Chemical Engineering

MCQs

A. Process Heat Transfer:

1) The dimension '$Mt^{-3}\ T^{-1}$ (where M, t & T stand for Mass, time & Temperature respectively) relates to the following quantity

a) Heat Flux, b) Heat transfer coefficient, c) Thermal Conductivity, d) Viscosity. Ans: b)

2) One 'Ton' of refrigeration capacity is equivalent to the removal of heat of the quantity

a) 12,000 Kcal/h, b) 3516 Btu/h, c) 12,000 Btu/h, d) 12,000 kW Ans: c)

3) Thermal resistance of composite wall is maximum when slabs of different materials are arranged in

a) Parallel, b) partly parallel & partly series, c) random, d) Series Ans: d)

4) In a heat transfer process through an insulated cylindrical pipe, the critical insulation thickness is proportional to

a) Convective Heat transfer coefficient outside the insulation

b) Thermal conductivity of the insulating material,

c) Overall radius of the insulated pipe, d) Thermal conductivity of the bare pipe Ans: b)

5) In a forced convection heat transfer process, the momentum boundary layer remains within the thermal boundary layer when Prandlt number is

a) 0, b) >1, c) <1, d) 1 Ans: c)

6) Stanton number used in chemical engineering is related to

a) Mass transfer, b) Momentum transfer, c) Heat Transfer, d) Work transfer Ans: c)

7) For very highly viscous liquids, Prandlt number assumes the value generally as

a) >>1, b) >1, c) 1, d) <<1 Ans.: a)

8) Heat exchanger effectiveness (ε) may assume values

a) $\varepsilon < 0$, b) $\varepsilon > 1$, c) $\varepsilon \geq 0$ d) $\varepsilon \leq 1$ Ans.: c) & d)

9) The efficiency of a heat exchanger of the following type increases with increasing heat capacity ratio

a) Shell & Tube heat b) Parallel, c) Counter-current, d) Cross-flow Ans: c)

B. Mechanical Operations:

10) The dust particles in the exhaust gas from a thermal power station are separated from the gas more effectively using

a) Wet scrubber, b) Electrostatic precipitator, c) Cyclone separator, d) Fabric filters Ans**:** b)

11) In a paint industry, the finer particles of a pigment are produced from coarse grains preferably by

a) Wet grinding in a ball mill, b) Dry grinding a ball mill

c) Roller mill, d) Fluid energy mill Ans: a)

12) Sieves are graded as per the mesh size of the screening surface by the number of wires

a) Per square inch of the screen, b) per linear centimeter of the screen, c) per linear inch of the screen, d) per square centimeter of the screen Ans: c)

13) The law stated as "the work required to form particles of size D_p from a very large feed is proportional to the square root of surface-volume ratio of the product**"** is known as

a) Bond's law, b) Rittinger's law, c) Kick's law, c) Griffith's law Ans: a)

14) Granulators in chemical engineering unit operation follow the principles of

A) Size reduction, b) Size exclusion, c) Size enlargement, d) evaporation Ans: c)

15) Screen effectiveness as a means of segregating the desired size of the particles of interest through screening is defined in terms of Recovery, Rp (Mass flow of the desired fraction in the product stream) and Rejection R_F (Mass flow of desired fraction in the feed)

a) $R_P \div R_F$, b) R_P X R_F , c) $R_P + R_F$, d) $R_P - R_F$ Ans: b)

16) In constant –pressure filtration system, which of the following parameters is established with time

a) Increasing Pressure drop, b) constant-rate filtration, c) Rate of filtration falls, d) Increasing Rate of filtration Ans: c)

C. Energy Sciences:

17) The usefulness of flash point measurement of a petroleum fuel is to evaluate the

a) Performance of the fuel,

b) Safety aspect of the storage and transportation of the fuel,

c) Ignition quality of the fuel, d) impurity level of the fuel Ans: b)

18) Calorific value of a fuel in the following list is highest for

a) Kerosene, b) Natural gas, c) LPG, d) Gasoline Ans: b)

