DRDO CEPTAM Previous Placement Papers | 7000

Defence Research and Development Organization (DRDO) Scientist Entry Test (SET) DRDO JMRC practice

DRDO Examination 2008 Stream - Chemical Engineering

Section - A

1. Nitric acid is manufactured by :

(a) Le Blanc process

(b) Haber process

(c) Ostwald process

(d) Solvay process

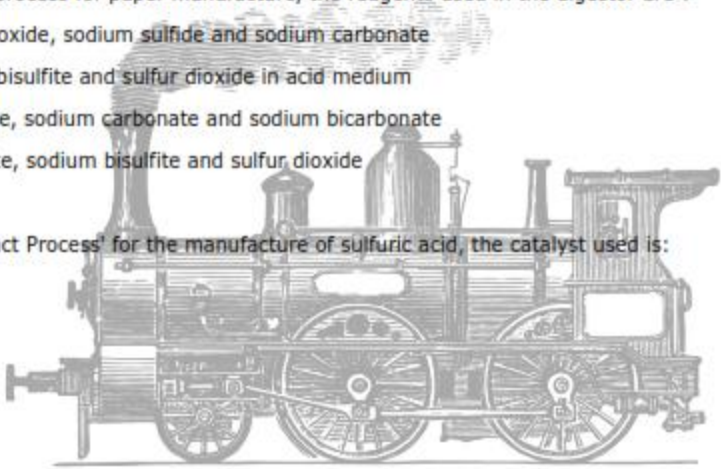
2. In the Kraft process for paper manufacture, the reagents used in the digestor are :

(a) sodium hydroxide, sodium sulfide and sodium carbonate

(b) magnesium bisulfite and sulfur dioxide in acid medium

(c) sodium sulfite, sodium carbonate and sodium bicarbonate

(d) sodium sulfite, sodium bisulfite and sulfur dioxide



3. In the 'Contact Process' for the manufacture of sulfuric acid, the catalyst used is:

(a) Fe2O3

(b) V2O5

(c) Pt-Rh

(d) AlCl3

4. Match the following

1. Hydrogen from light petroleum stock

2. High-octance gasoline from naphtha

3. Gasoline from gas oil

4. Petroleum coke from residue

P. Pyrolysis

Q. Catalytic cracking

R. Platforming

S. Steam-reforming

(a) 1-P, 2-R, 3-Q, 4-S

(b) 1-P, 2-Q, 3-R, 4-S

(c) 1-S, 2-R, 3-Q, 4-P

(d) 1-R, 2-S, 3-P, 4-Q

5. Among the four fuels listed below, the calorific value is the highest for :

(a) coal

(b) kerosene

(c) natural gas

(d) furnace oil

6. Match the following

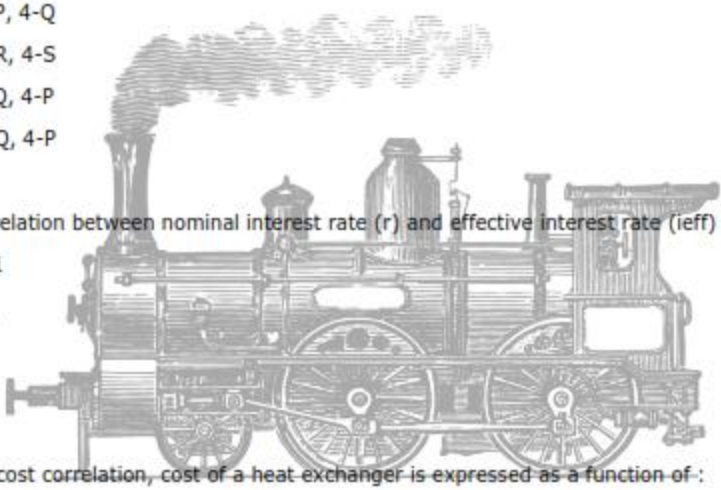
1. Cane sugar	P. Membrane cell
2. Polyvinyl chloride	Q. Urea
3. Caustic soda	R. Black-strap molasses
4. Ammonia	S. Emulsion polymerization

(a) 1-R, 2-S, 3-P, 4-Q

(b) 1-P, 2-Q, 3-R, 4-S

(c) 1-S, 2-R, 3-Q, 4-P

(d) 1-R, 2-S, 3-Q, 4-P



7. The correct relation between nominal interest rate (r) and effective interest rate (ieff) is:

(a) ieff = er + 1

(b) ieff = er - 1

(c) ieff = er

(d) ieff = r

8. In Guthrie's cost correlation, cost of a heat exchanger is expressed as a function of :

(a) LMTD

(b) overall heat transfer coefficient

(c) heat duty

(d) surface are

9. A mixture of components A,B,C and D with relative volatilities in the order A B C D is to be separated by number of possible sequences for this operation is

(a) 14

(b) 20

(c) 10

(d) 5

10. The cost component which is not considered in the estimation of the payout time (i.e. payback period)

(a) startup cost

(b) fixed capital

(c) depreciation

(d) working capital

11. A heat exchanger network without any loop has 4 streams above the pinch and 3 streams below the pi pinch and another is available below the pinch. The total number of heat exchangers for this network is :

