



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205



DEPARTMENT OF BIOTECHNOLOGY

Course Code / Name : U15BT301 / BIO PROCESS CALCULATION

Class (Year / Programme / Department / Section): II/ B.TECH/ BT

UNIT-1 BASIC CHEMICAL CALCULATIONS

S.No	Topics To Be Covered	Duration in Minutes	Teaching Aid	Books Referred
1.	Introduction	45	BB	T1
2.	Conservation of mass and energy	45	BB	T2,R1
3.	Unit and it's conversion	45	BB	T2
4.	Basic laws & Stoichiometric calculations	45	BB	T1
5.	Gases and vapours	45	PPT	T2,R2
6.	Liquids and solids	45	BB	R2
7.	Ideal gas law calculations	45	PPT	T1,R2
8.	Real gas relation ship	45	BB	T2
9.	Vapour pressure and liquids, saturations	45	PPT	T2
10.	Partial saturation	45	BB	T1,R2
11.	Vapour liquid equilibria	45	BB	T2

UNIT-II HUMIDITY AND SOLUBILITY

	Topics To Be Covered	Duration in Minutes	Teaching Aid	Books Referred
12.	Humidity	45	BB	T1
13.	Percentage humidity	45	PPT	T2,R1
14.	Relative humidity	45	BB	T2

15.	Molal humidity	45	PPT	T1
16.	Cox chart-saturation	45	BB	T2,R2
17.	Vaporization-condensation	45	PPT	R2
18.	Wet and dry bulb thermometry solubility & crystallization	45	BB	T1,R2
19.	Dissolution	45	PPT	T2
20.	Solubility of gases	45	BB	T2

UNIT-III MATERIAL BALANCES WITHOUT CHEMICAL REACTIONS

	Topics To Be Covered	Duration in Minutes	Teaching Aid	Books Referred
21.	Introduction	45	PPT	T1
22.	Overall material balances	45	BB	T2,R1
23.	Component material balances process flow sheet	45	PPT	T2
24.	Material balances without chemical reactions problems	45	BB	T1
25.	Material balances without chemical reactions	45	PPT	T2,R2
26.	Steady state	45	BB	R2
27.	Unsteady state	45	PPT	T1,R2
28.	Recycle	45	BB	T2
29.	Bypass & purge	45	PPT	T2

UNIT-IV MATERIAL BALANCES WITH CHEMICAL REACTIONS

	Topics To Be Covered	Duration in Minutes	Teaching Aid	Books Referred
30.	Material balance for steady state process with chemical reaction	45	BB	T1
31.	Material balance for unsteady state process with chemical reaction	45	BB	T2,R1
32.	Multiple sub systems	45	PPT	T2
33.	Recycle	45	BB	T1
34.	Bypass & purge	45	BB	T2,R2
35.	Degrees of freedom	45	PPT	R2

36.	Outline of NTU	45	BB	T1,R2
37.	Problems in biotechnology industrial applications	45	BB	T2
38.	Conclusion	45	BB	T2
UNIT-V ENERGY AND COMBUSTION BALANCE				
	Topics To Be Covered	Duration in Minutes	Teaching Aid	Books Referred
39.	Energy balance – laws	45	BB	T1
40.	Heat capacity calculations	45	BB	T2,R1
41.	Gas, liquid, fuel	45	BB	T2
42.	Enthalpy calculations	45	BB	T1
43.	Combustion calculations	45	PPT	T2,R2
44.	Fuel and fuel gas analysis	45	BB	R2
45.	Air fuel ratio	45	PPT	T1,R2
46.	Theoretical oxygen	45	BB	T2
47.	Percentage excess air & limiting and excess reactant	45	PPT	T2

TEXT BOOK:

1. Geankoplis C.J,-Transport process and unit operations , prentice hall india, 2002
2. Mccabe W.L.Smith J.C,harriot P.- Unit operations in chemical engineering,5th edn. McGraw-Hill Inc.,1993

REFERENCES:

1. B.I.Bhatt and S.M.Vora , Stoichiometry 4th edn.,Tata McGraw hill publishers
V.Venkataramani and N.Anantharaman , process calculation prentice hall of India,ltd , 2003