19) A Lube oil grade is marked as SAE-40; what is the full form of the abbreviation SAE?

a) Society of Automotive Engineers; b) Society of Automobile Engineers, c) Society of Atomic Energy, d) Saudi Arabia Exploration Ans: a)

20) The fixed carbon content is highest in which of the following coal samples?

a) Bituminous, b) Brown coal, c) Lignite, d) Anthracite Ans: d)

21) The calorific value of gaseous fuel is measured in

a) Bomb calorimeter, b)Reid apparatus, c) Junker's calorimeter, d) ASTM-D 86 Apparatus Ans: c)

22) Diesel index of a liquid fuel is determined to evaluate

a) Octane rating, b) Ignition quality, c) Cetane number, d) fluidity Ans: b)

23) Fischer-Tropsch process for the production of liquid hydrocarbons from coal-based feedstock is operated at high temperature ranging from 330 ^{0}C -350 ^{0}C using the following catalyst

a) Cobalt, b) Platinum, c) Iron, d) Palladium Ans: c)

D. Chemical Reaction Engineering:

24) Which of the following is a first order reaction?

(a) NH_4NO_2 –> $N_2 + 2H_2O$, (b) 2HI –> H2 + I_2

(c) $2NO_2$ –> $2NO + O_2$, (d) $2NO + O_2$ –> $2NO_2$ Ans: a)

25) The order of a chemical conversion is determined on the basis of

a) Stoichiometric equation, b) Temperature & pressure

c) Reaction mechanism based on the experimental facts

d) Catalytic effect on the conversion Ans: c)

26) For a first order of reaction, the rate constant depends upon

a) Reaction temperature, b) Initial concentration of reactants, c) Reaction time, d) Extent of reaction Ans: a)

27) The most industrially important gas phase catalytic chemical conversion is the reaction of SO_2 to SO_3 in the production of sulfuric acid, catalysed by nitric oxide in a lead chamber is an example of

a) Solid catalysed reaction, b) Homogeneous uncatalysed reaction

c) Homogeneous catalysed reaction, d) Heterogeneous uncatalysed reaction Ans: c)

28) The rate equation, $\log(-r_A) = \log(-dC_A/dt) = \log k + n \log C_A$ when plotted on a log-log graph paper taking $\log(-r_A)$ as the y axis and $\log C_A$ as the x-axis traces a line that is
a) Linear, b) exponential, c) parabolic, d) Hyperbolic Ans: a)

29) The conversion of a reactant, undergoing first-order reaction, at a time three times the half-life period of the reaction
a) 0.087, b) 0.5 c) 0.425 d) 1.0 Ans: a)

30) The units of frequency factor in Arrhenius equation,
a) Are the same as those as the rate constant, b) Depends on the order of the reaction,
c) Depends on the temperature, pressure of the reaction,
d) Are cycles per unit times Ans: a)

31) Over all order of reaction for which the rate constant has the order of units $(mol/L)^{(-3/2)}\, sec^{-1}$ is

a) -3/2, b) ½, c) 3/2, d) 5/2 Ans: d)

32 Pure A in gas phase enters a reactor. 50% of this A is converted to B through the reaction $A \rightarrow 3B$, mole fraction of A in the exit stream is

a) ½, b) 1/3 , c) ¼, d) 1/5 Ans: b)

33) For the reversible reaction $A \leftrightarrow 2B$, if the equilibrium constant K is 0.05 mol/L, starting from initially 2 moles of A and zero mole of B, how many moles will be formed at equilibrium
a) 0.253, b) 0.338, c) 0.152, d) 0.637 Ans: b)

CPT-I & II:

34) The ratio of P_2O_5 content in TSP is to SSP fertiliser
a) 1:3, b) 2:3, c) 3:1, d) 3:2 Ans: c)

35) In the manufacturing of ammonia by Haber's process, hydrogen is presently obtained from

a) producer gas, b) Synthesis gas, c) Coal gas, d) light petroleum gas Ans: b)

