BHL 331
Bioprocess Engineering I
Minor I Examination

Max. Marks : 20
Time : One hour

Please attempt all the questions.

1. Write short notes on
   (a) Steps in the propagation of plant cell cultivation in the bioreactor 1
   (b) Steps in the animal cell cultivation in the bioreactor 1

2. What factors are responsible for the minimization of lag time in a repetitive batch cultivation ? 2

3. Briefly describe how the residence time can be calculated for continuous and plug flow reactor by graphical procedure. 2

4. What are the advantages and disadvantages of plug flow reactor with respect to CSTF ? 2

5. Briefly describe how the residence time can be calculated for continuous and plug flow reactor by graphical procedure. 2

6. Describe
   a. Balanced growth
   b. Yield and productivity of fermentation 2

7. Draw a mass balance with respect to biomass and substrate around a single stage CSTF. (Continuous Stirred Tank Fermenter) Assuming the applicability of Monod's Equation, derive expressions for Biomass concentration **X** and Substrate concentration **S**. Describe wash out conditions. 4

8. What do you understand by maintenance coefficient? Describe the systematic approach to quantify the maintenance coefficient and true growth yield coefficient of microbial cell. 2

9. Briefly describe the operation of Coulter counter for the measurement of cell numbers What are its disadvantages? 2

$\frac{dx}{dt} = \mu x$

$DK + SK = \mu S$

$DK = S(\mu - k)$

$DK = 0$