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M.Tech. (Bio Tech.) (2018 Batch) (Sem.–1)

BIOPROCESS ENGINEERING & TECHNOLOGY

Subject Code : MTBT-103-18

M.Code : 75764

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

1. a) What do you understand by the term "Fed-batch culture.

   b) Explain the unstructured product formation kinetics with relevant expressions.

2. Xanthan gum is produced using Xanthomonas campestris in a batch culture as per following reaction stoichiometry. A medium containing glucose and ammonia dissolved in 20,000 litres of water is pumped into the CSTR fermenter and inoculated with X. campestris. Air is pumped; the off gas recovered during the entire batch is 1250 kg. The final gum concentration is 3.5 wt%.

   Reaction stoichiometry per unit mass of glucose:

   1g glucose + 0.23g O_2 + 0.01g NH_3 $\rightarrow$ 0.75g gum + 0.09g cells + 0.27g CO_2 + 0.13g H_2O

   a) Prepare a flow sheet for Xanthum gum production with necessary labeling.

   b) Prepare a calculation (mass balance) table demonstrating inlet and outlet stream

   c) What is the percentage of excess air?

   d) How much glucose and ammonia are required?

3. a) Derive an expression for thermal death kinetics.

   b) Discuss the design, types of continuous sterilizers with their flow diagrams and temperature-time profile curves.

4. a) Define the volumetric transfer coefficient (K_La) of a fermenter.

b) Discuss any one method in detail determining the K_La value along with suitable diagrams.

5. Explain various process parameters monitored and controlled in a fermenter.

6. Give a detailed account of several techniques used for cell disruption.

7. a) Discuss the process of crystallization.

   b) What are the different parameters considered before crystallising a compound?

8. Write short notes on following :

   a) Ultrafiltration

   b) Liquid liquid Extraction

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.