36) Sulfur, present in natural gas used for the synthesis of ammonia, is removed for avoiding sulfur poisoning of the catalyst (Fe) by the use of

a) PbO, b) ZnO, c) CoO, d) MnO_2 Ans: b)

37) Frasch process is used for mining of

a) Phosphorous, b) Arsenic, c) Sulfur, d) Iron Ans: c)

38) Which of the following catalyst is preferably used in the manufacture of nitric acid?

a) V_2O_5, b) Fe_2O_3, c) Pd, d) Pt-10% Rh gauge Ans: d)

39) During absorption of HCl gas in water (to produce HCl solution) , the gas is kept above dew point mainly to

a) avoid corrosion, b) increase the rate of absorption
c) Reduce cooling water rate, d) reduce the strength of acid Ans: b)

40) Portland cement contains mainly

a) CaO. SiO_2. Al_2O_3, b) MgO. SiO_2. Al_2O_3,
c) CaO. MgO. K_2O, d) MgO. SiO_2. Fe_2O_3 Ans: a)

41) Rancidity of the fatty oil can be reduced by

a) Decolouration, b) hydrogenation, c) oxidation, d) purification Ans: b)

42) Starch, a member of the carbohydrate family, is included in the class of

a) Disaccharide b) Polysaccharide c) Trisaccharide d) monosaccharide Ans: b)

43) BHC is an insecticide which lies in the group of

a) Organophosphates, b) Organochlorine, c) Carbamate, d) Plant derivative Ans: b)

44} Ethylene oxide is manufactured by the by oxidation of ethylene in presence of Ag_2O as catalyst at

a) 1atm & 100 ^{0}C b) 5 atm & 275 ^{0}C, c) 100 atm & 500^{0}C d) 50 atm & 1000 ^{0}C Ans: b)

45) High density polyethylene is manufactured using Zeigler-Natta catalyst under the following reaction conditions

a) High pressure & high temperature, b) high pressure & low temperature

c) Low pressure & high temperature d) low pressure & moderate temperature Ans: d)

46) The monomer of natural rubber is

a) Butadiene, b) Isoprene, c) Styrene, d) Chloroprene Ans: b)

Chemical Engineering Thermodynamics:

47) Changes in the state functions of a thermodynamic system from the initial state to reach the final state depend on

a) Path followed, b) Only on the initial state,
c) Independent of the path followed d) Only on the final state Ans: c)

48) A heat pump works on the principle of

a) First law of thermodynamics, b) Second law of thermodynamics,
c) Third law of thermodynamics, d) Zeroth law of thermodynamics Ans: b)

49) The efficiency of a Carnot engine between temperatures T_1 & T_2 ($T_1 < T_2$)

a) $\frac{T_2 - T_1}{T_1}$ b) $\frac{T_2 - T_1}{T_2}$ c) $\frac{T_1 - T_2}{T_1}$ d) $\frac{T_1 - T_2}{T_2}$ Ans: b)

50) The entropy change of a system undergoing reversible and adiabatic transformation in a cyclical way as given by ($\Delta S = \oint \frac{dQ_{rev}}{T}$) is

a) >0 b) 0 c) <0 d) ≥ 0 Ans: b)

51) The ratio of the adiabatic compressibility to isothermal compressibility is

a) 1 b) >1 c) <1 d) >> 1 Ans: c)

52) One ton of refrigeration capacity is equivalent to the heat removal rate of

a) 50 k Cal / hour, b) 3.5 kJ / hour, c) 12000 BTU /min, d) 2000 BTU / day Ans: b)

53) Equilibrium constant K is a function of

a) Temperature only b) Temperature and pressure

c) Pressure only d) Temperature, pressure and volume Ans: b)

54) Fugacity is equal to pressure for

a) real gases, b) real solutions, c) ideal solutions, d) ideal gases Ans: d)

55) The free energy change for a chemical reaction is given by

a) –RT ln K b) RT ln K

c) –R ln K d) R ln K Ans: a)

