Less than that of Venturi meter

2. Same as that of Venturi meter

3. Higher than that of Venturi meter

4. Twice than that of Venturi meter

**Question Number : 28 Question Id : 2203606988 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The operation of a rotameter is based on

**Options :**

1. Variable flow area

2. Rotation of a turbine

3. Pressure drop across a nozzle

4. Pressure at a stagnation point

**Question Number : 29 Question Id : 2203606989 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A pitot tube with a discharge coefficient of 0.9 is connected to a manometer containing water. A light oil with a specific gravity of 0.8 is flowing through a pipe line of 8 cm internal diameter. When the pitot tube is kept at the centre of pipe, the manometer reads 9 cm. If the average velocity is 80% of the maximum velocity then the flow rate of oil is _____.

**Options :**

1. 4.2 L/s

2. 3.2 L/s

3. 2.4 L/s

4. 5.4 L/s

**Question Number : 30 Question Id : 2203606990 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The sphericity of a particle of cubical shape is

**Options :**

1. $\pi$

2. $(\pi/6)^{1/3}$

3. $(\pi/6)^{1/2}$

4. $\pi/3$

**Question Number : 31 Question Id : 2203606991 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A particle A of diameter 10 microns settles in an oil of specific gravity 0.9 and viscosity of 10 poise under Stokes law. A particle B with diameter 20 microns settling in the same oil will have a settling velocity

**Options :**

1. same as that of A

2. 1/4 of that of A

3. twice as that of A

4. four times as that of A

**Question Number : 32 Question Id : 2203606992 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

For laminar flow of a fluid through a packed bed of spheres of diameter 'd', the pressure drop per unit length of bed depends upon the sphere diameter as

**Options :**

1. $d$

2. $d^2$

3. $d^4$

4. $1/d^2$

**Question Number : 33 Question Id : 2203606993 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

In case of a pressure driven laminar flow of a Newtonian fluid of viscosity ($\mu$) through a horizontal circular pipe, the velocity of the fluid is proportional to

**Options :**

1. $\mu$

2. $\mu^{0.5}$

3. $\mu^{-1}$

4. $\mu^{-0.5}$

**Question Number : 34 Question Id : 2203606994 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The angle formed by pouring a powder as a heap on a flat surface is known as

**Options :**

1. Contact of angle

2. Angle of nip

3. Angle of repose

4. Critical angle

**Question Number : 35 Question Id : 2203606995 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

To get ultrafine particles, the equipment used is a

**Options :**

1. Ball mill

2. Rod mill

3. Hammer crusher

4. Fluid energy mill

**Question Number : 36 Question Id : 2203606996 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

During Joule –Thomson expansion of gases

**Options :**

1. Entropy remains constant

2. Enthalpy remains constant

3. Temperature remains constant

4. Pressure remains constant

**Question Number : 37 Question Id : 2203606997 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

For efficient grinding, ball mill must be operated

**Options :**

1. at a speed less than critical speed

2. at a speed more than critical speed

3. at critical speed

4. with minimum possible small balls

**Question Number : 38 Question Id : 2203606998 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The critical speed of the ball mill of radius R, which contains balls of radius r, is proportional to

**Options :**

1. $(R - r)^{-0.5}$

2. $(R - r)^{-1}$

3. $(R - r)$

4. $(R - r)^{2}$

**Question Number : 39 Question Id : 2203606999 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Which of the following is used as a filter aid?

**Options :**

1. Diatomaceous earth

2. Canvas cloth

3. Lime

4. Hydrated lime

**Question Number : 40 Question Id : 2203607000 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The change in Gibbs free energy for vaporization of a pure substance at equilibrium is

**Options :**

1. positive

2. negative

3. zero

4. may be positive or negative

**Question Number : 41 Question Id : 2203607001 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The ____ is a significant dimensionless number for forced convection and the ____ is a significant dimensionless number for free/natural convection.

