Register Number: ……

M.TECH DEGREE EXAMINATIONS: JANUARY 2011

First Semester

BIOTECHNOLGY

BTY504: Biochemical Engineering & Fermentation Technology

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 2 = 20 Marks)

1. Give the principle of dissolved oxygen probe
2. Name the methods which enhances dissolved oxygen content in fermenters
3. What is "degree of reduction"? Calculate degree of reduction for C_6H_6.
4. Calculate the maximum biomass that can be supported in a batch fermenter with 7.0 g/L of fructose substrate, if $Y_{x/s} = 0.42$ g biomass / g substrate.
5. What are the roles of phosphorus and sulfur in the fermentation medium?
6. Serum containing medium is usually recommended for animal cell culture - Validate the statement.
7. What is diauxic growth?
8. Why do we maintain $\mu = D$ in continuous cultures?
9. Name any four proteins having therapeutic applications
10. With the help of a flow chart, show the production of penicillin

PART B (5 x 16 = 80 Marks)

11. (a) (i) Describe the stirred tank reactor and ancillaries with neat diagrams (12)

(ii) Write the important milestones in the development of fermenters (4)

(OR)

(b) (i) Write in detail the various chemical parameters to be monitored and controlled during fermentation (12)

(ii) What are the different configurations of agitators used in fermenters? (4)

12. (a) (i) Aerobic degradation of an organic compound by a mixed culture of organisms in waste can be represented by the following reaction

$$C_3H_6O_3 + aO_2 + bNH_3 \rightarrow cC_5H_7NO_2 + dH_2O + eCO_2$$

(1) Determine a, b, c, d, e if Yx/s = 0.4 g X / g S

(2) Determine the yield co-efficients $Y_{X/O2}$ & $Y_{X/NH3}$

(3) Determine the degree of reduction for the substrate, bacteria and RQ for the organisms

(OR)

(b) (i) Write short notes on maintenance coefficients (4)

(1) Describe the thermodynamic efficiency of growth (8)

(2) How is heat evolution related to oxygen consumption in aerobic cultures? (4)

13. (a) (i) List out various precursors used in fermentation medium (8)

(ii) Write short notes on the inexpensive carbon sources used in fermentation industry (8)

(OR)

(b) (i) Describe the simplex design for fermentation medium (12)

(ii) Write a note the medium used for plant and animal cell cultures (4)

14. (a) (i) Explain the growth pattern and kinetics in a batch culture with the help of growth curve for bacterial population (14)

(ii) Draw Monod plot and equation for microbial growth (2)

(**OR)**

(b) (i) Describe the growth of filamentous organisms and yeast. (10)

(ii) Write a note on growth and non-growth associated products. (6)

15. (a) (i) Give one example of each of microbial transformation processes involving oxidation, reduction, hydrolysis, and condensation. (8)

(ii) Describe the method of production of protease (8)

(OR)

(b) (i) Explain the industrial production of vaccines (10)

(ii) How is cephalosporin produced industrially? (6)

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