(a) 10

(b) 8

(c) 6

(d) 7

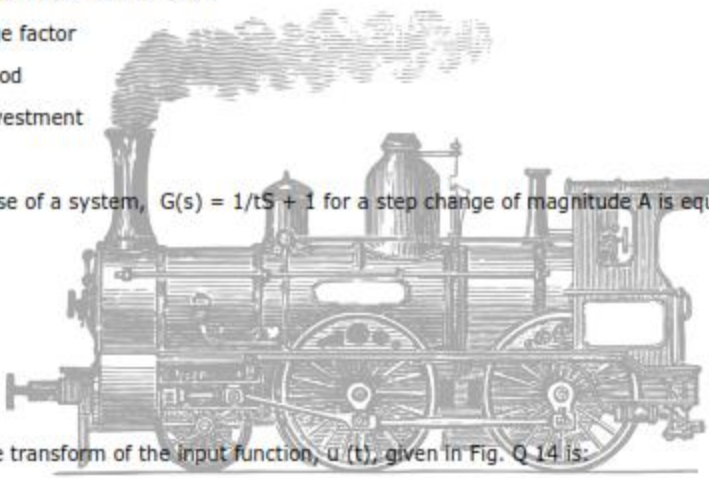
12. The measure of profitability of the process that does not take into account time value of money is :

(a) discounted cash flow rate of return

(b) capital charge factor

(c) payback period

(d) return on investment



13. The response of a system, G(s) = 1/tS + 1 for a step change of magnitude A is equal to :

(a) 1 - et/t

(b) A (1 - et/t)

(c) A (1 - e-t/t)

(d) 1 - e-t/t

14. The Laplace transform of the input function, u (t), given in Fig. Q 14 is:

(a) 1/5s2 (1 - e-3S)

(b) 1/5s2 (1 + e-3S)

(c) 3/5s2 (1 - e-3S)

(d) 3/5s2 (1 + e-3S)

15. A system with transfer function G (s) = S/S + 1 is subjected to a sinusoidal input u(t) = sin wt. At stea output relative to the input at w = 0 and w = ¥ will be, respectively :

(a) 0 and - p/2

(b) p/2 and 0

(c) -p/2 and 0

(d) 0 and p/2

16. For the response of an under damped second order process:

(a) overshoot = (decayratio)0.5

(b) overshoot = decayratio

(c) overshoot = (decayratio)2

(d) overshoot = (decayratio)-1

17. The connecting line of the type denotes:

(a) electric signal

(b) capillary tubing

(c) software link

(d) pneumatic signal

18. Match the following :

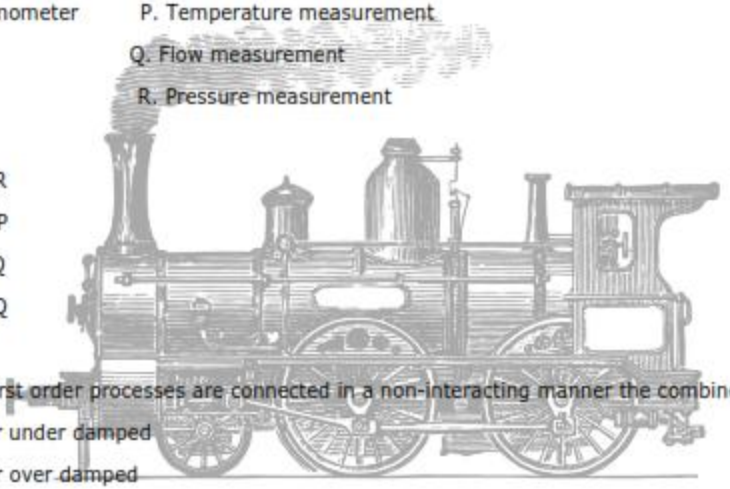
1. Hot wire anemometer	P. Temperature measurement
2. DP cell	Q. Flow measurement
3. Pyrometer	R. Pressure measurement

(a) 1-P, 2-Q, 3-R

(b) 1-Q, 2-R, 3-P

(c) 1-P, 2-R, 3-Q

(d) 1-R, 2-P, 3-Q



19. When two first order processes are connected in a non-interacting manner the combined system will be

(a) second order under damped

(b) second order over damped

(c) second order critically damped

(d) first order

20. The best method for controlling the temperature of a catalytic exothermic reaction taking place in a tub

(a) cascade control

(b) override control

(c) split-range control

(d) auctioneering control

21. U-tube manometer is a :

(a) zero order process

(b) first order process

(c) second order process

(d) third order process

22. The final value of f (s) = S/S2 + 3S + 2 is given by :

(a) 1

(b) 0

(c) 2

(d) 3

23. The equation (s) representing the linear system (s) is (are) : -

(I) d2y/dt2 + 8 dy/dt + y = u(t)

(II) (y + 7) dy/dt = 8 u(t)

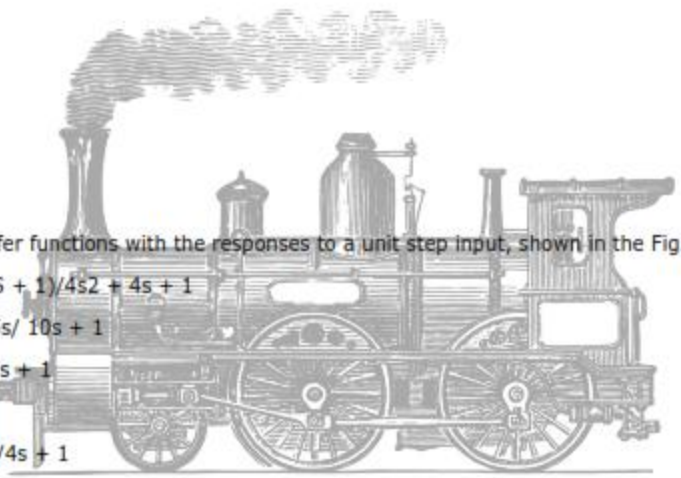
(III) 3 d2y/dt2 + 2 dy/dt +3y = u2(t)

(a) I only

(b) I and II

(c) II only

(d) III only



24. Match the transfer functions with the responses to a unit step input, shown in the Fig.

(I) G (s) = -3 (-4S + 1)/4s2 + 4s + 1

(II) G (s) = -2e-15s/ 10s + 1

(III) G (s) = -5/-15s + 1

(IV) G (s) = -0.2/s

(V) G (s) = 5s + 3/4s + 1

(a) I-C, II-E, III-D, IV-A, V-B

(b) I-E, II-C, III-A, IV-D, V-B

(c) I-E, II-A, III-C, IV-B, V-D

(d) I-A, II-C, III-E, IV-B, V-D

Statements for linked Answer Question 25 and 26:

Following is the Bode diagram of a process.

