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Sub Code: RBT601

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Roll No.

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

1. Attempt *all* questions in brief: **2 x 10 = 20**

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

2. Attempt any *three* parts of the following: **10 x 3 = 30**

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

3. Attempt any *one* part of the following: **10 x 1 = 10**

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

$$C_{16}H_{34} + aO_2 + bNH_3 \rightarrow cCH_{1.66}O_{0.27}N_{0.20} + dCO_2 + eH_2O$$

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 a chemostat with cell recycle.
B. Discuss various methods and concepts of sterilization.

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.