

Program: BE Biotechnology
Curriculum Scheme: Revised 2016
Examination: Final Year Semester VIII
Course Code and Course Name: BTC803 and Bioprocess Plant & Equipment design

Time: 1 hour

Max. Marks: 50

1		LMTD correction factor is applied in _____ Heat Exchanger
	a	1-1 cocurrent
	b	Double pipe
	c	All multipass
	d	All involving liquid/liquid heat transfer
2		LMTD correction factor is used in heat exchanger design for
	a	Double pipe heat exchanger
	b	Multipass shell and tube heat exchanger
	c	Fouling fluids
	d	Counter flow of hot and cold fluids
3		Thickness of flat heads and covers (t) must be equal to _____ (Where D_e is effective diameter of the flat head, P is the pressure, f is allowable stress of the material and C is a factor depending upon the method of shell attachment.)
	a	$CD_e\sqrt{(p/f)}$
	b	$CD_e\sqrt{(p.f)}$
	c	$CD_e (p/f)$
	d	$C\sqrt{(D_e p/f)}$
4		In a shell and tube heat exchanger, shortest center to center distance between adjacent tube is
	a	Called tube pitch
	b	Called tube clearance
	c	Always less than diameter of tube
	d	Always greater than diameter of tube
5		In most of the shell and tube heat exchanger, the tube pitch as compared the tube diameter is
	a	Less
	b	1.25-1.50 times
	c	2.5 times
	d	One-fourth
6		Triangular pitch tube layout as compared to square pitch in a shell and tube heat exchanger
	a	Permits the use of less tube in a given shell diameter.
	b	Facilitates comparatively easier external cleaning because of larger clearance
	c	Permits the use of more tubes in a given shell diameter.
	d	Permits the use of less tube in a given heat exchanger
7		25 percent cut segmental baffle means that the baffle
	a	Height is 75% of the I.D. of the shell
	b	Height is 25% of the I.D. of the shell

	c	Spacing is 75% of its height
	d	Width is 25% of its height
8		In shell and tube heat exchangers, straight tie rod are used to
	a	Hold baffle in space
	b	Fix the tubes in position
	c	Account for thermal strain
	d	Fix the tubes in outside shell
9		Most common baffle used in industrial shell and tube heat exchanger is
	a	75% cut segmental baffle
	b	25% cut segmental baffle
	c	Orifice baffle
	d	Disk and doughnut baffle
10		High pressure fluid in a shell and tube heat exchanger should preferably be routed through the
	a	Tubes to avoid the expense of high pressure shell construction
	b	Shell side for smaller total pressure drop
	c	Shell side if the flow is counter – current and tube side if the flow is co-current
	d	Shell side for large overall heat transfer co-efficient
11		In a shell and tube heat exchanger, the clearance of the tube is generally
	a	Not less than one-fourth of the tube diameter or 3/16”
	b	More than the tube diameter
	c	Equal to the diameter
	d	Not equal to the diameter
12		The <i>LMTD</i> correction factor (F_T) is defined as the
	a	Ratio of true temperature difference to the <i>LMTD</i>
	b	Ratio of <i>LMTD</i> to the true temperature difference
	c	Differenced of true temperature difference and the <i>LMTD</i>
	d	Geometric mean of the true temperature difference and the <i>LMTD</i>
13		The minimum baffle height should be
	a	Equal to the impeller diameter
	b	Twice the impeller diameter
	c	Twice the tank diameter
	d	3/4 of the tank height
14		In chemical process equipments, the conical bottom heads used, usually has an apex angle of
	a	20°
	b	40°
	c	60°
	d	80°
15		Shell side heat transfer co-efficient in case of square pitch as compared to the triangular pitch under similar condition of fluid flow and tube size is
	a	More