25. The ultimate gain of the process is :

(a) 8.33

(b) 4.99

(c) 12.55

(d) 1.21

26. The ultimate period of sustained cycling of the process is :

(a) 0.01 min/cycle

(b) 0.37 min/cycle

(c) 0.89 min/cycle

(d) 0.53 min/cycle

27. An elementary reaction is expressed as : A + B → C. The unit of the rate constant for this reaction is :

(a) 1/s

(b) mol/(m3.s)

(c) m3/(mol - s)

(d) m3 - s/mol

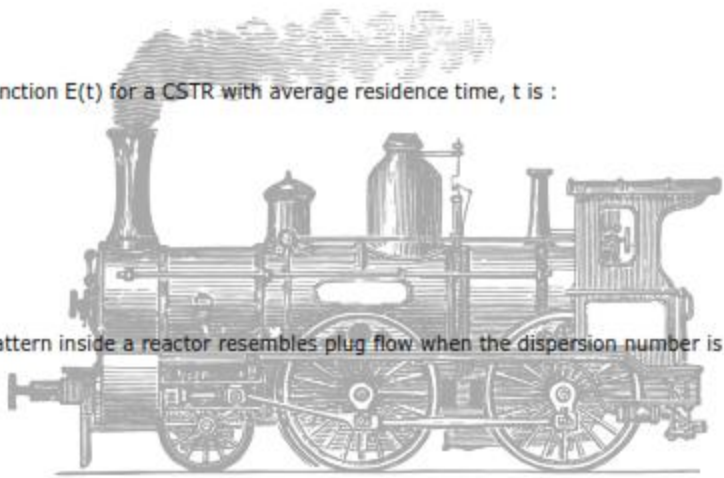
28. The RTD function E(t) for a CSTR with average residence time, t is :

(a) exp(-t/t)/t

(b) d(t - t)

(c) t/t

(d) exp(-t/t)



29. The flow-pattern inside a reactor resembles plug flow when the dispersion number is :

(a) 1

(b) <0.01

(c) 10 - 100

(d) >100

30. Consider the elementary liquid-phase reaction A→ B → C carried out in a CSTR under steady state. The 100 CA and rB = 100 CA - CB and /(m3.s), respectively. If there is no product in the feed, the value of resid maximum concentration of B is :

(a) 0.1 s

(b) 10 s

(c) 100 s

(d) 0.01 s

31. Consider the liquid-phase reactions shown in the schematic below carried out in a flow reactor at steady

Keeping the reaction-system isothermal, the yield of the desired product can be maximized by maintaining :

(a) low concentration of A and high concentration of B

(b) high concentration of A and high concentration of B

(c) low concentration of A and low concentration of B

(d) high concentration of A and low concentration of B

32. The first-order gas-phase reaction : A → 3R is carried out in a variable-volume CSTR at constant tempe is 60%, the Damkohler number is :

(a) 2.5

(b) 1.8

(c) 3.3

(d) 4.6

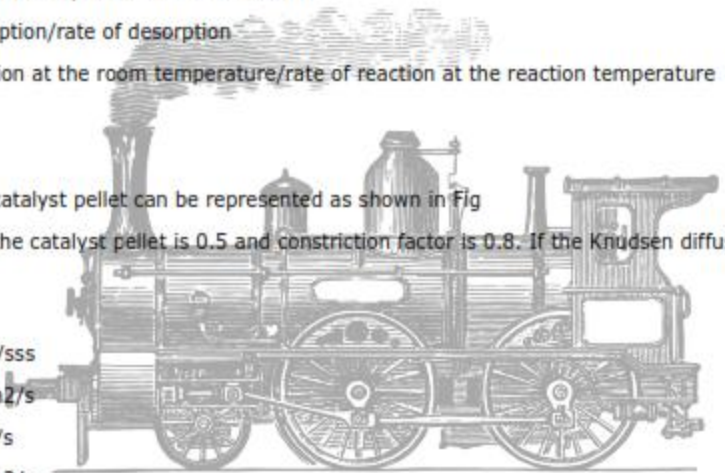
33. The Hatta number is a measure of :

(a) rate of reaction/rate of mass transfer

(b) rate of bulk reaction/rate of surface reaction

(c) rate of adsorption/rate of desorption

(d) rate of reaction at the room temperature/rate of reaction at the reaction temperature



34. Pores of a catalyst pellet can be represented as shown in Fig

The porosity of the catalyst pellet is 0.5 and constriction factor is 0.8. If the Knudsen diffusivity of a gas is 1 is :

(a) 4 x 10-7 m2/sss

(b) 1.3 x 10-8 m2/s

(c) 2 x 10-7 m2/s

(d) 1.4 x 10-6 m2/s

35. Thiele modulus is a measure of :

(a) rate of diffusion through the catalyst pellet/surface reaction rate

(b) bulk diffusivity/Knudsen diffusivity

(c) surface rection rate/rate of diffusion through the catalyst pellet

(d) actual overall rate of rection/rate of reaction that would result if the entire interior surface were exposed concentration at the surface temperature

