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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.

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- b) Discuss any one method in detail determining the K<sub>L</sub>a 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

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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.

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