56) Activity coefficient for an ideal solution is

a) One, b) zero, c) Equal to Henry's law constant, d) Equal to vapour pressure Ans: a)

57) The degrees of freedom for a system at equilibrium at constant pressure can be expressed by

a) C-P-2 b) C-P +2 c) C-P+1 d) C-P-1 Ans: c)

58) The Clausius-Clapeyron equation is applicable to ---------equilibrium process

a) solid-liquid b) liquid-vapour c) solid-vapour d) All of these Ans: d)

59) The equilibrium constant for the reaction $N_2 + 3H_2 \leftrightarrow 2NH_3$, is 0.1084. Under the same conditions, the equilibrium constant for the reaction $½\ N_2 + 3/2\ H_2 \leftrightarrow NH_3$ is

a) 0.3292 b) 0.0542 c) 0.1084 d) 0.0118 Ans: c)

Petroleum Refinery Engineering & PETROCHEMICALS:

60) The cost of transportation through pipeline of liquid petroleum increases with the following parameter

a) Increasing Pour Point, b) Decreasing pour point, c) fire point, d) API gravity Ans: a)

61) ASTM-D-86 distillation of petroleum crude is carried out prior to refinery operation mainly evaluate the

a) Sulfur content, b) Base of the crude, c) Gasoline content, d) Presence of overall impurity level Ans: b)

62) Catalytic cracking of petroleum products is done in order to improve the

a) Octane rating, b) paraffin content, c) Olefin content & lighter hydrocarbons,

d) Reduction in viscosity Ans: c)

63) The lubricating quality of a lube oil is higher, the higher is the

a) Viscosity Index, b) Diesel Index, c) Aniline point , d) Pour point Ans: a)

64) Petroleum crude with high H_2S content is known as

a) Sweet crude, b) Toxic crude, c) Sour crude, d) High sulfur crude Ans: c)

65) Lubricating Oil is obtained from the crude fractionating column as

a) Light & Heavy ends, b) Heavy ends, c) Light ends, d) Intermediate distillates Ans: d)

66) Which is the most ideal feedstock for 'cocking 'process' for the manufacture of petroleum coke?

a) Naphtha, b) Diesel, c) Light gas oil, d) Vacuum residue Ans: d)

67) Petroleum crude is deposited under the earth crust in the

a) Igneous rock, b) Sedimentary rock, c) Metamorphic rock, d) Alluvial deposit Ans: b)

68) In petroleum crude oil exploration, the unit 'acre-feet' is used to represent

a) Area of the oil field, b) Volume of the oil reserve, c) Depth of the oil field, d)None of these Ans: b)

69) Atmospheric distillation is carried out

a) Below 800^0 C & below 1 atm pressure, b) Above 366 ^{0}C & above 1 atm pressure, c) Upto 366 ^{0}C & at 1 atm pressure, d) At Above 366 ^{0}C & below 1 atm pressure

70) The Octane rating of a liquid petroleum fuel is expressed as the % composition of 'A' in a mixture of 'A' & 'B' by comparing its anti-knocking property with the fuel under test. The RON of 'A' is 100 & that of 'B' is 0. Which of the following pair represents the mixture?

a) n-Hexane & n-Octane b) Isooctane & n-Heptane, c) Toluene & n-Heptane, d) Iso-butane & n-Heptane.

71) Which is the most ideal feedstock for 'cocking ' process for the manufacture of petroleum coke

a) Naphtha, b) Diesel, c) Light gas oil, d) Vacuum residue

72) What is the most economic and productive means of transporting petroleum crude and products.

a) Roadway transport system, b) Airways, c) Pipelines, d) none of these.