36. An elementary liquid-phase reaction : A → B is to carried out in a PFR operated under steady state at c flow rate of A is 1 mol/s, the concentration of A in the feed is 1 mol/m3 and the value of the rate constant is required for 90% conversion of A is :

(a) 3.7 m3

(b) 2.3 m3

(c) 4.6 m3

(d) 12.6 m3

37. A liquid-phase reaction is being carried out in a constant-volume batch reactor. The rate constant is 0. reactant fed to the reactor is 1 mol/m3. The concentration of the reactant after 100 s is :

(a) 1/e mol/m3

(b) 2.3 mol/m3

(c) e mol/m3

(d) 0.1 mol/m3

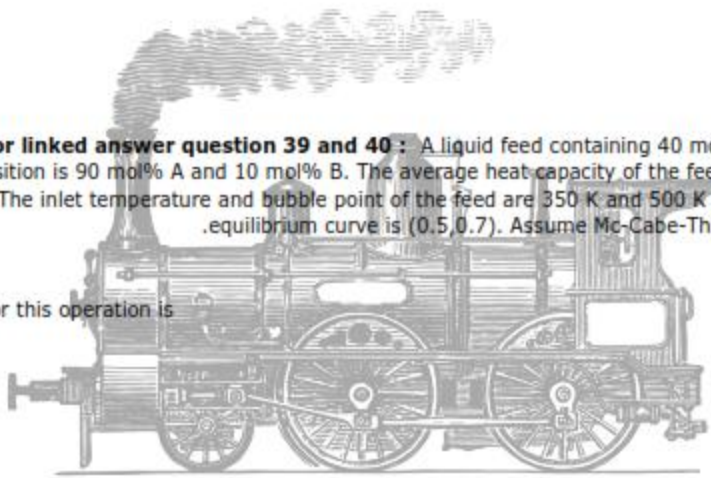
38. A reaction is being carried out in a set of two CSTRs in series under steady state. The reaction rate con is 10s in each reactor. Assuming no change in volume, the conversion of the reactant after the second react

(a) 50%

(b) 25%

(c) 100%

(d) 75%



Statement for linked answer question 39 and 40 : A liquid feed containing 40 mol% A and 60 mol% composition is 90 mol% A and 10 mol% B. The average heat capacity of the feed is 100 kJ/(kmol-K MJ/(kmol-K). The inlet temperature and bubble point of the feed are 350 K and 500 K respectively. The pc .equilibrium curve is (0.5,0.7). Assume Mc-Cabe-Thiele method of distil

39. The q-factor this operation is

(a) 3

(b) 2.5

(c) 1.5

(d) 1

40. The minimum reflux ratio for this operation is :

(a) 2

(b) 1

(c) 1.5

(d) 2.5

Statement for linked answer question 41 mid 42 : An organic vapor in exhaust air from a process is re carbon. The diameter of the absorbent bed is 0.15 m and the height is 0.6 m. The time equivalent of stoichi the time equivalent of bed capacity up to breakpoint is 2.4 x 104s.

41. The length of unused bed for this operation is :

(a) 0.1 m

(b) 0.3 m

(c) 0.4 m

(d) 0.2 m

42. For a new adsorption column to be installed for the same question, the desired break-point time is 3.6 : column should be :

(a) 0.8 m

(b) 1 m

(c) 0.75 m

(d) 1.5 m

Statement for linked answer question 43 mid 44 : Consider a mixture of vapor (A) and dry gas (B) at B are 20 kg/mol and 50 kg/mol respectively. The total pressure of the system is 100 kPa. Vapor pressure of

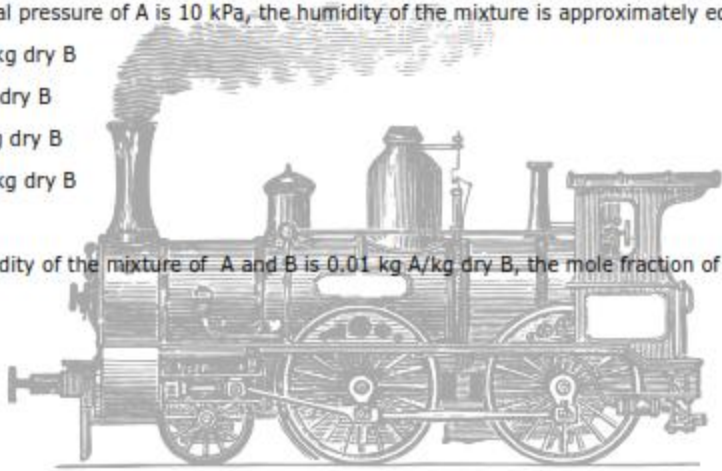
43. If the partial pressure of A is 10 kPa, the humidity of the mixture is approximately equal to :

(a) 0.004 kg A/kg dry B

(b) 0.1 kg A/kg dry B

(c) 0.04 kg A/kg dry B

(d) 0.002 kg A/kg dry B



44. If the humidity of the mixture of A and B is 0.01 kg A/kg dry B, the mole fraction of A in the gas phase

(a) 0.015

(b) 0.025

(c) 0.01

(d) 0.005

45. For wet bulb temperature to be equal to adiabatic saturation temperature, Lewis number should be equ

(a) ¥

(b) 0

(c) 10

(d) 1

Statement for linked answer question 46 mid 47 : A gas stream containing component A at 1 mol% is current packed tower. It is proposed to remove 90% of A by absorption in water. The gas flow rate is 20 mo mol/(m2.s). The equilibrium relationship in terms of mole fraction is given by

$y^* = 2x$

The mass transfer coefficients are :

kxa = 50mol/(m3.s)

kxa = 25mol/(m3.s)

