Reg.No. _____

Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

Code : 14BT2015 **Semester : 5**
Sub. Name : BIOREACTOR ENGINEERING **Duration : 3hrs**
Max. marks : 100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Assume that experimental measurement for a certain organism have shown that cells can convert – substrate carbon to biomass. i) Calculate the stoichiometric coefficients for following biological reactions: $C_6H_{12}O_6 + aO_2 + bNH_3 \longrightarrow cC_{4.4}H_{7.3}N_{0.86}O_{1.2} + dH_2O + eCO_2$ $C_{16}H_{34} + a\,O_2 + b\,NH_3 \longrightarrow cC_{4.4}H_{7.3}N_{0.86}O_{1.2} + d\,H_2O + e\,CO_2$ ii) Calculate the yield coefficients biomass with respect to substrate and oxygen supply for both the reactions. Also, comment on the differences.	CO-1	15
		(OR)		
2.	a.	Derive the expression various types of toxic compound inhibition models for growth?	CO-2	15
3.	a.	The production of penicillin was carried out in a batch reactor and the following data were obtained.	CO-2	15

Time (hr)	Glucose concentration (g/l)	*Penicillium notatum* concentration (g/l)	Penicillin concentration (g/l)
0	100	1	0
10	94	2.5	2
20	83	3.2	3.5
30	76	6.7	6.1
40	62	12.1	8.4
50	50	16.8	10.7
60	40	25.7	15.9
70	26	39.3	21.7

Determine net specific growth rate, growth rate @40hrs, biomass and product yield coefficient, doubling time and max cell concentration if 5 gm/l of biomass is used as inoculum .

		(OR)		
4.	a.	Write a detailed notes on batch growth kinetics of microorganisms and derive the kinetic equation for various stages of growth?	CO-2	15
5.	a.	Explain in detail about various methods to determine K_La?	CO-3	15
		(OR)		
6.	a.	A strain of mold was grown in batch culture on glucose and the following data were obtained,	CO-1	15

Time (Hrs)	Cell Conc. (g/L)	Ethanol Conc. (g/L)	glucose Conc. (g/L)
0	1.25	0	100
9	2.45	2.5	97
16	5.1	7.5	90.4
23	10.5	20	76.9
30	22	34	48.1
34	33	43	20.6
36	37.5	47	9.38
40	41	50	0.63

Calculate,

a. By fitting biomass data to logistic equation determine carrying capacity coefficient k.
b. Biomass yield coefficient.
c. Product yield coefficient

7.	a.	Explain the Working and principle of various air lift loop bioreactor also state its advantages and disadvantages	CO-2	15
		(OR)		
8.	a.	Explain the bioreactor consideration of Packed bed bioreactor with a neat sketch.	CO-2	15
		Compulsory:		
9.	a.	Elaborate on main parameters to be monitored and controlled in fermentation processes	CO-1	15

ALL THE BEST