73) The name of the additive used with gasoline for preventing the formation of ice-crystal

a) Glycol, b)Phosphoric compounds, c) MTBE, d) Methanol

74) Flash point & Fire point of petroleum fuels are essential parameters for the purpose of

a) Distillation Tower design, b) Transportation and storage safety, c) Process Technology development d) None of these

Materials Science and Technology:

75) How many atoms are there per unit cell in a body centered cubic lattice?

a) 2, b) 3, c) 4, d) 6 Ans: a)

76) The ability of a material to offer resistance to scratching or indentation is a measure of its

a) Brittleness, b) toughness, c) hardness, d) resilience Ans: c)

77) Creep is not exhibited at low temperature by

a) Rubber, b) Acrylic, c) Lead, d) Plastics Ans: a)

78) An elastic behaviour of materials is expressed in terms of

a) Hysteresis loop area, b) Stress-strain curve, c) Relaxation time, d) Phase diagram Ans: b)

79) Which of the following heat treatment processes is used for softening the hardened material?

a) Normalizing, b) Tempering, c) Annealing, d) Hardening Ans: c)

80) A material is called ductile, if it can be

a) drawn into wires, b) Hammered into a thin sheet, c) Fractured without deformation, d) Made lustrous by heating it. Ans: a)

81) The miller indices of a set of parallel planes which make intercepts in the ratio of 3a: 4b on the X and Y axes and parallel to the Z axis and a, b, c being the primitive vectors of the lattice are

a) [2 3 1], b) [0 3 4], c) [4 3 0], d) [3 0 4] Ans: c)

82) The reaction that, on heating one solid phase, yields another solid phase and one liquid phase is called

a) Eutectic, b) Peritectic, c) Eutectoid, d) Peritectoid Ans: b)

83) Dislocations are sometimes called
a) Point imperfection, b) Line imperfection, c) Surface imperfection, d) Volume imperfection , Ans: b)

84) Time dependent recoverable deformation is called
a) Elastic deformation, b) Plastic deformation, c) Anelastic deformation d) Temporary deformation Ans: c)

85) The toughness of a material is tested by
a) Tensile strength test b) Hardness test c) Creep test d) Impact test Ans: d)

Fluid Mechanics:

86) A fluid is a substance that

a) has to be kept in a closed container,

b) is almost incompressible,

c) has zero shear stress,

d) Flows when even a small shear force is applied to it Ans: d)

87) The ratio of inertial forces to gravitational forces is called ---------- number

a) Froude , b) Euler, c) Reynolds, d) Mach Ans: a)

88) The ---------- is measured by piezometric opening.

a) Dynamic pressure, b) Static pressure, c) total pressure, d) point pressure Ans: b)

89) Transition length for turbulent flow in smooth pipe is equal to ------- times the pipe diameter

a) 0.5, b) 5, c) 50, d) 100 Ans: a)

90) For turbulent flow of the Newtonian fluid in a circular cross-section pipe, the ratio of maximum to average fluid velocity is

a) 0.5, b) 1, c) 0.66, d) <0.5 Ans: a)

91) Hydraulic radius is the ratio of

a) wetted perimeter to flow area, b) Flow area to wetted parameter,

c) flow area to square of wetted perimeter, d) square root of flow area to wetted perimeter

Ans: b)

92) Stokes' law is valid, when particle Reynolds number is

a) >1, b) < 1, c) <5, d) None of these Ans: b)

93) The value of critical Reynolds number for pipe flow is

a) 1,300 b) 10,000, c) 1, 00, 000, d) 2100 Ans: d)

94) Power loss in an orifice meter is -------- that in venturimeter

a) less than, b) same as, c) more than, d) Depends on the type of flow Ans: c)

Mass Transfer:

95) Diffusivity of gases at atmospheric pressure in cm^2/s is in the range of

a) less than 1
b) greater than 1
c) greater than 10
d) greater than 100 Ans: a)

96) Diffusivity of liquids in cm^2/s is of the order of

a) 0.1, b) 0.01 , c) 10 , d) 1×10^{-5} Ans: d)

97) Mass transfer coefficient is defined as

a. Flux =(coefficient) / (concentration difference)
b. Flux =(coefficient) (concentration difference)
c. Flux =(concentration difference) / (coefficient)
d. none of these Ans: b)