46. The overall gas-phase NTU based on arithmetic mean driving force is approximately equal to :

(a) 5

(b) 2.5

(c) 7.5

(d) 10

47. The overall gas-phase HTU based on arithmetic mean driving force is approximately equal to :

(a) 2.6 m

(b) 2 m

(c) 1.6 m

(d) 3 m

48. The condition for which HETP of a packed tower is equal to overall gas phase HTU is :

(a) equilibrium curve is parabolic and lies below the operating line

(b) equilibrium curve is parabolic and lies above the operating line

(c) equilibrium and operating lines are orthogonal

(d) equilibrium and operating lines are straight and parallel

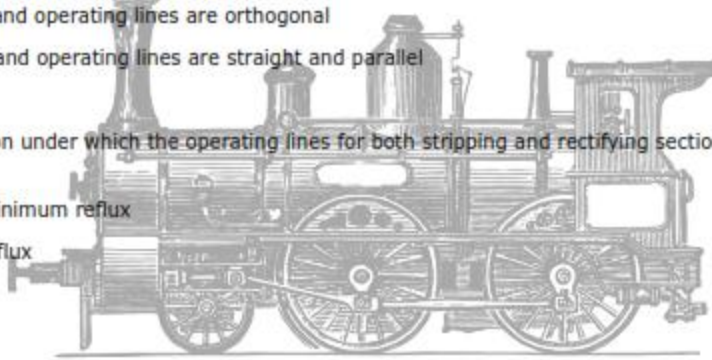
49. The condition under which the operating lines for both stripping and rectifying sections coincide with the :

(a) 1.2 times minimum reflux

(b) minimum reflux

(c) total reflux

(d) no reflux



50. If the moisture content of a solid on dry basis is X, then the moisture content on wet basis is :

(a) X/(I - X)

(b) X/(I + X)

(c) (1 + X)/X

(d) (1 - X)/X

Section - B

51. Moisture in a solid exerting an equilibrium pressure equal to that of pure liquid at the same temperatur

(a) bound moisture

(b) free moisture

(c) critical moisture

(d) unbound moisture

Statement for linked answer question ------ and ------ : An antibiotic is extracted from a dilute aqueo ratio of solvent to aqueous phase is 0.06. The distribution coefficient of the antibiotic is 50. No appreciable c well as solvent is observed with transfer of solute.

52. The percentage recovery of the antibiotic is an ideal single stage with the fresh solvent is :

(a) 75%

(b) 40%

(c) 50%

(d) 80%

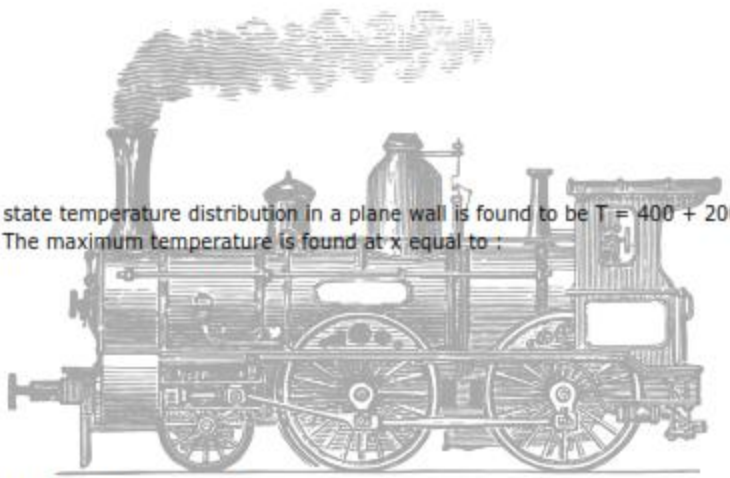
53. Approximate percentage recovery of the antibiotic in two ideal stages with the fresh solvent added to b is:

(a) 80%

(b) 99%

(c) 75%

(d) 94%



54. The steady state temperature distribution in a plane wall is found to be T = 400 + 2000x -10000x2, T i side of the wall. The maximum temperature is found at x equal to :

(a) 0

(b) 1

(c) 0.25

(d) 0.5

55. For the composite wall as shown in Fig.

R1, R2, R3 and R4 are the resistance of the different sections. The total resistance for one-dimensional heat

(a) R1 + R2 + R3 + R4

(b) R1R2 + R2R3 + R1R3 + R2R4 + R3R4 / R1 + R2 + R3 + R4

(c) R1R2R3 + R2R3R4 + R2 + R3 / R2R3

(d) R1R2+ R2R3 + R1R3 + R2R4 + R3R4 / R2 + R3

56. Lumped-capacity analysis for heat conduction in a solid wall is applicable when the conductive resistanc

(a) very low compared to convective resistance

(b) very high compared to convective resistance

(c) comparable with convective resistance

(d) equal to convective resistance

57. Fins do not help much for heat transfer into a boiling liquid because :

(a) boiling liquid is at constant temperature and no heat transfer is possible

(b) boiling liquid has very low convective heat transfer coefficient

(c) boiling liquid has very high convective heat transfer coefficient

(d) it is difficult to put fins in a boiling liquid

58. Heat transfer is taking place from a solid flat surface to a fluid flowing in laminar flow dh and dT are the layer thicknesses respectively. The correct statement is :

