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B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Fourth Semester

BT16405 – BIOPROCESS PRINCIPLES*(Biotechnology)***(Regulation 2016)****Time: Three Hours****Maximum : 100 Marks**

Answer ALL questions

PART A - (10 X 2 = 20 Marks)

	CO	RBT
1. Brief the role of fermentation in bioprocess industries.	1	U
2. Discuss why baffles are installed in the side wall of the fermentor leaving a small gap.	1	AN
3. Distinguish defined and undefined medium.	2	AP
4. List any four nitrogen sources used for the growth of the microorganisms in a fermentor.	2	R
5. Differentiate depth and surface filter sterilization.	3	AP
6. An unsterile broth contains initially 3.0×10^{10} viable cells. Calculate the Del factor of sterilization ($N_t = 10^3$).	3	E
7. Discuss biomass and oxygen yield coefficients.	3	R
8. Explain the degree of reduction and maintenance coefficient.	3	R
9. Write the equation for the Luedking-Piret model.	4	R
10. Differentiate batch and continuous cultivation.	4	AP

PART B - (5 X16 = 80 Marks)

11. (a) Illustrate the basic configurations of Continuous Stirred Tank Bioreactor and Air-lift bioreactor in detail. (16) 1 U
- (OR)**
- (b) Outline the main parameters to be monitored and controlled in the fermentation process. (16) 1 U

12. (a) Explain the various nutrients used in the formulation of the fermentation medium and its importance in detail. (16) 2 AN

(OR)

- (b) Explain Plackett - Burman design for medium optimization and its advantages over classical method of medium optimization in detail. (16) 2 AN

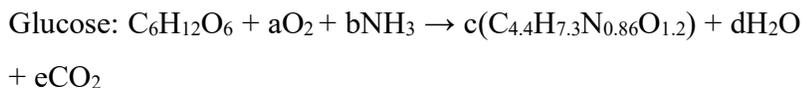
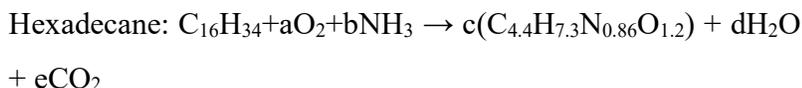
13. (a) Describe thermal death kinetics of microorganisms and explain how will you design a batch sterilization process. (16) 3 AP

(OR)

- (b) Explain various methods used for sterilization of liquid media and air in detail. (16) 3 U

14. (a) . The experimental measurements for an organism have shown that cells can convert two-thirds (w/w) of the substrate carbon (alkane or glucose) to biomass. (16) 3 E

- a. Calculate the Stoichiometric coefficients for the following reactions:



- b. Calculate the yield coefficients $Y_{X/S}$, Y_{X/O_2} for both the reactions. Comments on the differences.
c. Calculate the degree of reduction for glucose.

(OR)

- (b) Summarize the energetic analysis of microbial growth and product formation. (16) 3 E

15. (a) Explain the growth stages of *Escherichia coli* in batch cultivation and various environmental factors affecting its growth. (16) 4 AN

(OR)

- (b) Discuss the various methods used for the estimation of biomass. (16) 4 U