98) According to the film theory, the mass transfer coefficient, k_l, and diffusivity are related as

a) $k_l \mu D^{0.5}$
b) $k_l \mu D$
c) $k_l \mu D^{0.67}$
d) $k_l \mu D^{-1}$ Ans: b)

99) Corresponding to Prandtl number in heat transfer, the dimensionless group in mass transfer is

a) Reynolds number
b) Sherwood number
c) Peclet number
d) Schmidt number. Ans: d)

100) Schmidt number for gases is of the order of

a. 1
b. 10
c. 100
d. 1000 Ans: a)

101) For evaporation from a spherical naphthalene ball in a stagnant medium, Sherwood number is equal to

a. 0.5
b. 2
c. 20
d. 200 Ans: b)

102) According to film theory the mass transfer coefficient is proportional to

a) D
b) D^2
c) $D^{0.5}$
d) 1/D Ans: a)

103} Knudsen diffusion occurs when the ratio of mean free path to the pore diameter is

a. much greater than one
b. much less than one
c. equal to one
d. none of these Ans: a)

104) The equilibrium relation for distribution of a solute between a gas and liquid phase is given by y = mx (at a particular temperature). If k_y and k_x are individual gas and liquid phase mass transfer coefficients, respectively, the overall gas phase mass transfer coefficient is given by the relation

a. $1 / K_y = 1 / k_y + m / k_x$
b. $1 / K_y = m / k_y + 1 / k_x$
c. $1 / K_y = 1 / mk_y + 1 / k_x$
d. $1 / K_y = 1 / k_y + 1 / mk_x$ Ans: a)

Process Control:

105) The unit impulse response of a 1st order process is given by $2 e^{-0.5t}$. The gain & time constant for the processes are respectively

a) 4 & 2, b) 2 & 2, c) 2 & o.5, d) 1 & 0.5 Ans: a)

100) An input which generally increases linearly with time is known as

a) Step input, b) Sinusoidal input, c) Ramp input, d) linear input Ans: c)

106) Bolometer is used for the measurement of

a) Flow rate , b) Current, c) emf, d) Temperature Ans: d)

107) The phase lag of a 2^{nd} order system is always

a) ≤ 180 ^{0}C, b) >1200 ^{0}C, c) 125 ^{0}C, d) ≤ 90 ^{0}C Ans: a)

108) For critically damped second-order response, damping coefficient is

a) 0, b) =1, c) <1 , d) >1 Ans: b)

109) For a first order system, the corner frequency (ωc) is the frequency corresponding to

a) $\omega\,\tau = 1$, b) $\omega\,\tau = 0$, c) $\omega\,\tau = \frac{1}{\sqrt{2}}$, d) $\omega\,\tau = \sqrt{2}$ Ans: a)

110) Solenoid valve works like

a) P- controller, b) On-off controller, c) P-D controller, d) PID controller Ans: b)

Industrial Stoichiometry:

111) Cox chart is useful in the design of a distillation column (particularly suitable for petroleum hydrocarbon) is a plot of the

a) Temperature VS log (vapour pressure)

b) Vapour Pressure VS. log (Temperature)

c) log (Temperature) VS log (Vapour Pressure)

d) Log (Vapour pressure) VS. Log (1/Temperature) Ans: d)

112) The input & output of a furnace has the following composition by volume

Input: Fuel gas + 100% excess oxygen		Output: Flue gas + unconverted reactants	
CH_4	12% m	CO_2	--- 4.71%
CS_2	28%	H_2O	3.5%
CO_2	11%	O_2	10.4%
H_2	9%	N_2	81.84%
N_2	40%		

on SO_2 free basis. In this system, the TIE component is

a) SO_2, b)N_2, c) H_2O, d) CO_2 Ans: b)

113) Heat of reaction is a

a) Path function, b) State function, c) Independent of temperature, d) Independent of pressure Ans: b)

