- SEMETSER:- V
- COURSE NO.:- FE-359
- COURSE TITLE:- BIOCHEMICAL ENGINEERING
- CREDITS:- 3(2+1)

➢ THEORY

NO. OF UNITS	TOPICS	NO. OF LECTURES
1	*Biochemical Engineering and their scope: Definition, necessity, value engineering, good manufacturing practices. Standard operating procedures, good laboratory practices*	*2*
2	*History of Biochemical Engineering:* *Theory of scientists Pfizer, Alexander Fleming Salman Waksmen. Instrumentation and their control, physical and chemical parameters.*	*1*
3	*Role of biochemical engineering in development of modern fermentor: Scale up, management of cellular process, design, operation and their problems*	*3*
4	*Basis for biochemical engineering in fermentation industry:* *Unit operation, unit process, process design, chemical reaction kinetics, process variables, biochemical properties, process control*	*3*
5	*Kinetics of microbial growth and death: Definition, fermentation kinetics rate of cell synthesis, product formation and effect of environment. Types of kinetics, Batch and continuous type, control measures*	*2*
6	*Simple enzyme kinetics: Simple kinetics model for enzyme substrate interaction. Derive the equation of Michelin Menton, for reaction rate, product formation, calculation of Km and V max values*	*3*
7	*Complex enzyme kinetics: Oxidation – reduction form of enzymes, observed apparent rate constant, factors affecting the inhibition, competitive, non competitive inhibition, substrate interaction*	*3*
8	*Kinetics pattern of various fermentations: Classification of kinetics pattern, as per different scientists, simple, simultaneous, consecutive, stepwise, complex reactions and their examples*	*3*
9	*Media and air sterilization: Definition, thermal death time, media heat sterilization, advantages of continuous sterilization.*	*2*

10	*Aeration and agitation*	*3*
11	*Product recovery of different process: Mass transfer resistance, extraction, leaching, drying and evaporation, sorption and storage, permeability law*	*2*
12	*Product formation for value added products using bioconversions techniques Production of single cell protein, alcohol, raw material for required for product formation, production of antibiotics, economic process, utilization of damaged grain through bioconversion, present mode of utilization and their nutritional value*	*3*
	TOTAL	**30**

- PRACTICALS

NO. OF UNITS	TOPICS	NO. OF EXPT.
1	*Instrumentation and their control in fermentation industry -physical parameter*	*2*
2	*Instrumentation and their control in fermentation industry – chemical parameter, metabolic parameters and biosensors in food industry*	*2*
3	*To study the different parts of 30 lit. laboratory and 1 lakh lit. capacity fermentors*	*1*
4	*Comparative study of one lakh liter laboratory fermentor*	*1*
5	*To study the thermal stability of peroxides enzyme in potato*	*1*
6	*To asses the amylase activity from given foods sample*	*1*
7	*To measure the microbial growth after fermentation. (fermentation thermal death time)*	*1*
8	*To study the mass transfer of solution by dialysis process*	*1*
9	*To study the time temperature relationship for*	*1*

	destruction of microorganisms	
10	*To study the ethyl alcohol production through bioconversion*	*2*
11	*To study the vitamin production through bioconversion*	*1*
12	*Visit to Distillery Plant*	*1*
	TOTAL	**15**

- *Reference Books:*

- *Biochemical Engineering* — *Shuichi Alba, Arthur E. Humphrey and Nancy F. Millis*
- *Biochemical Engineering Fundamentals* — *Bailer J. E. and Ollis D. F.*