Rajasthan Public Service Commission - 2016

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Ques # :1

a distillation column has a feed of 40 % ethanol and 60 % water (weight basis) at a rate of 100 kg/s. 80% of ethanol is recovered from top. the vapour stream entering the condenser is at the rate of 90 kg/s. 90% of water is removed in bottoms. the ratio of amount refluxed to the distillate withdrawn is

1) 2.1
2) 1.1
3) 0.825
4) 1.37

Ques # :2

Air (79 mole % nitrogen and 21 mole % Oxygen) is passed over a catalyst at high temperature. Oxygen completely reacts with nitrogen as shown below.

$\frac{1}{2} N_2\ (g) + \frac{1}{2} O_2\ (g) \rightarrow NO\ (g)$

$\frac{1}{2} N_2\ (g) + O_2\ (g) \rightarrow NO_2\ (g)$

The molar ratio of NO to NO_2 in the product stream is 2:1, The fractional conversion of nitrogen is

1) 0.13
2) 0.20
3) 0.27
4) 0.40

Ques # :3

2 Kg of steam in a piston – cylinder device at 400 KPa and 175°C undergoes a mechanically reversible, isothermal compression to a final pressure such that the steam becomes just saturated. What is the work (W) required for the process,

Data

T=175°C, P= 400KPa, V= 0.503 m^3/kg, u=2606KJ/Kg, s=7.055KJ/Kg-K

T=175°C (Satd.vapour), V= 0.216m^3/kg, u=2579KJ/Kg, s=6.622 KJ/Kg-K

1) 0 kj
2) 230 kj
3) 334 kj
4) 388 kj

Ques # :4

A 35 wt% $Na_2\,So_4$ Solution in water , intially at 50°C, is fed to a crystallizer at 20°C. The Product stream contains hydrated crystals $Na_2\,So_4 \cdot 10H_2O$ in equilibrium with a 20 Wt % $Na_2\,So_4$ Solution. The molecular weights of $Na_2\,So_4$ and $Na_2\,So_4 \cdot 10H_2O$ are 142 and 322 respectively. The feed rate of the 35 % Solution required to Produce 500 Kg/hr of hydrated crystals is .

1) 403 kg/hr
2) 603 kg/hr
3) 803 kg/hr
4) 1103kg/hr

Ques # :5

A gaseous mixture has the composition 80 % CH_4, 10 % $C_2\,H_4$ and 10 % $C_2\,H_6$ on volume basis . The average molecular weight is

1) 17.57
2) 18.6
3) 0.057
4) 80.0

Ques # :6

a heat engine operates at 75 % of the maximum possible efficiency. the ratio of the heat source temperature (in k) to the heat sink temperature (in k) is 5/3. the fraction of the heat supplied that is converted to work is

1) 0.2
2) 0.3
3) 0.4
4) 0.6

Ques # :7

7.5 kj of heat is added to closed system while its internal energy decreases by 12 kj . the work done by the system is

1) -19.5 kj
2) -5.5 kj
3) 5.5 kj
4) 19.5 kj

Ques # :8

at a given temperature and pressure , a liquid mixture of benzen and toluene is in equilibrium with its vapor. the available degree(s) of freedom is (are)

1) zero
2) one
3) two
4) three

Ques # :9

For the isentropic expansion of an ideal gas from the intial condition T_1 , T_1 to the final conditions T_2, Which one of the following relations is valid ? $(\gamma = C_p/C_v)$

1) $\left(\frac{P_1}{P_2}\right) = \left(\frac{T_2}{T_1}\right)^{\gamma}$
2) $\left(\frac{P_1}{P_2}\right) = \left(\frac{T_1}{T_2}\right)^{\frac{\gamma}{\gamma-1}}$
3) $\left(\frac{P_1}{P_2}\right) = \left(\frac{T_1}{T_2}\right)$
4) $\left(\frac{P_1}{P_2}\right) = \left(\frac{T_1}{T_2}\right)^{\frac{\gamma-1}{\gamma}}$

Ques # :10

The fugacity of an ideal gas following Z = 1+ $\frac{BP}{RT}$ is given by

1) P exp (BP/RT)
2) BP/RT
3) $\frac{B}{RT} ln\, P$
4) $ln\left(\frac{BP}{RT}\right)$