	b	Same
	c	Less
	d	Twice
16		Which of the following material is seldom used for pressure vessel construction ?
	a	Rimmed steel
	b	Mild steel
	c	Killed steel
	d	Semi-killed steel
17		Wrought iron is pure iron with low content of
	a	Manganese and graphite
	b	Carbon and Manganese
	c	Iron and carbon
	d	Carbon and graphite
18		Gray cast iron hardness number is
	a	160 dash 190 BNH
	b	180 dash 220 BNH
	c	180 dash 240 BNH
	d	200 dash 240 BNH
19		Cylindrical and spherical shell thin wall having ratio of outside diameter thickness to exceeding
	a	3
	b	2
	c	1
	d	4
20		$F_a = PD/4t$ where D is considered for
	a	Mean diameter
	b	Minor diameter
	c	Major diameter
	d	Axial diameter
21		For torrispherical elliptical and hemispherical head internal pressure taken as _____ time of external pressure
	a	1.87
	b	1.77
	c	1.67
	d	1.57
22		Stress created in a flat plate due to the pressure acting as a _____ load
	a	Uneven distribution
	b	Uniform distribution
	c	Force distribution
	d	Pressure distribution
23		According to method of attachment of flat head to shell edge fixity factor change so far forged head fixity factor (C) is

	a	3
	b	0.2
	c	0.5
	d	0.4
24		Flat ring gasket material thickness range is _____ mm
	a	0.1 to 2.5
	b	0.3 to 1.8
	c	0.5 to 3.5
	d	0.5 to 3.0
25		In bolt design number of Bolt consider should be multiple of
	a	2
	b	4
	c	6
	d	8
26		A designer use principle for a design of pressure vessel component on
	a	Types of system
	b	Type of weight
	c	Type of height
	d	Type of product
27		Depending upon the ____ various requirements are given with weightage and specification
	a	Types of system
	b	Type of weight
	c	Type of height
	d	Type of product
28		Individual component for design of pressure vessel component is based on
	a	Forces acting on component
	b	Rate of material
	c	Types of system
	d	Types of product
29		pressures vessel component involved systematic approach of specification is
	a	Unknown to known solution
	b	Known to unknown solution
	c	Define solution
	d	Approach solution
30		The design of pressure vessel each component define specification of function element
	a	Specific function of element
	b	Determine forces acting on element
	c	Design individual component
	d	Determine failure model
31		Rod made of plain carbon steel force applied 5K Newton and area is 228mm ² what is a stress value in N/mm ²

	a	21.42
	b	21.92
	c	22.42
	d	22.92
32		Unit of modulus elastisity is
	a	N/mm
	b	N/mm ²
	c	N/mm ⁴
	d	N/mm ³
33		Unit of Stress is
	a	N/mm
	b	N/mm ²
	c	N/mm ⁴
	d	N/mm ³
34		Pressure design consideration in vessel design is known as
	a	Industrial design
	b	Information design
	c	Process design
	d	Machine design
35		Column support for the roof of a cylindrical storage tank must be provided for_____
	a	Small diameter tank
	b	Large Diameter Tank
	c	Small diameter tall tanks
	d	All tanks irrespective of their heights and diameters
36		Liquid/petroleum fuel storage tanks are built underground (as in case of petrol pumps), when the storage capacity is less than_____ kilolitres.
	a	20
	b	30
	c	45
	d	85
37		Storage tank operate under _____ pressure from pressure vessel
	a	High
	b	Medium
	c	Low
	d	Same
38		Fixed roof tank are meant for liquid _____ flash point
	a	High
	b	Medium
	c	Low
	d	Same
39		Material used for storage vessel having maximum tensile stress with joint efficiency is

	a	155 μ/mm^2
	b	165 μ/mm^2
	c	175 μ/mm^2
	d	118 μ/mm^2
40		Indian standard IS 226 - 1975 structural steel standard quality up to _____ mm thickness
	a	10
	b	15
	c	20
	d	25
41		For storage tank maximum allowable stress shall be _____ to the minimum yield stress
	a	0.5
	b	0.6
	c	0.8
	d	0.7
42		While permissible stress parameter design temperature range for storage tank is
	a	10° C to 200° C
	b	-10° C to 200° C
	c	10° C to 240° C
	d	-10° C to 240° C
43		Storage tank bottom plate constructed by _____ welding
	a	Spot
	b	Butt
	c	Plasma
	d	Stick
44		While two plug joining thickness of the weld is in _____ mm
	a	06_10
	b	06_12
	c	06_14
	d	06_16
45		The joint efficiency factor for the tank for the double weld joint is
	a	0.8
	b	0.85
	c	0.9
	d	0.95
46		Drain pipe system tested under the water pressure for leakage at
	a	35 N/cm ²
	b	30 N/cm ²
	c	25 N/cm ²
	d	20 N/cm ²

