

**B. TECH**  
**(SEM VI) THEORY EXAMINATION 2018-19**  
**BIOPROCESS ENGINEERING**

Time: 3 Hours

Total Marks: 100

Note: Attempt all Sections. If require any missing data; then choose suitably.

## SECTION A

2 x 10 = 20

## 1. Attempt all questions in brief:

- A. Explain the quantitative estimation of microbial growth.
- B. Differentiate between absolute filters and depth filters.
- C. Give Monod equation for specific growth rate.
- D. Discuss the term wash out.
- E. Explain how doubling time can be related to the specific growth rate?
- F. Discuss exponential phase of growth for bacteria.
- G. Define the term sterilization.
- H. Discuss OTR.
- I. Differentiate between selective & differential media.
- J. Differentiate between turbidostat and chemostat of a continuous reactor.

## SECTION B

10 x 3 = 30

## 2. Attempt any three parts of the following:

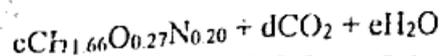
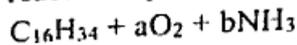
- A. What do you understand by batch sterilization of liquids? Discuss it in detail.
- B. What do you understand by  $K_{La}$ ? Discuss the method of  $K_{La}$  determination by gassing out techniques.
- C. What do you understand by air sterilization? Discuss Design of depth filter and estimation of its efficiency.
- D. What do you understand by critical dilution rate? Discuss washing out condition in detail.
- E. Explain the role of diffusion in bioprocessing. Discuss the method of Gas-liquid mass transfer in a bioreactor.

## SECTION C

10 x 1 = 10

## 3. Attempt any one part of the following:

- A. Production of single cell protein from hexadecane is described by the following reaction equation:



Where,  $CH_{1.66}O_{0.27}N_{0.20}$  represents the biomass. If  $RQ = 0.43$ , determine the stoichiometric coefficients.

- B. What do you understand by thermal death of microorganisms? Discuss the effect of temperature on specific death rate.

## 4. Attempt any one part of the following:

10 x 1 = 10

- A. What do you understand by chemostat cascade? Discuss the operation of chemostat with cell recycle.
- B. Discuss various methods and concepts of seedling.

5. Attempt any *one* part of the following: 10 x 1 = 10
- A. Discuss the growth of filamentous organisms. Explain kinetics and dynamics of pellet formation.
  - B. What do you understand by ideal reactor operation? Discuss batch operation of mixed bioreactors.
6. Attempt any *one* part of the following: 10 x 1 = 10
- A. Discuss in detail continuous operation of mixed bioreactors.
  - B. Explain the Fuzzy logic based controllers and artificial neural network based controllers in detail.
7. Attempt any *one* part of the following: 10 x 1 = 10
- A. Discuss oxygen transfer in bioreactors
  - B. What do you understand by scale up and scale down? Discuss physical and biological concepts of scale up.

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