Ques # :11

the transition length for a fluid to reach fully developed flow in a pipe of diameter 2 inch having reynolds number 1000 is

1) 8.33 feet
2) 166.6 feet
3) 18.33 feet
4) 1.66 feet

Ques # :12

The vapour pressure of a fluid (density = 1000 Kg/m^3) is 0.26 atm. A pump placed at 2 m height above a reservoir sucks the fluid and pumps at 2m height . The NPSH available is

1) 7.66 m
2) 10 m
3) 5 m
4) 5.65 m

Ques # :13

the velocity profile for bingham plastic fluid flowing (under laminar conditions) in a pipe is

1) parabolic
2) flat
3) flat near the wall and parabolic in the middle
4) parabolic near the wall and flat in the middle .

Ques # :14

A Bingham fluid of viscosity M=10 Pa.s, and yield stress $\tau_0 = 10\ KPa$, is sheared between flat parallel plates separated by a distance $10^{-3}\ m$. The top plate is moving with a velocity of 1 m/s. The shear stress on the plate is

1) 10 kpa
2) 20 kpa
3) 30 kpa
4) 40 kpa

Ques # :15

a fluid is flowing in laminar flow in a cylindrical pipe of diameter 2.5 cm. the maximum velocity at center is 0.1 m/s. the average velocity is .

1) 0.075 m/s
2) 0.067 m/s
3) 0.05 m/s
4) 0.025 m/s

Ques # :16

water is flowing under laminar conditions in a pipe of length (l) . if the diameter of the pipe is doubled , for a constant volumetric flow rate , the pressure drop across the pipe

1) decreases two times
2) decreases sixteen times
3) increases two times
4) increases sixteen times

Ques # :17

in a flow through venturimeter, the flow rate is

1) proportional to pressure drop
2) proportional to $(throat\ dia/pipe\ dia)^2$
3) proportional to square root of pressure drop
4) proportional to $1/\sqrt{1-(throat\ dia/pipe\ dia)^2}$

Ques # :18

A fluid showing the flow behaviour $\tau = 0.25\left(\frac{du}{dy}\right)^{0.8}$ may be the following type of fluid

1) bingham plastic
2) newtonian
3) dilatent
4) pseudoplastic

Ques # :19

pressure recovery in the orifice meter compare to venturi meter is

1) high
2) moderate
3) poor
4) very high

Ques # :20

the local velocity of a fluid along a stream line can be measured by

1) pitot tube
2) venturi meter

3) rotameter
4) orifice meter

Ques # :21

a single effect evaporator concentrates 1000 kg/h of a 10 % sodium hydroxide solution to 50 % . it requires steam consumption of 1200 kg/h. the evaporator economy is

1) 50 %
2) 33.3 %
3) 66.7 %
4) 80 %

Ques # :22

In a counter –flow double pipe heat exchanger, oil $(m = 2\ kg/s, C_p = 2.1KJ/kg°C)$ is cooled from 90°C to 40 °C by water $(m = 1\ kg/s, C_p = 4.2KJ/kg°C)$ Which enters the inner tube at 10 °C . The radius of the inner tube is 3cm and its length is 5 m. Neglecting the wall resistance , the overall heat transfer coefficient based on the inner radius , in $KW/m^2\ K\ is$

1) 0.743
2) 7.43
3) 74.3
4) 2475

Ques # :23

The inner wall of a furnace is at a temperature of 700°C . The composite wall is made of two substances 10 and 20 cm thick with thermal conductivities of 0.05 and 0.1 $Wm^{-1}\ °C^{-1}$ respectively. The ambient air is at 30°C and the heat transfer coefficient between the outer surface of wall and air is $20Wm^{-2}\ °C^{-1}$. The rate of heat loss from the outer surface in $w/m^2\ \ is$

1) 165.4
2) 167.5
3) 172.8
4) 175.0

Ques # :24

The heat flux (from outside to inside) across an insulating wall with thermal conductivity K = 0.04 W/mK and thickness 0.16 m is 10 $w/m2$. The temperature of the inside wall is -5°C . The outside wall temperature is

1) 25 °C
2) 30 °C
3) 35°C
4) 40 °C

Ques # :25

baffles in the shell-side of a shell and tube heat exchanger

1) reduce the pressure drop
2) force the liquid to flow parallel to the bank
3) decrease the shell- side heat transfer coefficient
4) increase the shell- side heat transfer coefficient