(a) dh and dT are always same

(b) dh or dT are independent of the momentum or thermal diffusivity respectively

(c) dh > dT, if momentum diffusivity is greater than thermal diffusivity

(d) dh > dT, if momentum diffusivity is lower than thermal diffusivity

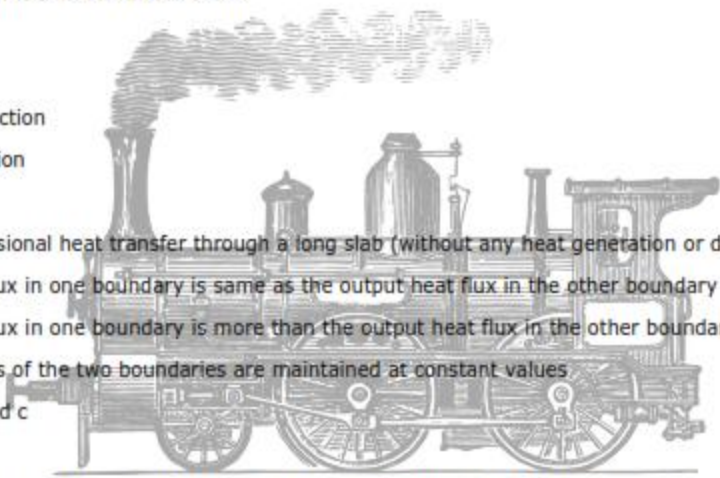
59. Rayleigh number is associated with :

(a) radiation

(b) conduction

(c) forced convection

(d) free convection



60. One-dimensional heat transfer through a long slab (without any heat generation or depletion inside) wi

(a) input heat flux in one boundary is same as the output heat flux in the other boundary

(b) input heat flux in one boundary is more than the output heat flux in the other boundary

(c) temperatures of the two boundaries are maintained at constant values

(d) all of a, b and c

61. A hemisphere of diameter, D is enclosed with a flat surface of diameter, D. The flat surface is designate designated as surface 1 and the hemisphere is designated as surface 2. The view factor matrix for the enclo:

(a)

(b)

(c)

(d)

62. The INCORRECT statement is :

(a) Both Nusselt and Biot numbers indicate ratio of conductive resistance to convective resistance

(b) Both Nusselt and BIot numbers are dimensionless groups

(c) Nusselt number uses thermal conductivity of fluid but Biot number uses thermal conductivity of solid

(d) Both Nusselt and Biot numbers use thermal conductivity of soiled

63. The statement "boiling point of a given aqueous solution is laminar function of the boiling point of pure as

(a) Duhring's rule

(b) Raoult's law

(c) Henry's law

(d) Colburn analogy.

64. The statement for a single-effect evaporator "1.5 kg steam is consumed per hour" indicates its:

(a) capacity

(b) economy

(c) capacity/economy

(d) economy/capacity

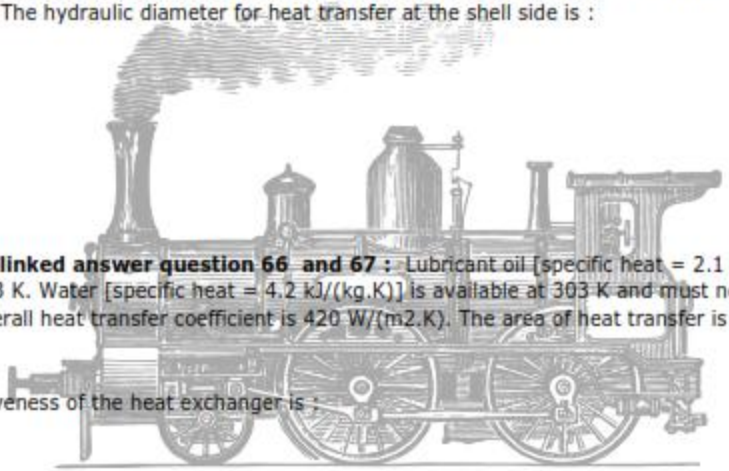
65. Tubes of 80 mm2 cross-sectional area and 29 mm perimeter are arranged in square pitch inside a shell pitch is 15 mm. The hydraulic diameter for heat transfer at the shell side is :

(a) 29 mm

(b) 40 mm

(c) 15 mm

(d) 20 mm



Statement for linked answer question 66 and 67 : Lubricant oil [specific heat = 2.1 kJ/(kg.K)] with a be cooled to 323 K. Water [specific heat = 4.2 kJ/(kg.K)] is available at 303 K and must not be heated abov fashion. The overall heat transfer coefficient is 420 W/(m2.K). The area of heat transfer is 12 m2.

66. The effectiveness of the heat exchanger is :

(a) 0.8

(b) 0

(c) 0.6

(d) 0.75

67. The number of transfer units of the heat exchanger is approximately equal to :

(a) 1.2

(b) 1.5

(c) 1.7

(d) 1.0

68. For flow across a tube bundle in a baffled shell and tube heat exchanger, the pressure drop is :

(a) maximum for square pitch

(b) maximum for triangular pitch

(c) maximum for rotated square pitch

(d) independent of pitch arrangement

69. For a constant-pressure filtration process with negligible filter cloth resistance, the volume of filtrate co corresponding filtration time q through the relationship :

(a) μ q

(b) μ √q

(c) μ q2

(d) μ q-1

70. The following conditions are applicable for a centrifuge :

Load inside the centrifuge : 10 kg

Diameter of the basket : 50 cm

Rotational speed : 10000 Hz

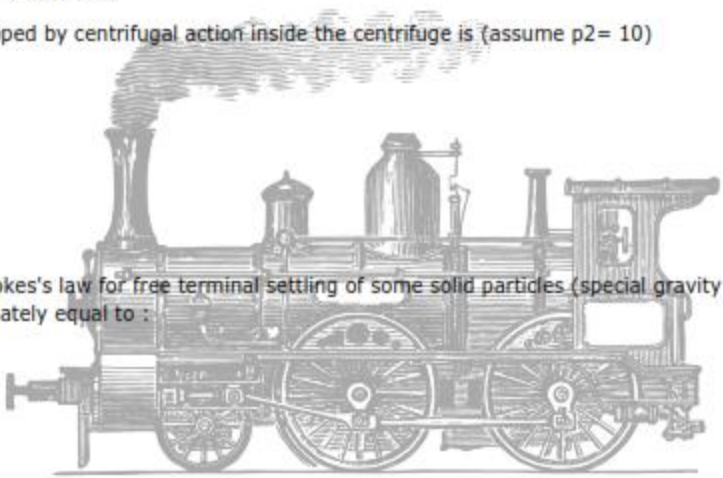
The force developed by centrifugal action inside the centrifuge is (assume p2= 10)