47		Self supporting cone roof maximum angle value is
	a	35
	b	34
	c	36
	d	37
48		Thermal stress used in a joint like
	a	Expansion
	b	Stress
	c	Process
	d	Machine
49		The ratio of increasing length with original length is called
	a	Elongation
	b	Strain
	c	Percentage of elongation
	d	Yield stress
50		Cast iron and alloy basic carbon percentage is
	a	3 to 4%
	b	1 to 2%
	c	0.5 to 1%
	d	0. 1%
51		The following type of layout is preferred for low volume production of non standard products
	a	Product layout
	b	Process layout
	c	Fixed position layout
	d	Combination layout
52		The following type of layout is preferred to manufacture a standard product in large quantity
	a	Product layout
	b	Process layout
	c	Fixed position layout
	d	Combination layout
53		If all the processing equipment and machines are arranged according to the sequence of operations of a product the layout is known as
	a	Product layout
	b	Process layout
	c	Fixed position layout
	d	Combination layout
54		Which process is also called product recovery?
	a	Upstream processing
	b	Mid-stream processing
	c	Downstream processing
	d	Biological processing

55		Regional factors for location planning include all of the following except:
	a	Raw materials
	b	Markets
	c	Labor considerations
	d	Attitudes
56		Process layout is used for:
	a	Repetitive processing
	b	Intermittent processing
	c	Bioprocess
	d	Chemical process
57		The inputs to a transformation process include all of the following except
	a	Material
	b	People
	c	Information
	d	Transportation
58		Process selection is primarily considered during:
	a	Planning
	b	Organizing
	c	Leading
	d	Controlling
59		In the mechanical design process the first step is to _____.
	a	Brainstorm solutions
	b	Prepare rough sketches
	c	Prepare a budget
	d	Identify the problem
60		Pressure design and detail machine design is a
	a	Design analysis
	b	Design activity
	c	Design application
	d	Design operation
61		The function of a _____ is to transfer heat from one fluid to another
	a	Heat exchanger with cooling water
	b	Heat exchanger
	c	Heat exchanger with reboiler
	d	Heat exchanger with preheater
62		In industry, a _____ is a type of packed bed used to perform Separation processes
	a	Packed column
	b	Packed column with feed in between
	c	Plate column
	d	Packed between reactor

63		At the _____, the low pressure gas is changed to high pressure gas
	a	Expander
	b	Ejector
	c	Blower
	d	Compressor
64		_____ consisting of a movable plug element and a stationary ring seat in a generally spherical ball
	a	Gate valve
	b	Ball valve
	c	Globe valve
	d	Middle Valve
65		It indicate a pressure in pressure tank
	a	Orifice
	b	Pressure indicator
	c	Process indicator controller
	d	Rapture dice
66		Governor is used for _____
	a	Controlling the load
	b	Controlling the weight
	c	Controlling the speed
	d	Controlling the operation
67		As per hooks law stress is _____ to strain
	a	Infinity
	b	Equal
	c	Proportional
	d	Less than
69		The function of a _____ heath cooling water is to transfer heat from one fluid to another
	a	Pressure vessel
	b	Heat exchanger
	c	Storage tank
	d	Expander
70		At the _____, the low temperature gas is changed to high temperature gas
	a	Expander
	b	Ejector
	c	Blower

	d	Compressor
71		An injector is a system of ducting and nozzles used to direct the flow of a high-pressure fluid
	a	Expander
	b	Ejector
	c	Blower
	d	Compressor
72		_____ require very little space along the pipe axis and hardly restrict the flow of fluid when the gate is fully opened
	a	Gate valve
	b	Ball valve
	c	Globe valve
	d	Middle Valve
73		_____ is a device used for measuring flow rate, for reducing pressure or for restricting flow
	a	Orifice
	b	Pressure indicator
	c	Process indicator controller
	d	Rapture dice
74		_____ consisting of a movable plug or disc element and a stationary ring seat in a generally spherical body
	a	Gate valve
	b	Ball valve
	c	Globe valve
	d	Middle Valve
75		_____ tray arrangement is recommended for distribution column having diameter upto four feet
	a	Cross flow
	b	Split flow
	c	Radial flow
	d	Straight flow
76		Operating velocity in the absorption power is design at pressure drop _____ mm
	a	1 - 5
	b	20 – 40
	c	1000 – 1500
	d	100 - 150
77		In between the distillation column and bubble cap having minimum clearance is
	a	76
	b	96
	c	38
	d	88
78		Distillation and absorption column also known as tower is essentially a tall shell with number of nozzle