Ques # :26

A Composite wall consists of two plates 'A' and 'B' placed in series normal to the flow of heat. The thermal conductivities are K_A and K_B and the specific heat capacities are C_{PA} and $C_{PB,}$ for plates A and B respectively. Plate B has twice the thickness of plate A . At steady state, the temperature differnce across plate 'A' is greater than that across plate 'B' when

1) $C_{PA} > C_{PB}$
2) $C_{PA} < C_{PB}$
3) $K_A < 0.5\ K_B$
4) $K_A > 2\ K_B$

Ques # :27

when vaporisation takes place directly at the heating surface , it is called

1) film boiling
2) nucleate boiling
3) vapour binding
4) none of these

Ques # :28

if the baffle spacing in a shell and tube heat exchanger increases , then the reynolds number of the shell side fluid

1) remains unchanged
2) increases
3) increases or decreases depending on number of shell passes
4) decreases

Ques # :29

choose the correct statement

1) in dropwise condensation, the heat transfer coefficient is more than film type condensation
2) in dropwise condensaion, the thermal resistance is more than that in film type condensation.
3) the process of condensation for pure substance is generally non-isothermal
4) dropwise condensation is obtinable only when the cooling surface is wetted easily by the liquid .

Ques # :30

the units of resistance to heat transfer are :-

1) $J\,m^2\;K^{-1}$
2) $J^{-1}\,m^{-2}\,K^{+1}$
3) $W\,m^{-2}\;K^{-1}$
4) $W^{-1}\,m^2\,k$

Ques # :31

on a tray in an absorption column, the ratio of solvent to gas flow is 2.0 . the equilibrium curve between leaving streams is represented by equation y=0.5 x, where 'y' is mole fraction of solute in gas and 'x' is mole fraction of solute in solvent. the gas enters the tray with solute mole fraction 0.002. the mole fraction of solute in gas leaving the tray is (assume that solvent enters the tray with no solute present)

1) 0.04
2) 0.0002
3) 0.0004
4) 0.001

Ques # :32

According to the Fenske equation, what will be the minimum number of plates required in a distillation column to separate an equimolar binary mixture of components A & B into an overhead fraction containing 99 mole% A and a bottoms fraction containing 98 mole% B ? [Assume that the relative volatility ($\alpha_{AB} = 2$) does not change appreciably in the column]

1) 5
2) 9
3) 12
4) 28

Ques # :33

a partially miscible mixture of 50 % a and 50 % , b is separated into extract phase having 80 % . a and raffinate phase having 90% b. the ratio of extract to raffinate phase is

1) 3:4
2) 8:9
3) 1:1
4) 4:3

Ques # :34

according to penetration theory, mass transfer coefficient is proportional to :

1) $\sqrt{D_{AB}}$
2) D_{AB}
3) $\frac{1}{D_{AB}}$
4) $D_{AB}^{1.5}$

Ques # :35

it takes 6 hours to dry a wet solid from 50 % moisture content to the critical moisture content 15 % . how much time 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 %)

1) 71 min
2) 74 min
3) 51 min
4) 94 min

Ques # :36

At equilibrium, the concentration of water in vapor phose (C^*) in kg/m^3 of air space and the amount of water (m) adsorbed per kg of dry silica gel are related by $(C^*) = 0.0667m$. To maintain dry conditions in a room of air space $100m^3$ containig 2.2 kg of water vapour initially , 10 kg of dry silica gel is kept in the room . The fraction of initial water remainig in the air space after a long time (during which the temprature is maintained constant) is

1) 0.02
2) 0.06
3) 0.03
4) 0.05

Ques # :37

to increase the absorption factor

1) increase both solvent flow rate and gas-flow rate
2) increase solvent flow rate and decrease gas flow rate
3) increase gas flow -rate and decrease solvent flow rate
4) decrease both solvent flow rate and gas flow rate

Ques # :38

schmidt number is

1) hD/k
2) $\mu/\rho D_{AB}$
3) $\rho/\mu D_{AB}$
4) $\rho D_{AB}/\mu$

Ques # :39

The Lewis relation for air-water humidification is given by
(K_y – Mass transfer coefficient of moisture in air ;
h_G – heat transfer coefficient,
C_S heat capacity of vapour gas mixture)

1) $\frac{h_G^2}{K_y C_s} = 1$
2) $\frac{K_y {C_s}^2}{h_G} = 1$

3) $\frac{h_G}{K_y C_s} = 1$

4) $\frac{K_y^2 h_G}{C_S} = 1$

Ques # :40

a 25cm x 25cm x 1cm flat sheet weighing 1.2 kg initially was dried from both sides under constant drying rate conditions . it took 1500 seconds for the weight of the sheet to reduce to 1.05 kg. another 1m x 1m x 1cm flat sheet of the same materials is to dried from one side only. under the same constant drying rate conditions, the time required for drying (in seconds) from its weight of 19.2 kg to 17.6 kg is .

