

# Question Paper Preview

**Question Paper Name:** Chemical Engineering 12th May 2018 Shift1  
**Subject Name:** Chemical Engineering  
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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.  $x + yx^2 = c$

2.  $y + xy^2 = c$

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

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

Question Number : 5 Question Id : 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

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

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  $1/3^{\text{rd}}$  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  $20^{\circ}\text{C}$  and 750 mm Hg pressure has a relative humidity of 70%.

What is its percentage humidity? Vapour pressure of water at  $20^{\circ}\text{C}$  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  $30^\circ C$  contains 5 moles of solute (M.W. = 50 kg/kmol) per kg of solvent (M. W. = 20 kg/kmol). The solubility at  $100^\circ C$  is 10 moles of the solute per kg of the solvent. If 10 kg of the original solution is heated to  $100^\circ C$ , 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 Que  
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

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

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

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

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  $k$ ,  $2k$  and  $3k$  respectively. For the same heat transfers, the temperature drop across the wall will be in the ratio of

Options :

- 1:2:3
- 3:2:1
- 1:1:1
- 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 :

- Conduction only
- Forced convection only
- Forced convection and conduction
- 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 pipe is given by, where  $k$  and  $h$  are thermal conductivity and heat transfer coefficient respectively.

Options :

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

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 =  $28.8 \frac{\text{cm}^3}{\text{g.mol}}$

Molecular volume of  $\text{NH}_3 = 26.2 \frac{\text{cm}^3}{\text{g.mol}}$

Options :

1.  $0.013 \text{ cm}^2/\text{s}$

2.  $0.154 \text{ cm}^2/\text{s}$

3.  $0.06 \text{ cm}^2/\text{s}$

4.  $0.242 \text{ cm}^2/\text{s}$

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

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

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

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  $27 \text{ mol/cm}^2 \cdot \text{s}$ , the diffusive flux (in  $\text{mol/cm}^2 \cdot \text{s}$ ) at a distance

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

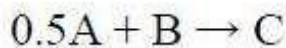
2. 50

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



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
- 0
- $\infty$
- 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

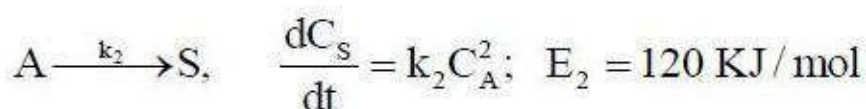
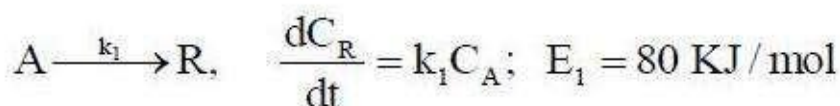
A solution contains 1.0 mole% impurity. It is to be reduced to 0.02% by reaction with catalyst in a CSTR. The reaction follows first order kinetics with respect to impurity, reaction rate constant is  $0.003 \text{ sec}^{-1}$ . Estimate the size of CSTR needed to treat the feed rate of  $0.0005 \text{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

Options :

- $5.3 \text{ m}^3$
- $8.1 \text{ m}^3$
- $5 \text{ m}^3$
- $5.7 \text{ m}^3$

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



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

Autocatalytic reactions are best carried out in a

Options :

1. CSTR
2. CSTR in series
3. Plug flow reactor
4. Recycle reactor

The half-life of an  $n^{\text{th}}$  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

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

Options :

1. 0
2. infinity
3. 1
4. 10



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

A thermometer initially at  $100^{\circ}\text{C}$  is dipped at  $t = 0$  into an oil bath, maintained at  $150^{\circ}\text{C}$ . If the recorded temperature is  $130^{\circ}\text{C}$  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

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.  $0^\circ$
2.  $45^\circ$
3.  $90^\circ$
4.  $180^\circ$

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.  $45^\circ$

2.  $-90^\circ$

3.  $-180^\circ$

4.  $-45^\circ$

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

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

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.  $-\infty \leq K \leq +\infty$
4.  $0 \leq K \leq 20$

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  $m^{\text{th}}$  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

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