**Options :**

1. Grashof, Sherwood

2. Grashof, Reynolds

3. Reynolds, Grashof

4. Sherwood, Grashof

**Question Number : 42 Question Id : 2203607002 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The expression for overall heat transfer coefficient for a single wall pipe is (i and o correspond to inner and outer side of the pipe respectively):

**Options :**

1. $$\frac{1}{UA} = \frac{1}{h_i} + \frac{x}{k} + \frac{1}{h_o}$$

2. $$\frac{1}{UA} = \frac{1}{h_i A_i} + \ln\frac{(r_i / r_o)}{2\pi kL} + \frac{1}{h_o A_o}$$

3. $$\frac{1}{UA} = \frac{1}{h_i A_0} + \ln\frac{(r_i / r_o)}{2\pi kL} + \frac{1}{h_o A_i}$$

4. $$\frac{1}{UA} = \frac{1}{h_i A_i} + \ln\frac{(r_o / r_i)}{2\pi kL} + \frac{1}{h_o A_o}$$

**Question Number : 43 Question Id : 2203607003 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

When the ratio of the Grashof number to the square of the Reynolds number is one, the dominant mechanism of heat transfer is

**Options :**

1. Free convection

2. Entry length problem in laminar forced convection (developing thermal boundary layer)

3. Mixed convections (both free and forced)

4. Forced convection

**Question Number : 44 Question Id : 2203607004 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

To determine the heat transfer coefficient Dittus-Boelter equation is applicable for

**Options :**

1. Laminar flow

2. Liquid metals

3. Turbulent flow

4. Natural convection

**Question Number : 45 Question Id : 2203607005 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Which **ONE** of the following statements about baffles in a shell and tube heat exchanger is **FALSE**?

**Options :**

1. Act as a support to the tube bundle

2. Reduce the pressure drop on the shell-side

3. Alter the shell-side flow pattern

4. Help in increasing the shell-side heat transfer coefficient

**Question Number : 46 Question Id : 2203607006 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

In a general heat exchanger

**Options :**

1. $(LMTD)_{parallel} > (LMTD)_{cross} > (LMTD)_{counter}$

2. $(LMTD)_{cross} > (LMTD)_{counter} > (LMTD)_{parallel}$

3. $(LMTD)_{counter} > (LMTD)_{parallel} > (LMTD)_{cross}$

4. $(LMTD)_{counter} > (LMTD)_{cross} > (LMTD)_{parallel}$

**Question Number : 47 Question Id : 2203607007 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The two significant dimensionless numbers in transient heat conduction are

**Options :**

1. Reynolds and Biot number

2. Biot and Fourier number

3. Reynolds and Prandtl number

4. Fourier and Peclet number

**Question Number : 48 Question Id : 2203607008 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Three walls of same thickness and cross sectional area have thermal conductivity k, 2 k and 3 k respectively. For the same heat transfers, the temperature drop across the wall will be in the ratio of

**Options :**

1. 1:2:3

2. 3:2:1

3. 1:1:1

4. 1:2:4

**Question Number : 49 Question Id : 2203607009 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

In a pipe flow heat is transferred from hot wall to the liquid by

**Options :**

1. Conduction only

2. Forced convection only

3. Forced convection and conduction

4. Free and forced convection

**Question Number : 50 Question Id : 2203607010 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The critical radius r of insulation on a pie is given by, where k and h are thermal conductivity and heat transfer coefficient respectively.

**Options :**

1. $r = \frac{2k}{h}$

2. $r = \frac{k}{h}$

3. $r = \frac{k}{2h}$

4. $r = \frac{h}{k}$

**Question Number : 51 Question Id : 2203607011 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Ammonia is diffused into air at 36°C and atmospheric pressure. Find out the value of diffusivity for ammonia in air?

Given: Molecular volume of air = $28.8 \frac{cm^3}{g.mol}$

Molecular volume of $NH_3 = 26.2 \frac{cm^3}{g.mol}$

**Options :**

1. $0.013 cm^2/s$

2. $0.154\ cm^2/s$

3. $0.06\ cm^2/s$

4. $0.242\ cm^2/s$

**Question Number : 52 Question Id : 2203607012 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Which of the following feed conditions will result in equal vapour flow-rates in both the rectifying and stripping sections?