1) 1000
2) 1500
3) 2000
4) 2500

Ques # :41

An isothermal aqueous phase reversible reaction P ⇌ R is to be carried out in a mixed flow reactor. The reaction rate ($K\ mole/m^3\ h$) is given by $r = 0.5C_p - 0.125\ C_R$. A stream containing only 'P' enters the reactor. The residence time required (in hours) for 40 % conversion of 'P' is

1) 0.80
2) 1.33
3) 1.60
4) 2.67

Ques # :42

A reaction 2A→B, $r_A = -C_A^2$ is carried out in CSTR (inlet concentration= 1mol/liter, volume = 1 liter , flow rate =0.5 liter/s) .The conversion is

1) 90 %
2) 50 %
3) 66.7 %
4) 33.3 %

Ques # :43

The conversion for a second order, irreversible reaction (constant volume),

$$A \xrightarrow{K_2} B$$

In batch mode is given by .

1) $\frac{1}{1+K_2\ C_{A_0}\ t}$

2) $\frac{K_2\ C_{A_0}\ t}{1+K_2\ C_{A_0}\ t}$

3) $\frac{(K_2\ C_{A_0}\ t)^2}{1+K_2\ C_{A_0}\ t}$

4) $\frac{K_2\ C_{A_0}\ t}{(1+K_2\ C_{A_0}\ t)^2}$

Ques # :44

For an iso – thermal second order aqueous phase reaction A → B, the ratio of the time required for 90% conversion to the required for 45 % Conversion is

1) 2
2) 4
3) 11
4) 22

Ques # :45

according to arrhenius equation

1) k versus $\frac{1}{T}$ is a straight line with positive slope
2) k versus T is a straight line with positive slope
3) log k versus $\frac{1}{T}$ is a straight line with negative slope
4) log k versus T is a straight line with positive slope

Ques # :46

A pulse tracer is introduced in an ideal CSTR (with a mean residence time τ) at time zero . The time taken for the exit concentration of the tracer to reach half of its initial value will be .

1) 2τ
2)

$0.5\,\tau$

3) $\tau/0.693$

4) $0.693\,\tau$

Ques # :47

a first-order reaction requires two equal volume cstrs. the conversion is

1) more when they are connected in parallel
2) less when connected in series
3) more when connected in series
4) same whether connected in series or parallel

Ques # :48

If ΔG (Gibbs free energy change) for a reaction is negative then the reaction is

1) Not feasible
2) Feasible
3) Feasibility does not depend on ΔG
4) Exothermic

Ques # :49

A sceond order liquid phase reaction A $\rightarrow$B is carried out in a mixed flow reactor operated in semi- batch mode (no exit stream). The reactant 'A' at concentration C_{AF} is fed to the reactor at a volumetric flow rate of 'F' . The volume of the reacting mixture is 'V' and the density of the liquid mixture is constant . The mass balance for 'A' is :-

1) $\frac{d}{dt}(VC_A) = -F(C_{AF} - C_A) - KC_A{}^2V$

2) $\frac{d}{dt}(VC_A) = F(C_{AF} - C_A) - KC_A{}^2V$

3) $\frac{d}{dt}(VC_A) = -FC_A - KC_A{}^2V$

4) $\frac{d}{dt}(VC_A) = -FC_{AF} - KC_A{}^2V$

Ques # :50

what is the exit conversion of reactant 'a' for a zero order reaction taking place in a cstr. following data: rate constant = 1 mole/min l, feed concentration = 1mole/ l; feed flow rate= 0.5 l/min and reactor volume= 1l.