	a	Horizontal cylindrical
	b	Vertical cylindrical
	c	Spherical
	d	Square
79		Packed column are _____ for depending with liquid containing large consideration of solid
	a	Suitable
	b	Stable
	c	Expensive
	d	Not suitable
80		A packed column are design for _____
	a	Low pressure
	b	High pressure
	c	Medium pressure
	d	Atmospheric pressure
81		Which type of packing is most suitable for corrosive service
	a	Random packing
	b	Structured packing
	c	Asbestos
	d	Foiled seed
82		Chimney play has _____ down corner with number of nozzle
	a	1
	b	2
	c	4
	d	0
83		Stress concentration is generally denoted by
	a	Ks
	b	Ky
	c	Ka
	d	Kt
84		In distillation process Concentration is _____ on selective component
	a	Infinite
	b	Decrease
	c	Constant
	d	Increase
85		Find the distillation preferred for the Relative volatility = Vapour pressure of A/ Vapour pressure of B = 360/355 then value of Relative volatility is = _____ unit composition
	a	1.01
	b	1.014
	c	1.018
	d	1.016
86		_____ Entrainer increases the relative volatility.

	a	Multi-component distillation
	b	Reactive distillation
	c	Azeotropic distillation
	d	Vapour pressure
87		Relative volatility increases by formation of _____
	a	Low boiling
	b	High boiling
	c	Medium heat
	d	Constant heat
88		The use of solvent for increasing the relative volatility is for
	a	Multi-component distillation
	b	Reactive distillation
	c	Azeotropic distillation
	d	Extractive distillation
89		Less risk of contamination the because of short growth period in _____ fermentation
	a	Continuous stirred tank
	b	Bubble column
	c	Batch operation
	d	Fluidized bed rotter
90		Industrial fermentors hold up to _____ litter of culture
	a	100000
	b	150000
	c	200000
	d	250000
91		_____ for mentor is having poor mixing difficult to control pH when addition of acid
	a	Tray
	b	Packed bed fermenter
	c	Forced
	d	Pneumatic
92		The microorganism are disappeared in liquid nutrient medium at maintained environment condition
	a	Tray
	b	packed bed
	c	Submerged
	d	Airlift
93		Bubble column bioreactor is usually cylindrical with an aspect ratio of _____
	a	4_5
	b	4_6
	c	4_7
	d	4_8
94		In _____ fermenter sporged zone is known as risen and zero that receive no gas at downstream
	a	Batch operated

	b	Continuous stirred tank
	c	Airlift
	d	Bubble column
95		In _____ process when micro organism added into medium which support its growth the culture passes through number of stage is known as growth curve
	a	Continuous
	b	Batch
	c	Feb - batch
	d	Airlift
96		Number of bacteria increase exponentially in lag phase so expansion means _____
	a	Specific growth rate
	b	Constant growth rate
	c	Increased growth rate
	d	Decreased growth rate
97		The total amount of biomass in the vessel increase but biomass concentration is meant and _____
	a	Increase
	b	Decrease
	c	Constant
	d	Regulate
98		Fresh medium is added in continuously fermenting vessel
	a	Batch operated
	b	Continuous stirred tank
	c	Airlift
	d	Bubble column
99		_____ material is preferable for the construction of small-scale fermenter
	a	Quartz
	b	Glass
	c	Iron steel
	d	proof
100		The _____ is non-toxic and corrosion proof
	a	Quartz
	b	Glass
	c	Iron steel
	d	proof
101		The _____ is largest diameter for glass fermenter
	a	50 cm
	b	70 cm
	c	60 cm
	d	80 cm