

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI (NEW) - EXAMINATION – SUMMER 2016

Subject Code:2160508

Date:17/05/2016

Subject Name: Biochemical Engineering

Time: 10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Conventional symbols are used in this question paper.
5. Figures to the right indicate full marks.

Q1

- (A) Explain the various steps of bio-process by the proper sketches (07)
- (B) The following rheological data were obtained with a fermentation broth in the very initial stage of fermentation. (07)
- (i) Find out whether the fluid is Newtonian or non-Newtonian. If it is non-Newtonian fluid, find the rheological constants.
 - (ii) If it is a Newtonian fluid, find the viscosity of the fluid.

$\gamma \text{ s}^{-1}$	$\tau \text{ N/m}^2$
5	100
10	210
15	295
20	410
32	620
50	1000

Q2

- (A) Discuss aerobic and anaerobic fermentation process give an examples (07)
- (B) (i) What is meant by “limiting substrate concentration”? (07)
- (ii) Describe the Monod model for specific growth rate

OR

- (B) State the names of mediums for bio processing operations and discuss them. (07)

Q3

- (A) Write short note on Antibiotics with application (07)
- (B) Write Short note on Enzymes (07)

OR

- Q3 (A) Describe how microorganism can be used for effluent treatment. (07)
- (B) (i) A particular organism follows substrate-inhibition kinetic growth equation of Edwards(1970.) The kinetic parameters are $(\mu_m) = .25\text{h}^{-1}$, $k_s = 2\text{g/l}$ and $k_i = 1.35\text{g/l}$. Determine the value of substrate concentration at which the specific

growth rate is maximum.

- Q4** (A) Derive an expression for steady state concentration of limiting substrate in a continuous flow bioreactor (07)
- (B) Write note on Manual Control of Bio Process operation (07)
- OR**
- Q4** (A) Discuss the types of reactors used in bioprocess detail design (07)
- (B) Write short on Computer control of Bio process Operation (07)
- Q5** (A) Explain the sedimentation and derive the equation for terminal velocity. (07)
- (B) Explain the different types of membrane process and their specification (07)
- OR**
- (A) A sedimentation tank is being for settling of solid dirt particles in the downstream processing of effluent from a distillery after fermentation of molasses. The feed has a solid content of 1% and the outlet stream is free of solids. The feed rate is 10 tones/hour and the average diameter of solid particle is 50 microns and its specific gravity is 1.1. Estimate the necessary area of the tank.”?
Data: $\mu = 1 * 10^{-3} \text{ Pa s}$
 $\rho_p = 1.1 * 10^3 \text{ kg/m}^3$
 $\rho_f = 1000 \text{ kg/m}^3$
- (B) Write short notes on (i) Specific cake resistance (ii) Crystallizer (07)