

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – WINTER 2023****Subject Code:3160512****Date:13-12-2023****Subject Name: Biochemical Engineering****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.
 4. Simple and non-programmable scientific calculators are allowed.
- Q.1 (a) State the important differences between prokaryotes and eukaryotes. 03
- (b) Outline the method of the graphical evaluation of kinetic parameters derived from the Michaels-Menten equation? 04
- (c) Explain 'Lock and Key' and 'Induced fit Model' of enzyme-substrate complex formation hypothesis 07
- Q.2 (a) List the various unit operation involved in bio-processing operation 03
- (b) You as a chemical engineer will decide on which general requirements of Fermentation process. 04
- (c) State the advantages and disadvantages of the continuous culture. 07
- OR**
- (c) Differentiate between competitive, uncompetitive and non-competitive enzyme inhibition. 07
- Q.3 (a) Enlist various techniques of Enzyme/Cell immobilization. 03
- (b) Write in brief on different types of sterilization 04
- (c) Explain the phenomenon of thermal-death kinetics of cells and spores 07
- OR**
- Q.3 (a) List three industrially important enzymes with their uses 03
- (b) Outline the different methods used for measurement of microbial growth? 04
- (c) Explain growth of a typical microbial culture in batch conditions. 07
- Q.4 (a) Explain 'critical dilution rate' and 'wash out' in context with continuous culture 03
- (b) Discuss various problems that may arise if DO level falls down in an aerobic process 04
- (c) Explain the methods for determination of K_{La} value 07
- OR**
- Q.4 (a) Write down Monod equation of microbial growth and explain the terms therein 03
- (b) State the names of mediums for bio processing operations and discuss them. 04
- (c) Describe various methods of product separation and purification operations in bioprocess industries in brief. 07
- Q.5 (a) How is fed-batch process carried out for fermentation. 03
- (b) Explain any method of membrane separation used for product recovery? 04
- (c) Explain the method of manufacturing of industrial alcohols using biotechnology route? 07
- OR**
- Q.5 (a) Define aerobic and anaerobic fermentation process with an example of each. 03
- (b) Outline the various challenges faced during the scale-up process at different level. 04
- (c) Discuss the different types of fermenter used in batch and continuous process. 07
