

M.E. BIO-PROCESS ENGINEERING
FIRST YEAR FIRST SEMESTER EXAM 2024
Industrial Biotechnology

Time – Three hours

Full marks –100

Answer any four questions.

1. A marine microorganism contains an enzyme that hydrolyzes glucose-6-sulfate (S). The assay is based on the rate of glucose formation. The enzyme in a cell-free extract has kinetic constants of $K_m = 6.4 \times 10^{-4} \text{ M}$ and $V_{\max} = 325 \text{ nmoles} \times \text{lt}^{-1} \times \text{min}^{-1}$. Galactose – 6 – sulfate is a competitive inhibitor (I). At 10^{-5} M galactose – 6 – sulfate and $1.8 \times 10^{-5} \text{ M}$ glucose-6-sulfate, v was $1.10 \text{ nmole} \times \text{lt}^{-1} \times \text{min}^{-1}$. Calculate K_i for galactose – 6- sulfate.
Derive the expression for noncompetitive inhibition. 15 + 10

2. Briefly describe solid state fermentation and its merits and demerits. Which type of products are found using this process.
Briefly describe the production of citric acid and its application. 10 +15

3. Write down the recovery of lactic acid from media after fermentation? Briefly describe the production of Acetone-butanol fermentation. 7+18

4. Derive the expression of Michaelis Menten equation and its significance.
Briefly describe Lineweaver Burk plot.
Briefly describe entrapment and encapsulation immobilization process and its advantages. 8+5+12

3. Briefly describe the production of amylase and its application. Write down the application of enzyme in Food and Medical Industry. 15+10