Code No: R05222301 **R05** **Set No. 2**

II B.Tech II Semester Examinations,December 2010
BIOPROCESS ENGINEERING
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Sodium Bicarbonate is used as carbon source for the commercial production of a micro algae. A constant cell density is always maintained in the reactor by harvesting the cells daily. The growth rate is measured regularly and an average growth rate of 0.1 gm/lit (dry weight) is recorded daily. The total culture volume is 1100 litres. Sodium bicarbonate is the only Carbon source and it is added daily. Assume that the cells are 50% Carbon by weight. Calculate the quantity of Sodium Bicarbonate to be added daily if the conversion efficiency is assumed to be 90%. [16]

2. (a) What is aseptic operation and containment? [4]
   (b) Describe a typical aseptic, aerobic fermentation process. [4]
   (c) What is sparger? Describe different spargers used in fermentors. [2+6]

3. Discuss briefly the energetic analysis of microbial growth and product formation. [16]

4. (a) Draw the schematic diagram of a typical continuous injector- flash cooler steriliser.
   (b) Draw the flow diagram of continuous sterilisation system employing spiral heat exchangers. [8+8]

5. (a) Explain the procedure involved in the determination of cell number density and cell mass concentration.
   (b) Give a short note on simple unstructured kinetic models for microbial growth. [8+8]

6. Explain the difference between:
   (a) Competitive and non-competitive product inhibition
   (b) Growth and non-growth associated products. [8+8]

7. Determine coefficients a, b, c and d (where RQ=0.66) along with the biomass yield coefficient and oxygen yield coefficient for aerobic degradation of benzoic acid by a mixed culture of microorganisms as represented by the following overall reaction
   $C_6H_5COOH + aO_2 + bNH_3 - - \rightarrow cC_5H_7NO_2 + dH_2O + eCO_2$ [16]

8. Write in detail about role of biotechnology in bioprocess Engineering. [4+12]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: R05222301 **R05** **Set No. 4**

II B.Tech II Semester Examinations,December 2010
BIOPROCESS ENGINEERING
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Explain the difference between:
   (a) Competitive and non-competitive product inhibition
   (b) Growth and non-growth associated products. [8+8]
2. (a) What is aseptic operation and containment? [4]
   (b) Describe a typical aseptic, aerobic fermentation process. [4]
   (c) What is sparger? Describe different spargers used in fermentors. [2+6]
3. Sodium Bicarbonate is used as carbon source for the commercial production of a micro algae. A constant cell density is always maintained in the reactor by harvesting the cells daily. The growth rate is measured regularly and an average growth rate of 0.1 gm/lit (dry weight) is recorded daily. The total culture volume is 1100 litres. Sodium bicarbonate is the only Carbon source and it is added daily. Assume that the cells are 50% Carbon by weight. Calculate the quantity of Sodium Bicarbonate to be added daily if the conversion efficiency is assumed to be 90%. [16]
4. Determine coefficients a, b, c and d (where RQ=0.66) along with the biomass yield coefficient and oxygen yield coefficient for aerobic degradation of benzoic acid by a mixed culture of microorganisms as represented by the following overall reaction
   $C_6H_5COOH + aO_2 + bNH_3 - - \rightarrow cC_5H_7NO_2 + dH_2O + eCO_2$ [16]
5. Discuss briefly the energetic analysis of microbial growth and product formation. [16]
6. (a) Draw the schematic diagram of a typical continuous injector- flash cooler steriliser.
   (b) Draw the flow diagram of continuous sterilisation system employing spiral heat exchangers. [8+8]
7. Write in detail about role of biotechnology in bioprocess Engineering. [4+12]
8. (a) Explain the procedure involved in the determination of cell number density and cell mass concentration.
   (b) Give a short note on simple unstructured kinetic models for microbial growth. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: R05222301 **R05** **Set No. 1**

II B.Tech II Semester Examinations,December 2010
BIOPROCESS ENGINEERING
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) What is aseptic operation and containment? [4]
   (b) Describe a typical aseptic, aerobic fermentation process. [4]
   (c) What is sparger? Describe different spargers used in fermentors. [2+6]
2. Explain the difference between:
   (a) Competitive and non-competitive product inhibition
   (b) Growth and non-growth associated products. [8+8]
3. Sodium Bicarbonate is used as carbon source for the commercial production of a micro algae. A constant cell density is always maintained in the reactor by harvesting the cells daily. The growth rate is measured regularly and an average growth rate of 0.1 gm/lit (dry weight) is recorded daily. The total culture volume is 1100 litres. Sodium bicarbonate is the only Carbon source and it is added daily. Assume that the cells are 50% Carbon by weight. Calculate the quantity of Sodium Bicarbonate to be added daily if the conversion efficiency is assumed to be 90%. [16]
4. Write in detail about role of biotechnology in bioprocess Engineering. [4+12]
5. Discuss briefly the energetic analysis of microbial growth and product formation. [16]
6. (a) Explain the procedure involved in the determination of cell number density and cell mass concentration.
   (b) Give a short note on simple unstructured kinetic models for microbial growth. [8+8]
7. (a) Draw the schematic diagram of a typical continuous injector- flash cooler steriliser.
   (b) Draw the flow diagram of continuous sterilisation system employing spiral heat exchangers. [8+8]
8. Determine coefficients a, b, c and d (where RQ=0.66) along with the biomass yield coefficient and oxygen yield coefficient for aerobic degradation of benzoic acid by a mixed culture of microorganisms as represented by the following overall reaction
   $C_6H_5COOH + aO_2 + bNH_3 - - \rightarrow cC_5H_7NO_2 + dH_2O + eCO_2$ [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: R05222301 **R05** **Set No. 3**

II B.Tech II Semester Examinations,December 2010
BIOPROCESS ENGINEERING
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Write in detail about role of biotechnology in bioprocess Engineering. [4+12]
2. Explain the difference between:
   (a) Competitive and non-competitive product inhibition
   (b) Growth and non-growth associated products. [8+8]
3. Determine coefficients a, b, c and d (where RQ=0.66) along with the biomass yield coefficient and oxygen yield coefficient for aerobic degradation of benzoic acid by a mixed culture of microorganisms as represented by the following overall reaction $C_6H_5COOH + aO_2 + bNH_3 - - \rightarrow cC_5H_7NO_2 + dH_2O + eCO_2$ [16]
4. Discuss briefly the energetic analysis of microbial growth and product formation. [16]
5. (a) Explain the procedure involved in the determination of cell number density and cell mass concentration.
   (b) Give a short note on simple unstructured kinetic models for microbial growth. [8+8]
6. (a) Draw the schematic diagram of a typical continuous injector- flash cooler steriliser.
   (b) Draw the flow diagram of continuous sterilisation system employing spiral heat exchangers. [8+8]
7. (a) What is aseptic operation and containment? [4]
   (b) Describe a typical aseptic, aerobic fermentation process. [4]
   (c) What is sparger? Describe different spargers used in fermentors. [2+6]
8. Sodium Bicarbonate is used as carbon source for the commercial production of a micro algae. A constant cell density is always maintained in the reactor by harvesting the cells daily. The growth rate is measured regularly and an average growth rate of 0.1 gm/lit (dry weight) is recorded daily. The total culture volume is 1100 litres. Sodium bicarbonate is the only Carbon source and it is added daily. Assume that the cells are 50% Carbon by weight. Calculate the quantity of Sodium Bicarbonate to be added daily if the conversion efficiency is assumed to be 90%. [16]

⋆ ⋆ ⋆ ⋆ ⋆