**Options :**

1. Subcooled Liquid

2. Bubble Point Liquid

3. Dew Point Vapour

4. Superheated Vapour

**Question Number : 53 Question Id : 2203607013 Question Type : MCQ Option Shuffling : Yes 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 : 2203607014 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Overall efficiency of the column is

**Options :**

1. The ratio of number of ideal plates to actual plates

2. The ratio of number of actual plates to ideal plates

3. Same as the murphree efficiency

4. Always more than the point efficiency

**Question Number : 55 Question Id : 2203607015 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Minimum number of ideal stages are required in a fractionating column when the reflux ratio is equal to

**Options :**

1. Minimum reflux ratio

2. Optimum reflux ratio

3. Zero

4. Infinity

**Question Number : 56 Question Id : 2203607016 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Sherwood number in mass transfer is analogous to the following dimensionless group in heat transfer

**Options :**

1. Graetz number

2. Grashoff number

3. Nusselt number

4. Prandtl number

**Question Number : 57 Question Id : 2203607017 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The equation of operating lines of fractionating column that runs under a total reflux is

**Options :**

1. $y > x$

2. $x > y$

3. $x = y$

4. $xy = 1$

**Question Number : 58 Question Id : 2203607018 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The amount of free moisture in a solid

**Options :**

1. must be greater than the unbound moisture

2. less than the critical moisture content

3. more than the bound moisture

4. equal to critical moisture

**Question Number : 59 Question Id : 2203607019 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

In which of the following cases the number of overall gas phase transfer units will be equal to the number of ideal plates for the same degree of separation

**Options :**

1. the equilibrium line and the operating lines are nearly straight

2. the equilibrium line and the operating lines are straight and parallel

3. the slope of the operating lines is unity

4. lines are non-linear

**Question Number : 60 Question Id : 2203607020 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

It takes 6 h to dry a wet solid from 50% moisture content to the critical moisture content of 15%. How much longer will it take to dry the solid to 10% moisture content, under the same drying conditions (the equilibrium moisture content of the solid is 5%).

**Options :**

1. 15 min

2. 51 min

3. 71 min

4. 94 min

**Question Number : 61 Question Id : 2203607021 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The ratio of the thermal boundary layer thickness to the concentration boundary layer thickness is proportional to

**Options :**

1. Nusselt number

2. Lewis number

3. Sherwood number

4. Prandtl number

**Question Number : 62 Question Id : 2203607022 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Which of the following is the concentration driven membrane?

**Options :**

1. osmosis

2. reverse osmosis

3. dialysis

4. ultrafiltration

**Question Number : 63 Question Id : 2203607023 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The binary diffusivity in liquids is of the order of

**Options :**

1. $10^{-5}$ $m^2/s$

2. $10^{-5}$ $cm^2/s$

3. $10^{-5}$ $mm^2/s$

4. $10^{-5}$ $ft^2/s$

**Question Number : 64 Question Id : 2203607024 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A free molecule flow may be initiated when the pores of a porous solid are smaller than the mean free path of the gas molecules which is termed as

**Options :**

1. Brownian motion

2. Soret effect

3. Knudsen diffusion

4. Forced diffusion

**Question Number : 65 Question Id : 2203607025 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Driving force in case of filtration by a centrifuge is

**Options :**

1. Centrifugal pressure exerted by the liquid

2. Speed of the centrifuge

3. Narrow diameter of the vessel

4. Formation of highly porous cake

**Question Number : 66 Question Id : 2203607026 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Species A is diffusing at steady state from the surface of a sphere (radius = 1 cm) into a stagnant fluid. If the diffusive flux at a distance r = 3 cm from the center of the sphere is 27 $mol/cm^2.s$, the diffusive flux (in $mol/cm^2.s$) at a distance r = 9 cm is

**Options :**

1. 1

2. 3

3. 9

4. 27

**Question Number : 67 Question Id : 2203607027 Question Type : MCQ Option Shuffling : Yes 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. Sherwood number

3. Schmidt Number

4. Stanton Number

**Question Number : 68 Question Id : 2203607028 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Which of the following columns with same diameter gives lowest pressure per unit height?

**Options :**

1. Bubble cap column

2. Sieve plate column

3. Packed column (stacked column)

4. Randomly packed column

**Question Number : 69 Question Id : 2203607029 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

For absorption of a gas from a bubble rising steadily through a stagnant liquid, which one of the following theories of mass transfer do you think to be most appropriate?

**Options :**

1. Film theory

2. Surface Renewal theory

3. Penetration theory

4. None of above theory

**Question Number : 70 Question Id : 2203607030 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Consider the distribution curve of C, in two partially miscible A (carrier) and B (solvent). What is the selectivity of separation at the plait point?