114) For water evaporating into unsaturated air under adiabatic condition and at constant pressure, that remains constant throughout the period of vaporisation is

a) dry bulb temperature, b) Wet bulb temperature

c) humidity, d) Relative humidity Ans: b)

115) The enthalpy of formation of water from hydrogen & oxygen is -286 kJ mol^{-1}, the enthalpy of decomposition of water into hydrogen & oxygen is

a) -286 kJ mol^{-1}, b) + 286 kJ mol^{-1}, c) - 143 kJ mol^{-1}, d) +143 kJ mol^{-1} Ans: b)

116) Air has 21% O_2 and 79% N_2 by volume respectively. What is the average molecular weight of air?

a) 29, b) 28.84, c) 29.3, d) 28.48 Ans: b)

117) 1 ^{0}Brix is equivalent to a sugar solution

a) 100%, b) 1%, c) 0.1%, d) 10% Ans: b)

118) The vapour pressure of water at 100 ^{0}C is

a) 100 N/m^2 , b) 76 cm of Hg, c) 13.59 cm of Hg, d) 760 mm of water column Ans: b)

Project Engineering

119) A reactor needs to be coated with corrosion resisting materials. One type of lining costs 5 lacs and is expected to last for 2 yrs. Another type of lining lasts for 3 yrs. If both choices have to be economically equal with the effective rate of interest being 18%, compounded economically, the price one should pay for the 2nd lining is

a) 6.1lacs b) 6.5 lacs c) 6.9 lacs d) 7.6 lacs Ans: c)

120) A plant produces phenol. The variable cost in rupees per ton of phenol is related to the plant capacity P (in tones per day) as 45,000 + 5P. The fixed charge is Rs 1,00,000 per day. The selling price of phenol is Rs. 50,000 per ton. What is the optimal plant capacity (in tones per day) for minimum cost per ton of phenol, is

a) 101 b) 140 c)283 d) 422 Ans: b)

121) A process plant has a life of 7 yrs. and its salvage value is 30%. What MINIMUM fixed-percentage factor will the depreciation amount for the 2nd year, calculated by declining balance method be equal to that calculated by the straight line depreciation method.

a) 0.1 b) 0.113 c) 0.527 d) 0.887 Ans: b)

117) A continuous fractionator system is being designed. The following cost figures are estimated for a reflux ratio of 1.4

Fixed cost including all accessories(Rs.) for			Operating cost (Rs./year) for	
Column	Condenser	Reboiler	Condenser cooling water	Reboiler heating steam
6×10^6	2×10^6	4×10^6	8×10^6	1×10^6

The annualized fixed charge is 15% of the fixed cost. The total annualized cost (in Rs.) is

a) 10.8×10^6 b) 13.35×10^6 c) 15.9×10^6 d) 3.15×10^6 Ans: a)

122) A pump has an installed cost of Rs.40, 000 and a 10 year estimated life. The salvage value of the pump is zero at the end of 10 years. The pump value (in Rs.)after depreciation by the declining balance method at the end of 6 years is

a) 4295 b) 10486 c) 21257 d) 37600 Ans: b)

123) For the case of single lump-sum capital expenditure of Rs.10 crores which generates a constant annual cash flow of Rs. 2 crores in each subsequent year, what is the payback period (in years) if the scrap value of the capital outlay is zero?

a) 10 b) 20 c) 1 d) 5 Ans: d)

124) Due to 20% drop in the product selling price, the payback period of a new plant increased 1.5 times that estimated initially, the production cost and the production rate remaining unchanged. If the production cost is Cp and the new selling price is Cs, the Cp/Cs is

a) 0.2 b) 0.4 c) 0.5 d) 0.6 Ans: b)

125) A sale contact signed by chemical manufacturer is expected to generate a net cash flow of Rs. 125,00,000 per year at the end of each year for a period of three years. The applicable discount rate (interest rate) is 10%. The net present worth of the total cash flow is in Rs.

a) 3,75,00,000 b) 34187500 c) 31075000 d) 16637500 Ans: c)