

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VII Examination-Nov/Dec.-2011

Subject code: 170506**Date: 29/11/2011****Subject Name: Biochemical Engineering****Time: 10.30 am-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.

- Q.1** (a) Starting from the basic reactions between enzyme and substrate derive the Michaelis-Menten equation and carry out the graphical evaluation of kinetic parameters. **07**
- (b) Explain with diagrams 'Lock and key model' and 'Induced fit model' for enzyme-substrate reactions **07**

- Q.2** (a) State and explain various methods of measurement of microbial growth. Draw a typical growth curve to show different phases. **07**
- (b) Discuss the differences between the Prokaryotic and Eukaryotic cells. State the salient features and types of bacteria with rough sketches **07**

OR

- (b) Discuss primary, secondary and tertiary structure of proteins. What is protein denaturation? **07**
- Q.3** (a) Explain the advantages and various methods of enzyme immobilization with sketches. **07**
- (b) Aerobic degradation of benzoic acid by a mixed culture of microorganisms can be represented by the following reaction. **07**
- $$\underset{\text{(substrate)}}{\text{C}_6\text{H}_5\text{COOH}} + a \text{O}_2 + b \text{NH}_3 \Rightarrow c \underset{\text{(bacteria)}}{\text{C}_5\text{H}_7\text{NO}_2} + d \text{H}_2\text{O} + e \text{CO}_2$$
- (i) Determine stoichiometric coefficients a, b, c, d and e, if RQ = 0.9
- (ii) Determine the yield coefficients, $Y_{x/s}$ and Y_{x/O_2}

OR

- Q.3** (a) Explain glycolysis and TCA cycle with diagrams. **07**
- (b) State various methods of sterilization. Discuss batch and continuous sterilization process. **07**
- Q.4** (a) Derive the equation for continuous stirred tank fermenter stating the assumptions and the material balance. **07**
- (b) State the advantages and disadvantages of continuous culture. **07**
- OR**
- Q.4** (a) Explain various methods of cell disruption for product recovery operation. **07**
- (b) Discuss anaerobic digestion and biodegradation in context with biological waste water treatment. **07**

Q.5 (a) Discuss the production of Single cell protein with a diagram. **07**
State the uses of single cell protein.

Discuss Nitrogen cycle stating all the reactions and schematic
(b) diagram. **07**

OR

Q.5 (a) Discuss the production of lactic acid with a flow diagram. State **07**
the applications of lactic acid.

(b) Give examples (one each) of the following: **07**
(i) Transport protein (ii) Disaccharide (iii) Polysaccharide (iv)
Unsaturated fatty acid (v) cofactor (vi) product inhibition (vii)
Information biomolecule