(a) 10000 N

(b) 10000 kN

(c) 10000 MN

(d) 10000 GN



71. To apply Stokes's law for free terminal settling of some solid particles (special gravity = 2.8) in water, tl will be approximately equal to :

(a) 45 μm

(b) 4.5 μm

(c) 450 μm

(d) 0.45 μm

72. Two impellers with diameters 8 cm and 1 cm have the same power number. The first one rotates with a second impeller is :

(a) 3.2 Hz

(b) 32 Hz

(c) 320 Hz

(d) 3200 Hz

73. Limestone of average diameter 25 mm is being crushed to particles of size 10 mm. If the feed size of tl according to the Rittinger's law the percentage increase in power requirement to get the same-sized product

(a) 10%

(b) 25%

(c) 40%

(d) 100%

74. Match the following :

1. Water	P. Dilatant fluid
2. Toothpaste	Q. Newtonian fluid
3. Polymer solution	R. Bingham plastic fluid
4. Starch suspension	S. Pseudoplastic fluid

(a) 1-Q, 2-R, 3-S, 4-B

(b) 1-P, 2-Q, 3-R, 4-S

(c) 1-R, 2-S, 3-P, 4-Q

(d) 1-S, 2-P, 3-Q, 4-R

75.

Match the following :

1. P. Euler equation
2. Q. Navier-Stokes equation
3. R. Continuity equation
4. S. Bernoulli's equation.

(a) 1-S, 2-P, 3-Q, 4-R

(b) 1-R, 2-S, 3-P, 4-Q

(c) 1-Q, 2-S, 3-P, 4-R

(d) 1-P, 2-Q, 3-R, 4-S

76. Match the following :

1. Rotameter	P. Direct measurement of mass flow rate
2. Notch tube	Q. Full-bore meter
3. Orifice meter	R. Measurement of local velocity
4. Coriolis meter	S. Variable area meter

(a) 1-S, 2-P, 3-Q, 4-R

(b) 1-R, 2-P, 3-P, 4-Q

(c) 1-Q, 2-S, 3-P, 4-R

(d) 1-S, 2-R, 3-Q, 4-P

77. For one dimensional flow (z-direction) of a fluid through a pipe, match the following :

1. Steady flow	P. $V \neq f(z)$
2. Fully developed flow	Q. $V \neq f(r)$
3. Uniform flow	R. $V \neq f(t)$
4. Irrotational flow	S. $V \times V = 0$

(a) 1-S, 2-P, 3-Q, 4-R

(b) 1-R, 2-P, 3-Q, 4-S

(c) 1-Q, 2-S, 3-P, 4-R

(d) 1-S, 2-R, 3-Q, 4-P

78. For the velocity profile of a fluid in Cartesian coordinate.

V = xy2i - xy3j + xyk, the flow is :

(a) steady and incompressible

(b) unsteady and incompressible

(c) steady and compressible

(d) unsteady and compressible

79. Bernoulli's equation is applicable when the flow is :

(a) streamline, unsteady, frictionless and incompressible

(b) streamline, steady, friction and incompressible

(c) streamline, steady, frictionless and compressible

(d) streamline, steady, frictionless and incompressible

80. A pipeline of inside diameter 0.1 m and length 10 m is fitted with two p/2 rad elbows, one p/4 rad elbo lengths of one p/2 rad elbow, one p/4 rad elbow and one gate valves are 30, 16 and 8 respectively. The rati

(a) 0.1

(b) 1

(c) 10

(d) 0

81. Water flows through an annulus of two concentric pipes at a velocity of 0.1 m/s. The outside diameter diameter of the outer pipe is 0.2m. Viscosity of water is 1 mPa-s. The Reynolds number for the flow is :

(a) 2 x 104

(b) 2 x 103

(c) 1 x 104

(d) 1 x 103

82. A cylindrical pump (NPSH requirement = 5 m) draws a non-volatile liquid from reservoir at a pressure c in the suction line is well within 1m, the minimum lift is :

(a) 10.4 m

(b) 15 m

(c) 20 m

(d) 14 m

83. A cylindrical column has inside volume of 0.02 m3 and 50% of that volume is filled with a packing mate Superficial velocity through the column is 0.1 m/s, the interstitial velocity is :

(a) 0.1 m/s

(b) 0.25 m/s

(c) 4 m/s

(d) 10 m/s

84. In a particulate fluidization experiment, when the velocity is increased by 10 times. The length of the b doubled. The new void fraction is :

(a) 0.7

(b) 0.6

(c) 0.5

(d) 0.8

85. The statement that describes the 3rd law of thermodynamics is :

(a) "All gases having same reduced property behave similarly"

(b) "Heat transfer from low temperature to high temperature source is not possible without external work"

(c) "Crystalline solids have zero heat capacity at absolute zero temperature"

(d) "Energy can neither be created nor be destroyed but can be transformed from one form to another"

86. A gas cylinder contains 1.4 kg of liquid nitrogen. This gas is released and brought to 273 K and atmosp the gas assuming ideal behavior is :

