

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) - EXAMINATION – SUMMER 2018****Subject Code:2170407****Date:03/05/2018****Subject Name:Biochemical Engineering-I****Time:02.30 PM to 05.00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

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|------------|--|-----------|
| Q.1 | (a) Define the terms: thixotropic and rheopectic fluids | 03 |
| | (b) Explain the terms: open system and closed system | 04 |
| | (c) Derive Mechalis-Menten equation. | 07 |
| Q.2 | (a) Explain the law of conservation of mass. | 03 |
| | (b) Distinguish between biochemical engineer and bioprocess engineer. | 04 |
| | (c) Liquid from a brewery fermenter can be considered to contain 10% ethanol and 90% water. 50.000kg ⁻¹ of this fermentation product are pumped to a distillation column on the factory site. Under current operating conditions a distillate of 45% ethanol and 55% water is produced from the top of the column at a rate one-tenth that of the feed. | 07 |
| | (a) What is the composition of the waste “bottoms” from the still? | |
| | (b) What is the rate of alcohol loss in the bottoms? | |
| | OR | |
| | (c) Explain how biologist and an engineer differ in their approach? | 07 |
| Q.3 | (a) Define: time dependent viscosity, elasticity. | 03 |
| | (b) What four types of products do biotechnologies produce? | 04 |
| | (c) Discuss the non-newtonian fluids with required equations. | 07 |
| | OR | |
| Q.3 | (a) Write a note on effects of shear on viscosity for all fluids. | 03 |
| | (b) Draw the sketch of bioreactor with necessities. | 04 |
| | (c) Discuss the fundamentals of gas-liquid mass transfer. | 07 |
| Q.4 | (a) What is analogy between mass and heat transfer? | 03 |
| | (b) Briefly explain : enzyme deactivation | 04 |
| | (c) Write a note on: diffusion theory | 07 |
| | OR | |
| Q.4 | (a) Elaborate on product formation kinetics | 03 |
| | (b) Explain the terms: yield factor, respiratory quotient | 04 |
| | (c) Narrate the cell growth kinetics with suitable equations. | 07 |
| Q.5 | (a) What is function of sparger, baffle and pinch valve in a bioreactor? | 03 |
| | (b) What criteria should be considered for bioreactor construction? | 04 |
| | (c) Derive the expression for batch culture time as a function of product concentration | 07 |
| | OR | |
| Q.5 | (a) What is difference between chemostat and turbidostat operation? | 03 |
| | (b) What do you mean by probability of contamination? Why it is necessary to consider it in sterilization process? | 04 |
| | (c) What is difference between asepsis and sterilization? How can aseptic operation be achieved in a reactor? | 07 |