University of Mumbai

Examination 2020 under cluster ___ (Lead College Short name)

Program: Biotechnology Engineering

Curriculum Scheme: Rev2012

Examination: Third Year V

Course Code: BTC505 and Course Name: Bioreactor Analysis and Technology

Time: 1 hour Max. Marks: 50

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

Q. 1	The exit age distribution of fluid leaving a vessel is used
A	to study the reaction mechanism
B	to study the extent of non-ideal flow in the vessel
C	to know the reaction rate constants
D	to know the activation energies of a reaction.
Q. 2	Stimulus-response techniques are commonly used to characterize the extent of non-ideal flow in vessels. Tracer input signal is used as stimulus. Any material can be used
A	as tracer if it can disturb the flow pattern in the vessel
B	as tracer if it does not disturb the flow pattern in the vessel and it can be detected.
C	as tracer if it follows i.e deal flow patterns
D	as tracer
Q. 3	F(t) is ----------
A	Cumulative residence time Distribution function
B	Exit age distribution function
C	Dirac delta function
D	Step function
Q. 4	The 'E' curve for a non-ideal reactor defines the fraction of fluid having age between t and t + dt
A	At the inlet
B	At the outlet

C	In the reactor
D	Averaged over the inlet and outlet
Q. 5	The single parameter model proposed for describing non ideal flow is the _____ model
A	Tank in series
B	Dispersion
C	Both A & B
D	PFR
Q6.	Which of the following is not the advantage of fluidised bed reactor
Option A:	Uniform particle mixing
Option B:	Uniform temperature gradient
Option C:	Ability to Operate Reactor in Continuous State
Option D:	pH stability
Q7.	Observable Thiele modulus is used because
Option A:	diffusion reaction theory can be used only if true parameters are known
Option B:	diffusion theory can be used only in biological systems
Option C:	Weisz's module cannot be used
Option D:	km, Vmax, k1 is unknown in most cases
Q8.	To increase the overall rate of a rxn limited by internal diffusion the reaction should not
Option A:	decrease the radius R
Option B:	increase the concentration of A
Option C:	increase the radius R
Option D:	increase the temperature

Q9.	In which of the following valve a sliding disc is moved in or out of flow path?
Option A:	Gate valve
Option B:	Globe valve
Option C:	Needle valve
Option D:	Piston valve
Q10.	Role of draft tube is
Option A:	increases the gas hold-up and decreases the volumetric mass transfer coefficient
Option B:	decreases the gas hold-up and increases the volumetric mass transfer coefficient
Option C:	increases the gas hold-up and increases the volumetric mass transfer coefficient
Option D:	decreases the gas hold-up and decreases the volumetric mass transfer coefficient
Q11.	A backmix reactor
Option A:	is same as plug flow reactor
Option B:	is same as ideal stirred tank reactor
Option C:	employs mixing in axial direction only
Option D:	is most suitable for gas phase reaction
Q12.	Which of the following is not a criteria considered for scale up of Bioreactor
Option A:	Constant impeller tip speed (π NDi = constant)
Option B:	Constant power input per unit volume (P/V = constant)
Option C:	Similar drop size distribution (ds = constant)
Option D:	Varying KLa
Q13.	Which of the following is a type of Fed-Batch culture?
Option A:	Variable volume
Option B:	External Feedback
Option C:	Internal Feedback
Option D:	Chemostat

Q14.	In a bioreactor, components for mass transfer may typically include all except -
Option A:	Total organic carbon (TOC)
Option B:	Chemical oxygen demand (COD)
Option C:	Electron acceptor
Option D:	Fluidity
Q15.	For reactions in parallel, the ____ is the key to proper control of product distribution.
Option A:	concentration level of reactants
Option B:	concentration level of buffers
Option C:	concentration level of products
Option D:	concentration level of stabilisers
Q16.	____ is sufficient if the reaction is first order or if the fluid was either in a state of complete segregation or maximum mixedness.
Option A:	Axial mixing
Option B:	RTD
Option C:	plug flow mixing
Option D:	Turbo mixing
Q17.	Which of the following does not belong to 4 types of multiple reaction systems?
Option A:	Parallel
Option B:	Series
Option C:	Independent
Option D:	Co-dependent
Q18.	Higher free energy of activation of a chemical reaction (at a given temperature) implies

Option A:	Slower rate of reaction
Option B:	Higher rate of reaction
Option C:	Higher equilibrium conversion
Option D:	Both B & C
Q19.	_____ reactor comprises of a cylindrical vessel provided with a gas sparger, which pushes gas bubbles into a liquid phase or a liquid-solid suspension.
Option A:	Bubble column
Option B:	Stirred tank
Option C:	Agitated
Option D:	Cylindrical bed
Q20.	For reactions in parallel, the ____ is the key to proper control of product distribution.
Option A:	concentration level of reactants
Option B:	concentration level of buffers
Option C:	concentration level of products
Option D:	concentration level of stabilisers
Q21.	_____ is a process similar to liquefaction whereby a granular material is converted from a static solid-like state to a dynamic fluid-like state.
Option A:	Fluidization
Option B:	gas hold up
Option C:	sterilisation
Option D:	Lyophilisation
Q22.	What happens in a Quasi-Steady state?
Option A:	Specific growth increases

Option B:	Specific growth decreases
Option C:	Specific growth becomes constant
Option D:	Specific growth becomes zero
Q23.	Mass transfer co-efficient is defined as
Option A:	Flux = Co-efficient/concentration difference.
Option B:	Co-efficient = Flux/concentration difference.
Option C:	Flux=concentration difference/co-efficient.
Option D:	Flux=concentration difference/Flux.
Q24.	Which of the following is not a criteria considered for scale up of Bioreactor
Option A:	Constant impeller tip speed (π NDi = constant)
Option B:	Constant power input per unit volume (P/V = constant)
Option C:	Similar drop size distribution (ds = constant)
Option D:	Varying KLa
Q25.	Study of chemical kinetics is the easiest in the case of _____ reactions
Option A:	Irreversible
Option B:	Reversible
Option C:	Surface
Option D:	Side