Karunya University
(Karunya Institute of Technology and Sciences)
(Declared as Deemed to be University under Sec.3 of the UGC Act, 1965)

End Semester Examinations - 2015-16 Even Semester - May 2016

14BT2009 Bioprocess Principles

Set B

Time : 3 hrs
Total Marks: 100

1. What are the five groups of commercially important fermentation process available? Explain in detail with examples [20 Marks]

OR

2. What is sampling? Explain various types of sampling with a neat diagram. [20 Marks]

3. Elaborately explain the process of medium formulation and the important constituents need to be added for medium formulation. [20 Marks]

OR

4. For the following data calculate the difference, average difference, mean square, experimental error and factors showing larger effect. [20 Marks]

Factors	Carbon	Nitrogen	vitamins	Dum-1	precursor	Dum-2	Inducer
H	1	1	2	1	1	3	1
H	2	1	3	1	1	2	1
H	1	2	2	1	2	1	2
H	2	2	3	1	2	1	2
L	1	1	2	1	1	1	3
L	1	1	2	1	1	1	1
L	1	2	2	1	2	1	1
L	1	2	2	1	2	1	1

5. A fermentation process requires 7.7 liters batch of complex medium to be steam sterilized at 121 °C. Assuming that the medium before sterilization contains 10^6 bacterial spores of *Bacillus stearothermophilus* per ml and the probability of non-sterility after sterilization is 1 in 1000, Determine the holding time at 121°C and $\blacktriangledown_{holding}$. The time of heating from 100°C to 121°C is 9 min and the time of cooling from 121°C to 100°C is 11 min. Assume that the spore death below 100°C is insignificant. And the value of $\blacktriangledown_{table}$=12.549, A=$9.5x10^{37}min^{-1}$, E=283 KJ/mol and R=8.314 J/(molK). [20 Marks]

OR

6. Air is sterilized through a depth filter and is sent at an flow rate of 12 m^3/sec for an fermentation process for 8 hours with an linear velocity of 0.17m/s. the value of the rate constant is 1.7 cm^{-1} Calculate

   1. Initial number of microorganisms present in air [4 Marks]

   2. Radius of the filter [4 Marks]

   3. Length of the filter [3 Marks]

   4. Cross sectional area of filter [3 Marks]

   5. X_{90} [3 Marks]

   6. Efficiency of filtration [3 Marks]

7. Elaborately explain the process of isolation of industrially important microorganisms.[20 Marks]

OR

8. Describe with a neat diagram the process of inoculum development for Bacterial process.[20 Marks]

9. The experimental measurement of a mixed culture of organism have shown the following reaction whose RQ is found to be 0.9

$$C_6H_5COOH + aO_2 + bNH_3 \longrightarrow cC_5H_7NO_2 + dH_2O + eCO_2$$

Calculate:

a. Stoichiometric coefficients a, b, c, d and e [10 Marks]

b. Degrees of reduction for substrate and biomass [5 Marks]

c. Biomass, Nitrogen and CO_2 yield coefficient [5 Marks]

Wishing you All the Best