**Options :**

1. infinity

2. zero

3. one

4. ten

**Question Number : 71 Question Id : 2203607031 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

For identical feed composition and flow rate, N plug flow reactors in series with a total volume V gives the same conversion as a single

**Options :**

1. plug flow reactor of volume V

2. CSTR of volume V

3. plug flow reactor of volume V/N

4. plug flow reactor of volume NV

**Question Number : 72 Question Id : 2203607032 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

For which reaction order, the half-life of the reactant is half of the full lifetime (time for 100% conversion) of the reactant?

**Options :**

1. Zero order

2. Half order

3. First order

4. Second order

**Question Number : 73 Question Id : 2203607033 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

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. bypass

3. dead zone

4. channeling

**Question Number : 74 Question Id : 2203607034 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A gaseous reaction A $\rightarrow$ 2B + C takes place isothermally in a constant pressure reactor. Starting with a gaseous mixture containing 50% A (rest inert), the ratio of final to initial volume is found to be 1.5. The percentage conversion of A is

**Options :**

1. 30

2. 50

3. 60

4. 74

**Question Number : 75 Question Id : 2203607035 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

For the following reaction, the rate constant at 373 K is 0.5 per minute

$$0.5A + B \rightarrow C$$

The overall order of the reaction is

**Options :**

1. 0.5

2. 1.0

3. 1.5

4. 0.0

**Question Number : 76 Question Id : 2203607036 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

For the gaseous reaction $2A \rightarrow B$ where the feed consists of 50 mole% A and 50 mole% inert, the expansion factor is

**Options :**

1. 1.0

2. –0.5

3. –0.25

4. 0.0

**Question Number : 77 Question Id : 2203607037 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The eddy diffusivity for a liquid in the plug flow must be

**Options :**

1. 1

2. 0

3. $\infty$

4. between 0 and 1

**Question Number : 78 Question Id : 2203607038 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A solution contains 1.0 mole% impurity. It is to be reduced to 0.02% by reaction with catalyst in a CSTR. The reaction follows first order kinetics with respect to impurity, reaction rate constant is 0.003 $sec^{-1}$. Estimate the size of CSTR needed to treat the feed rate of 0.0005 $m^3/s$

**Options :**

1. 5.3 $m^3$

2. 8.1 $m^3$

3. 5 $m^3$

4. 5.7 $m^3$

**Question Number : 79 Question Id : 2203607039 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

For the liquid phase parallel reactions

$$A \xrightarrow{k_1} R, \quad \frac{dC_R}{dt} = k_1 C_A; \quad E_1 = 80 \text{ KJ/mol}$$

$$A \xrightarrow{k_2} S, \quad \frac{dC_S}{dt} = k_2 C_A^2; \quad E_2 = 120 \text{ KJ/mol}$$

The desired product is R. A higher selectivity of R will be achieved if the reaction is conducted at

**Options :**

1. low temperature in a PFR

2. high temperature in a CSTR

3. low temperature in a CSTR

4. high temperature in a PFR

**Question Number : 80 Question Id : 2203607040 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A reversible liquid phase endothermic reaction is to be carried out in a plug flow reactor. For minimum reactor volume, it should be operated such that the temperature along the length

**Options :**

1. decreases

2. increases

3. is at the highest allowable temperature

4. increases and then decreases

**Question Number : 81 Question Id : 2203607041 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

An increase in temperature causes the equilibrium conversion of a reversible exothermic reaction to

**Options :**

1. Remain unaffected

2. Increase

3. Increase or decrease (depending on temperature)

4. Decrease

**Question Number : 82 Question Id : 2203607042 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Autocatalytic reactions are best carried out in a

**Options :**

1. CSTR

2. CSTR in series

3. Plug flow reactor

4. Recycle reactor

**Question Number : 83 Question Id : 2203607043 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The half-life of an $n^{th}$ order reaction in a batch reactor depends on

**Options :**

1. only the rate constant

2. only the rate constant and the order of the reaction

3. only the rate constant and the initial reactant concentration

4. the rate constant, initial reactant concentration and the order of the reaction

**Question Number : 84 Question Id : 2203607044 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

For an ideal plug reactor, the value of the Peclet number is

**Options :**

1. 0

2. infinity

3. 1

4. 10

**Question Number : 85 Question Id : 2203607045 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Exothermic reactions are best carried out in a