1) 50 %
2) 75 %
3) 100 %
4) 200 %

Ques # :51

fire triangle consists of

1) fuel , heat and oxygen
2) fuel, air and dust
3) air, dust and smoke
4) temperature , pressure and volume

Ques # :52

risk is defined mathematically as

1) probability x consequences
2) probability + consequences
3) probability - consequences
4) probability / consequences

Ques # :53

which of the following is not a chemical related health hazard ?

1) carcinogenicity
2) reactivity
3) corrosivity
4) toxicity

Ques # :54

ammonia becomes an immediate danger to your life and health when it is present at the following level or greater:-

1) 10 ppm
2) 30 ppm
3) 300 ppm
4) 1000 ppm

Ques # :55

The following symbol is used when something in your workplace is a:

1) chemical weapon
2) biohazard
3) toxic substance
4) radiation danger

Ques # :56

the following is indirect cost of accident

1) money paid for treatment of worker
2) compensation paid to worker
3) cost of lost time of injured worker
4) all of these

Ques # :57

fatal accident frequency rate (fafr) is defined as

1) number of deaths per 10^8 working hours
2) number of deaths per 10^6 working hours
3) number of deaths per 10^4 working hours
4) number of deaths per 100 working hours

Ques # :58

which of the following colour is used for radiation hazard

1) orange
2) purple
3) red
4) yellow

Ques # :59

the following is best suited to extinguish oil or flammable liquid fire

1) soda acid
2) vaporizing liquid
3) dry chemical
4) foam

Ques # :60

dow fire and explosion index (f&ei) of 135 calculated for a plant has the following degree of hazard:

1) light
2) moderate
3) heavy
4) severe

Ques # :61

Rittinger's crushing law is

Where P is power required by machine , m is feed rate, K is a constant,
D_{pa} and D_{pb} are particle average diameter in feed and product, respectively.

1) $\frac{P}{m} = \frac{K}{\sqrt{D_p}}$
2) $\frac{P}{m} = K\left(\frac{1}{\sqrt{D_{pb}}} - \frac{1}{\sqrt{D_{pa}}}\right)$
3) $\frac{P}{m} = K \ln\left(\frac{D_{pa}}{D_{pb}}\right)$
4) $\frac{P}{m} = K\left(\sqrt{D_{pb}} - \sqrt{D_{pa}}\right)$

Ques # :62

A centrifugal filtration unit operation at a rotational speed of 'ω' has inner surface of the liquid (density ρ_L) located at a radial distance 'R' from the axis of rotation . The thickness of the liquid film is 'δ' and no cake is formed. The initial pressure drop during filtration is :

1) $\frac{1}{2}\,\omega^2 R^2 \rho_L$

2) $\frac{1}{2}\,\omega^2 \delta\,\rho_L\;\;(2R+\delta)$

3) $\frac{1}{2}\,\omega^2 \delta^2 \rho_L$

4) $\frac{1}{2}\,\omega^2 R\,\rho_L\,(R+2\delta)$

Ques # :63

in a cyclone of diameter 0.2 m, the particles enter at velocity 10 m/s . the separation factor is approximately

1) 100
2) 50
3) 200
4) 150

Ques # :64

in constant pressure filtration:-

1) resistance decreases with time
2) rate of filtration is constant
3) rate of filtration increases with time
4) rate of filtration decreases with time

Ques # :65

The terminal setting velocity of a 6 mm diameter glass sphere (density 2500 kg/m^3) in a Viscous Newtonian liquid (density 1500 kg/m^3) is 100 $\mu m/s$. If the particle Reynolds number is small and the value of acceleration due to gravity is 9.81 m/s^2 , then the viscosity of the liquid (in Pa-s) is

1) 100.1
2) 196.2
3) 245.3
4) 490.5

Ques # :66

in a constant - pressure filtration through cake filter process, volume of filtrate 'v' is collected in time 't' then

1) $\frac{t}{v}$ versus v is a straight line.
2) $\frac{t}{v}$ versus t is a straight line.
3) $\frac{v}{t}$ versus t is a straight line.
4) v versus t is a straight line.

