University of Mumbai

Examination 2020 under cluster ___ (Lead College Short name)

Program: **Biotechnology Engineering**

Curriculum Scheme: **Rev2016**

Examination: First/Second/Third/Final Year Semester I/II/III/**IV**/V/VI/VII/VIII

Course Code: BTC406 and Course Name: Unit Operation II

Time: 1 hour Max. Marks: 50

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For the students:- All the Questions are compulsory and carry equal marks .

Q1	Consider a plane wall of area A, having a layer of insulation on it. What will happen to the thermal resistance for convection of wall if the thickness of the insulation is increased?
Option A:	The thermal resistance for convection increases with increase in thickness of insulation
Option B:	The thermal resistance for convection decreases with increase in thickness of insulation
Option C:	The thermal resistance for convection remains same with increase in thickness of insulation
Option D:	There is no relation between insulation and heat transfer rate
Q2	Two insulating materials of thermal conductivity K and 2K are available for lagging a pipe carrying a hot fluid. If the radial thickness of each material is the same.
Option A:	Material with higher thermal conductivity should be used for the inner layer and one with lower thermal conductivity for the outer.
Option B:	Material with lower thermal conductivity should be used for the inner layer and one with higher thermal conductivity for the outer.
Option C:	It is immaterial in which sequence the insulating materials are used.
Option D:	It is not possible to judge unless numerical values of dimensions are given.
Q3	A wall of thickness 0.6 m has width has a normal area 1.5 m2 and is made up of material of thermal conductivity 0.4 W/mK. The temperatures on the two sides are 800°C. What is the thermal resistance of the wall?
Option A:	1 W/K
Option B:	1.8 W/K
Option C:	1 K/W
Option D:	1.8 K/W
Q4	Heat is conducted through a 10 cm thick wall at the rate of 30 W/m2 when the temperature difference across the wall is 10oC. What is the thermal conductivity of the wall?
Option A:	0.03 W/mK
Option B:	0.3 W/mK
Option C:	3.0 W/mK
Option D:	30.0 W/mK
Q5	A steam pipe is to be lined with two layers of insulating materials of different thermal conductivities. For minimum heat transfer….
Option A:	The better insulation must be put inside
Option B:	The better insulation must be put outside
Option C:	One could place either insulation on either side

Option D:	One should take into account the steam temperature before deciding as to which insulation is put where.
Q6	Reverse of boiling is _____ .
Option A:	Condensation
Option B:	Solidification
Option C:	Sublimation
Option D:	Freezing
Q7	During the process of boiling energy conversion takes place is
Option A:	Kinetic energy to thermal energy
Option B:	Potential to kinetic energy
Option C:	Thermal energy to kinetic energy
Option D:	Kinetic energy to potential energy
Q8	In pool boiling, as soon as the temperature of heating surface reaches the boiling point of the liquid, heat transfer takes place
Option A:	By conduction
Option B:	By natural convection
Option C:	By forced convection
Option D:	By radiation
Q9	At 1 atm pressure, the boiling point of water is _____
Option A:	100 ^{o}C
Option B:	0 ^{o}C
Option C:	-100 ^{o}C
Option D:	1 ^{o}C
Q10	To calculate the temperature difference in a Shell and tube heat exchanger, we use
Option A:	LMTD
Option B:	Mean temperature difference
Option C:	Median of the temperature difference
Option D:	Square mean of the temperature difference
Q11	Which of the following has the maximum Heat transfer rate for a Double Pipe Heat Exchanger?
Option A:	Cross Flow
Option B:	Parallel Flow
Option C:	Counter-flow
Option D:	Split Flow
Q12	The interchange factor is also known as
Option A:	Equivalent emissivity
Option B:	Irradiation
Option C:	Radiosity

Option D:	Shape factor
Q13	When heat is added to a liquid from a submerged solid surface, its called
Option A:	Nucleate boiling
Option B:	Film boiling
Option C:	Pool boiling
Option D:	Transition Boiling.
Q14	The Stefan-Boltzmann constant has units of
Option A:	$kcal/m^2$ hr K^4
Option B:	kcal/m hr K^4
Option C:	kcal/hr K^4
Option D:	$kcal/m^2$ K^4
Q15	The absorptivity of black body equals to
Option A:	1
Option B:	2
Option C:	3
Option D:	4
Q16	The unit of overall coefficient of heat transfer is _____ .
Option A:	W/m^2K
Option B:	W/m^2
Option C:	W/mK
Option D:	W/m
Q17	Which of the following accessories is provided in the vapour line of an evaporator for removing the entrained liquid?
Option A:	Bleed point
Option B:	Vent
Option C:	Catchall
Option D:	Baffle
Q18	Mass transfer co-efficient (K) and diffusivity (D) are related according to film theory as---------- .
Option A:	$K \propto D$
Option B:	$K \propto 1/D$
Option C:	$K \propto D^{1.5}$
Option D:	$K \propto D^2$
Q19	What is the unit of mass transfer coefficient?
Option A:	m^2
Option B:	m/s
Option C:	m^2s
Option D:	m^2/s

Q20	Which of the following is present in turbulent flow mass transfer, because of which mass transfer is fast?
Option A:	Slow mass transfer
Option B:	Less mass transfer
Option C:	Molecular diffusion
Option D:	Eddy diffusion
Q21	The situation of Equimolar counter diffusion satisfy with the condition _____ . where, N_A and N_B = molar flux of A and B respectively in binary system.
Option A:	$N_B = 0$
Option B:	$N_A = - N_B$
Option C:	$N_A/(N_A + N_B) = 1$
Option D:	$N_A = 0$
Q22	The Concentration of the two phases in a closed system at the interphase is _____ .
Option A:	Changes continuously
Option B:	Never changes
Option C:	Becomes zero
Option D:	Increases till the driving force becomes zero
Q23	Equilibrium distribution of one solute between two phases is conveniently described in terms of the _____ .
Option A:	Fick's law
Option B:	Danckwerts law
Option C:	Distribution law
Option D:	Newton's law
Q24	What is the correct expression for overall mass transfer coefficient based on mole fraction driving forces?
Option A:	1/Kx = 1/KAky + 1/kx
Option B:	Kx = 1/KAky + 1/kx
Option C:	1/Kx = KA/ky + 1/kx
Option D:	1/Kx = 1/KAkx + 1/ky
Q25	In aerobic fermentation, _____ molecules must overcome a series of transport resistances before being utilized by the cell.
Option A:	nitrogen
Option B:	hydrogen
Option C:	oxygen
Option D:	ozone