**Options :**

1. CSTR

2. CSTR in series

3. Plug flow reactor

4. CSTR followed by a plug flow reactor

**Question Number : 86 Question Id : 2203607046 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A thermometer initially at 100°C is dipped at t = 0 into an oil bath, maintained at 150°C. If the recorded temperature is 130°C after 1 minute, then the time constant of thermometer (in min) is

**Options :**

1. 1.98

2. 1.35

3. 1.26

4. 1.09

**Question Number : 87 Question Id : 2203607047 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Routh stability method used for stability analysis of

**Options :**

1. Open loop transfer function

2. Closed loop transfer function

3. Characteristic equation

4. Time lag systems

**Question Number : 88 Question Id : 2203607048 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

According to Bode stability criterion, a system is unstable if the pen loop frequency response exhibits an amplitude ratio exceeding unity at frequency for which phase lag is

**Options :**

1. 0°

2. 45°

3. 90°

4. 180°

**Question Number : 89 Question Id : 2203607049 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Which of these is used for mass flow measurement?

**Options :**

1. Coriolis meter

2. Orifice meter

3. Rotameter

4. Differential pressure cell

**Question Number : 90 Question Id : 2203607050 Question Type : MCQ Option Shuffling : Yes 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

3. Either of feedback and feed forward control

4. Cascade control

**Question Number : 91 Question Id : 2203607051 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

In an increasing system, the time constant typically is the time for the system's step response to reach _____ % of final value

**Options :**

1. 36.78

2. 63.21

3. 44.35

4. 55.62

**Question Number : 92 Question Id : 2203607052 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The transfer function of a process is $1 / (16s^2 + 8s + 4)$. If a step change is introduced into the system, then the response will be

**Options :**

1. Under damped

2. Critically damped

3. Over damped

4. Slightly damped

**Question Number : 93 Question Id : 2203607053 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Gas chromatography is used for measurement of

**Options :**

1. Temperature

2. Pressure

3. Concentration

4. Flow rate

**Question Number : 94 Question Id : 2203607054 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A first order system with a time constant of 1 min is subjected to frequency response analysis. At an input frequency of 1 radian/min, the phase shift is

**Options :**

1. 45°

2. –90°

3. –180°

4. –45°

**Question Number : 95 Question Id : 2203607055 Question Type : MCQ Option Shuffling : Yes 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 input.

**Options :**

1. impulse

2. step

3. ramp

4. sinusoidal

**Question Number : 96 Question Id : 2203607056 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Cascade control contains _____.

**Options :**

1. One feedback and one feed forward

2. two feed forward

3. two feedbacks

4. No feedbacks

**Question Number : 97 Question Id : 2203607057 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The nature of dynamic response of second order system, whose damping coefficient is less than one is _____.

**Options :**

1. non oscillatory

2. fastest non oscillatory

3. oscillatory

4. linearly increases

**Question Number : 98 Question Id : 2203607058 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The closed loop pole of a stable second order system could be

**Options :**

1. One real positive and the other real negative

2. Both real and negative

3. Complex conjugate with positive real parts

4. Both real and positive

**Question Number : 99 Question Id : 2203607059 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Which of the systems having the following transfer functions is stable?

**Options :**

1. $1/(s^2 + 2)$

2. $1/(s^2 - 2s + 3)$

3. $1/(s^2 + 2s + 2)$

4. $E^{-20s} / (s^2 + 2s - 1)$

**Question Number : 100 Question Id : 2203607060 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Characteristic equation of a closed loop system is given as

$$S^4 + 6s^3 + 11s^2 + 6s + K = 0$$

Stable closed loop behavior can be ensured when gain K is such that

**Options :**

1. $0 \leq K \leq 10$

2. $K > 10$

3. $-\text{infinity} \leq K \leq +\text{infinity}$

4. $0 \leq K \leq 20$

**Question Number : 101 Question Id : 2203607061 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

A HAZAN study is _____ and a HAZOP study is _____

**Options :**

1. Qualitative, qualitative

2. Quantitative, qualitative

3. Qualitative, quantitative

4. Quantitative, quantitative

**Question Number : 102 Question Id : 2203607062 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

In a manufacturing industry, break-even point occurs when

**Options :**

1. The annual rate of production equals the assigned value

2. The total annual product cost equals the total annual sales

3. The annual profit equals the expected value

4. The annual sales equals the fixed costs

**Question Number : 103 Question Id : 2203607063 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

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

**Options :**

1. Rs. 800,000

2. Rs. 900,000

3. Rs. 1000,000

4. Rs. 1,100,000

**Question Number : 104 Question Id : 2203607064 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

An investment of Rs. 100 Lakhs is to be made for construction of a plant which will take two years to start production. The annual profit from operation of the plant is Rs. 20 Lakhs. What will be the payback time?