Ques # :67

a tyler standard screen of 100 mesh is made by weaving wire of diameter 0.0042 inch . the clear opening size will be

1) 0.01 inch
2) 0.004 inch
3) 0.039 inch
4) 0.0058 inch

Ques # :68

Two identically sized spherical particles 'A' and 'B' having densities ρ_A and ρ_B , respectively are settling in a fluid of density 'ρ' . Assuming free settling under turbulent flow conditions, the ratio of the terminal settling velocity of particle 'A' to that of particle 'B' is given by

1) $\sqrt{\frac{(\rho_A - \rho)}{(\rho_B - \rho)}}$
2) $\sqrt{\frac{(\rho_B - \rho)}{(\rho_A - \rho)}}$
3) $\frac{(\rho_A - \rho)}{(\rho_B - \rho)}$
4) $\frac{(\rho_B - \rho)}{(\rho_A - \rho)}$

Ques # :69

If the volume and surface area of a non-spherical particle are 4 mm^3 and 14 mm^2 , respectively, the nominal diameter of particle is 2 mm , then the sphericity will be

1) 3/7
2) 6/7
3) 7/8
4) none of these

Ques # :70

A bed of spherical glass beads (density 3000 Kg/m^3) (diameter 1 mm , bed porosity 0.5) is to be fluidized by a liquid of density 1000 Kg/m^3 and viscosity 0.1 Pa.s . Assume that the Reynold's number based on particle diameter is very small compared to one. If $g = 10m/s^2$, then the maximum velocity (in m/s) required to fluidize the bed is

1) 3.33×10^{-4}
2) 3.33×10^{-1}
3) 3
4) 30

Ques # :71

break-even point is the point of intersection of

1) fixed cost and total cost
2) total cost and sales revenue
3) fixed cost and sales revenue
4) none of these

Ques # :72

Heat integration is planned in a process plant at an investment Rs. 2×10^6. This would result in a net energy saving of 20 GJ per year. If the nominal rate of interest is 15 % and the plant life is 3 years , then the breakeven cost of energy, in Rs per GJ (adjusted to the nearest hundred), is

1) 33,500
2) 43,800
3) 54,200

4) 65,400

Ques # :73

a column costs rs 5.0 lakhs and has a useful life of 10 years . using the double declining balance depreciation method, the book value of the unit at the end of five years (in lakhs of rs.) is

1) 1.21
2) 1.31
3) 1.64
4) 2.05

Ques # :74

which of the following is not a component of working capital ?

1) raw materials in stock
2) finished product in stock
3) transportation facility
4) semi- finished products in the process

Ques # :75

for a solid processing plant , the delivered equipment cost is rs 10 lakhs . using long multiplication method, the total capital investment , in lakhs of rupees is

1) 46
2) 57
3) 100
4) 200

Ques # :76

Due to a 20 % drop in the product selling prices, the pay back period of a new plant increased to 1.5 time that estimated initially, the production cost and the production rate remaining unchanged. If the production cost is C_p and the new selling prices is C_s then $\frac{C_p}{C_s}$ is

1) 0.2
2) 0.4
3) 0.5
4) 0.6

Ques # :77

For a 1-1 fixed sheet heat exchanger, the following data are given :

Design :- inside pressure :- Shell side = $10^3 KN/m^2$

Tube side = $2 \times 10^3 KN/m^2$

Temperature :- Shell side = 50°C

Tube side = 150°C

Allowable stress value at both design temperature is $1.2 \times 10^5 KN/m^2$.

Shell inside diameter = 0.6 m,

corrosion allowance (for shell and heaters) = 3×10^{-3} m

and joint efficiency =1 .

Find the nearest shell thickness

1) 4.85×10^{-3} m

2) 2.48×10^{-3} m

3) 5.48×10^{-3} m

4) 4.48×10^{-3} m

Ques # :78

A batch reactor produces 1×10^5 Kg of a product per year. The total batch time (in hours) of the reactor is $K\sqrt{P_B}$, where P_B is the product per batch in Kg and $K = 1.0\ h\sqrt{Kg}$. The operating cost of the reactor is Rs 200/h. The total annual fixed charges are Rs $340 \times P_B$ and the annual raw material cost is Rs 2×10^6 . The optimum size (in Kg) of each batch (adjusted to the nearest integer) is

1) 748

2) 873

3) 953

4) 1148

Ques # :79

a reactor needs to be lined with a corrosion resistant lining, one type of lining cost rs.5 lakhs and is expected to last for 2 years . another type of lining lasts for 3 years . if both choices have to be equally economical with the effective interest rate being 18%, compounded annually, the price one should pay for the second type of lining is

1) rs 6.1 lakhs

2) rs 6.5 lakhs

3) rs 6.9 lakhs

4) rs 7.6 lakhs

Ques # :80

which one is not considered as a method for profitabiltiy evaluation?

