

IMS ENGINEERING COLLEGE	IMSEC/QF/45
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NBT-053: Industrial Biotechnology

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UNIT I. Introduction to Engineering Calculation

Introduction to engineering calculations; unit conversion, measurement conventions, Errors in Data and Calculations, Presentation of Experimental Data, Data Analysis, General Procedures For Plotting Data, Process Flow Diagrams.

UNIT II. Bioreactor Types and operation control

batch reactors, fed-batch reactors, CSTR reactors, various types of bioreactors for microbial, animal , plant cell culture, fluidized bed reactor, bubble column, air lift fermenter, packed bed, trickle bed etc. parallel and series bioreactor. Impellers, stirrer, glands and bearings, packed gland seal, mechanical seal, magnetic drives, baffles, different types of spargers, computer based advance controllers for bioreactors.

UNIT III. Bioreactor Design

Introduction, general design information, design of bioreactors, basic function of a bioreactor design, mass and energy balance, materials of construction for bioprocess plant, mechanical design of process equipment, utilities for biotechnology production plants.

UNIT IV. Reactor engineering

Ideal reactors, concept of holding and space time, performance equations for single reactors; multiple reactor systems, design of multiple reactors: kinetics of series and parallel reaction, residence time distributions (RTD), exit age distribution, recycle reactors, recycle ratio for auto catalytic reactions.

UNIT V. Applications

Process technology for the production of cell biomass and some primary metabolites, e.g. ethanol, acetone-butanol, citric acid, dextran and amino acids. Microbial production of industrial enzymes glucose isomerase, cellulase & lipases. Applications of bioconversion, transformation of steroids and sterols. Transformation of non-steroidal compounds, antibiotics and pesticides. Bioenergy-fuel from biomass, production and economics of biofuels. Metal recovery and microbial desulfurization of coal.