(a) 1.12 m3

(b) 2 m3

(c) 1 m3

(d) 2.24 m3

87. Consider the chemical reaction 4NH (g) + 5O2 (g) = 4NO2(g) + 6H2O (g) with ? H = -227 kJ/kmol. Th maximum at :

(a) high pressure and high temperature

(b) low pressure and high temperature

(c) high pressure and low temperature

(d) low pressure and low temperature

88. The condition for a gas to show maximum deviation from ideal behavior is :

(a) high pressure and low temperature

(b) low pressure and high temperature

(c) high pressure and high temperature

(d) low pressure and low temperature

89. A chemical system comprises of 4 components and 2 phases. The degrees of freedom for the system ar

(a) 2

(b) 4

(c) 6

(d) 0

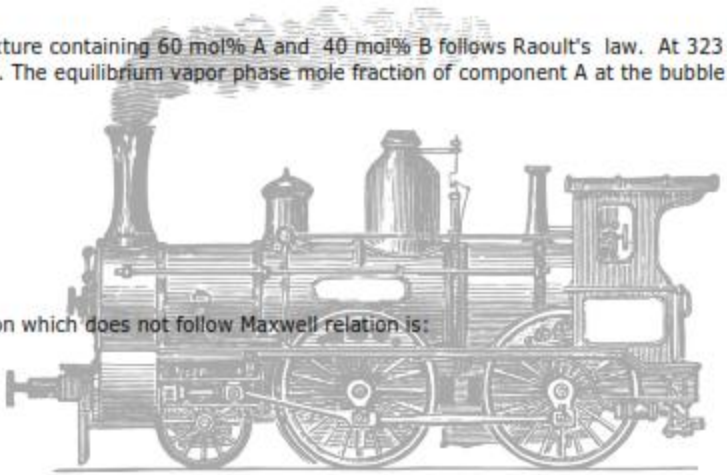
90. A liquid mixture containing 60 mol% A and 40 mol% B follows Raoult's law. At 323 K the vapor press kPa respectively. The equilibrium vapor phase mole fraction of component A at the bubble point, 323 K is :

(a) 0.8

(b) 0.5

(c) 0.9

(d) 0.75



91. The equation which does not follow Maxwell relation is:

(a)

(b)

(c)

(d)

92. The correct definition of entropy of a system with constant composition is ;

(a) S =

(b) S =

(c) S =

(d) S =

93. The dimension of viscosity is :

(a) MLT-1

(b) MLT-1 T-1

(c) MLT-2 T-1

(d) MLT-1 T-2

94. A gas containing 1 mole % ethane is in contact with water at 293 K and 2 x 103 kPa. If the Henry's lav fraction, the mole fraction of dissolved ethane in water is :

(a) 2 x 10-4

(b) 8 x 10-2

(c) 1 x 10-3

(d) 8 x 10-6

95. The internal energy of reaction for the reaction $C_2H_4(g) + 2Cl_2(g) \rightarrow C_2HCl_3(1) + H_2(g) + HCl(g$ reaction is :

(a) -420.5 kJ/mol

(b) -418 kJ/mol

(c) -416 kJ/mol

(d) -150 kJ/mol

96. The heats of oxidation of magnesium and iron according to the following reactions are :

$Mg + O_2 \rightarrow MgO$, ? H = - 610 kJ

$2Fe + O_2 \rightarrow Fe_2O_3$, ? H = - 810 kJ

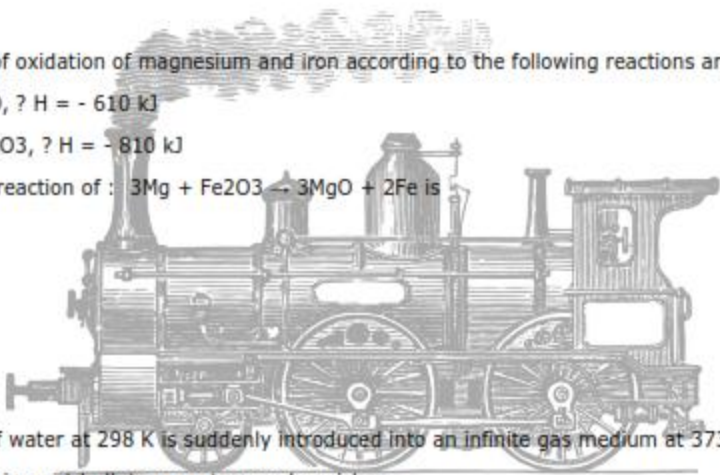
The heat of the reaction of : $3Mg + Fe_2O_3 \rightarrow 3MgO + 2Fe$ is

(a) 2680 kJ

(b) - 830 kJ

(c) 1680 kJ

(d) - 1020 kJ



97. A droplet of water at 298 K is suddenly introduced into an infinite gas medium at 373 K saturated with

(a) the drop attains wet bulb temperature and vanishes

(b) the drop-row in size and attains the temperature of 373 K.

(c) the drop reduces in size and attains the temperature of 373 K.

(d) the size of the drop remains unaltered and it attains the temperature of 373 K.

98. The coefficient of volumetric expansion for an ideal gas at a pressure, P and temperature, T is :

(a) 1/T

(b) T

(c) P

(d) 1/T2

99. The proximate analysis of coal involves the determination of :

(a) net calorific value

(b) caking index

(c) carbon, hydrogen, nitrogen, sulfur and oxygen

(d) volatile matter, fixed carbon, ash and moisture.

100. The Clausius-Clapeyron equation describes the variation of :

(a) heat capacity with temperature

(b) density with pressure

(c) vapor pressure with temperature

(d) surface tension with temperature