1) payout period
2) present worth
3) cost index
4) discounted cash flow

Ques # :81

which process is used for the manufacture of soda ash ?

1) haber process
2) frasch process
3) contact process
4) solvay process

Ques # :82

styrene is produced from ethylbenzene by the process of

1) dehydrogenation
2) oxidation
3) alkylation
4) dehydration

Ques # :83

the most important process currently used for industrial production of carbon black is

1) furnace black process
2) channel black process
3) lamp black process
4) thermal black process

Ques # :84

mixed fertilizer having its grade designated by 5-25-10, means-

1) The fertilizer contains 5 % by weight elemental nitrogen, 25 % by weight P_2O_5 and 10 % by weight K_2O .
2)

The fertilizer contains 5 % by weight ammonia, 25 % by weight phosphoric acid and 10 % by weight KCl .

3) The fertilizer contains 5 % by weight K_2O, 25 % by weight NH_3 and 10 % by weight P_2O_5.
4) The fertilizer contains 5 % by weight P_2O_5, 25 % by weight NH_4Cl and 10 % by weight K_2O .

Ques # :85

crude petroleum consists of

1) 84-87 % carbon & 11-14 % hydrogen
2) 11-14 % carbon & 84-87 % hydrogen
3) 54 % carbon & 25 % hydrogen
4) 70- 72 % carbon & 5-7 % hydrogen

Ques # :86

In the urea manufacturing process, feed to the urea reactor consists of NH_3 and CO_2 in the under ratio of :

1) 1:3-4
2) 1:1
3) 3-3.5:1
4) none of these

Ques # :87

mercaptans are added to liquefied petroleum gas to

1) reduce its cost
2) assist in checking its leakage
3) increase its calorific value
4) reduce explosion limit

Ques # :88

hydrolysis of sugar is called

1) hydration
2) inversion
3) esterification
4) none of these

Ques # :89

formaldehyde is also produced from methanol by oxidation dehydragenation process . the catalyst employed in the process is

1) $Pt - Rh$
2) ZrO_2
3) $Pd - Carbon$
4) $Ag - gauze$

Ques # :90

sodium tripoly phosphate (stpp) is used as

1) a reinforcing agent in elastomers
2) a raw material in the production of food - grade phosphoric acid.
3) a builder in detergents.
4) all of these

Ques # :91

turbidity of water is an indication of the presence of

1) dissolved solids
2) dissolved gases
3) floating solids
4) suspended inorganic matter

Ques # :92

most efficient suitable dust removal equipment for removal of fly ash from flue gas in a thermal power plant is

1) electrostatic precipitator `
2) bag filter
3) gravity settling chamber
4) cyclone separator

Ques # :93

Maximum safe limit of SO_2 in air is

1) 5 ppm
2) 500 ppm

3) 2000 ppm
4) 5000 ppm

Ques # :94

cyclone separator's working is based mainly on

1) diffusion
2) gravitation
3) centrifugal force
4) electrostatic force

Ques # :95

in the design of grit chambers

1) temperature is an important factor
2) the maximum velocity of flow is 1 ft/s
3) the detention period should be atleast 30 min
4) there should be a 5 to 1 ratio of length to depth.

Ques # :96

chloramines are used in water treatment

1) for disinfection
2) for taste and colour control
3) as algicides
4) for weed control in reservoirs

Ques # :97

ecological system or ecosystem refers to

1) a group of individuals of any one kind of organism
2) all of the population occupying a given area
3) the community and non- living environment working together
4) a portion of the earth where living objects can be found .

Ques # :98

for protection of acquatic life in a fresh water stream sewage effluent should never lower the dissolved oxygen content lower than

1) 15 ppm

2) 10 ppm
3) 5 ppm
4) 20 ppm

Ques # :99

the operating pressure drops for a fabric filter are usually in the range of

1) 0.2 to 0.5 in H_2O g
2) 2 to 6 in H_2O g
3) 8 to 60 in H_2O g
4) 0.01 to 0.1 in H_2O g

Ques # :100

spetice tank are primarily used for

1) the aerobic decomposition of deposited sweage solids
2) separation of deposited solids
3) anaerobic decomposition of depsited solids
4) separation of oil & grease scums.