**Options :**

1. 5 years

2. 7 years

3. 12 years

4. 10 years

**Question Number : 105 Question Id : 2203607065 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

For a cylindrical internally pressurized vessel, which of the following closure types would withstand highest pressure if each closure is of the same material and thickness?

**Options :**

1. Hemispherical

2. Ellipsoidal

3. Conical

4. Flat plate

**Question Number : 106 Question Id : 2203607066 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

P is the investment made on equipment, S is its salvage value and n is the life of the equipment in years. The depreciation for the $m^{th}$ year by the Sum-of-year-digits method will be

**Options :**

1. $(P - S)/n$

2. $1 - (P/S)^m$

3. $(m/n) * (P - S)$

4. $[2*(n-m+1)*(P-S)] / [n*(n+1)]$

**Question Number : 107 Question Id : 2203607067 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

If the fixed expenses of a company are INR 1,38,00,000; variable expenses are INR 2,70,00,000; total sales volume is INR 5,00,00,000. Break even sales volume would be INR

**Options :**

1. 3,30,00,000

2. 3,00,00,000

3. 30,00,000

4. 3,00,000

**Question Number : 108 Question Id : 2203607068 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The relation between capital rate of return ratio (CRR), net present value (NPV) and maximum cumulative expenditure (MCE) is

**Options :**

1. CRR = NPV/MCE

2. CRR = MCE/NPV

3. CRR = NPV * MCE

4. CRR = MCE/(NPV + MCE)

**Question Number : 109 Question Id : 2203607069 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

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. $1000\ (1+0.10)^{20}$

3. $1000\ [1 + (0.1/4)]^{5}$

4. $1000\ [1 + (0.1/2)]^{5}$

**Question Number : 110 Question Id : 2203607070 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

An indication of a material's ability to resist wear is termed as?

**Options :**

1. Toughness

2. Stiffness

3. Fatigue

4. Surface hardness

**Question Number : 111 Question Id : 2203607071 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Which of these has the lowest flash point?

**Options :**

1. Kerosene

2. Diesel

3. Petrol

4. Ethanol

**Question Number : 112 Question Id : 2203607072 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Chloroprene is used in manufacture of

**Options :**

1. Butyl rubber

2. Neoprene

3. Nitrile rubber

4. Thikol

**Question Number : 113 Question Id : 2203607073 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

2 litres of nitrogen at N.T.P weighs _____ gms

**Options :**

1. 14

2. 2.5

3. 28

4. 1.25

**Question Number : 114 Question Id : 2203607074 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Which of the following gaseous fuels is likely to have the highest Gross Calorific value?

**Options :**

1. Sewage Gas

2. LPG

3. Producer Gas

4. Natural Gas

**Question Number : 115 Question Id : 2203607075 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

For handling concentrated hydrochloric acid a suitable material of construction is

**Options :**

1. Aluminium

2. Hastelloy

3. Stainless steel

4. Cast iron

**Question Number : 116 Question Id : 2203607076 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Brass is an alloy of

**Options :**

1. nickel and tin

2. copper and zinc

3. tin and lead

4. copper, nickel and zinc

**Question Number : 117 Question Id : 2203607077 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Coolant used in fast breeder reactor is

**Options :**

1. molten sodium

2. heavy water

3. ordinary water

4. helium

**Question Number : 118 Question Id : 2203607078 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

Carona discharge is related to the operation of

**Options :**

1. Fast breeder reactor

2. Electrostatic precipitator

3. induction motor

4. hydrodynamic generator

**Question Number : 119 Question Id : 2203607079 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

The most widely used coagulant for removing suspended impurities from water is

**Options :**

1. Bleaching powder

2. Chlorine

3. Calcium sulphate

4. Alum

**Question Number : 120 Question Id : 2203607080 Question Type : MCQ Option Shuffling : Yes 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