GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VI

CHEMICAL TECHNOLOGY

Subject Name: Fluid Flow & Heat Transfer
Subject Code: 163503

Teaching Scheme				Evaluation Scheme			
Theory	**Tutorial**	**Practical**	**Total**	**University Exam(E)**	**University Exam(P)**	**Mid Sem Exam(Theory) (M)**	**Practical (Internal)**
4	0	3	7	70	0	30	50

Sr. No.	Course contents
	Fluid Flow
01.	Introduction to engineering principles of fluid mechanics. Units & conversions. Basics of fluid statics & dynamics.
02.	Definition of fluid, Newtonian & Non-Newtonian fluids, viscosity, density, pressure, surface tension. Hydrostatic equation, manometry, capillarity, buoyancy & pressure measurements. Principle of momentum transfer & balances.
03.	Flow characteristics, laminar & turbulent flows. Significance of Reynolds number. Bernoulli's theorem & its significance Flow through ducts – pipes & open channels, concept of friction factor. Pipe fitting & valves. Flow measurement – orifice meter, venturimeter, rotameter, pilot – tube, notches & weirs, hot wire anemometer. Flow past immersed bodies, packed & fluidized beds.
04.	Turbomachinery – principles of operation & selection of pumps, compressors, blowers, fans, ejectors, etc. for chemical & allied process industries.
05.	Mixing of fluids – types of mixers & blenders for Newtonian & non-Newtonian fluids in single & multiphase systems in chemical & allied process industries.
	Heat Transfer
06.	Mechanism of heat transfer by conduction, convection & radiation. Concept of individual & overall heat transfer coefficient, Significance of Prandtl number.
07.	Applications of the principles of heat transfer to design equipment such as heat exchangers. Condensers, jacketed kettles & coils, boilers. Evaporation. Refrigeration. Drop wise & film wise condensation. Boiling. Unsteady state heat transfer. Heat transfer media.

Reference Books:

1. Chemical Engineering, Volumes 1 &2, Coulson & Richardson, 6th Ed.,1986
2. Transport Phenomena, Bird R.B Stewart & Lightfoot, 2nd Ed., 2005
3. Process Heat Transfer ,D.Q.Kern, 2nd Ed. , 1998.
4. Unit Operations of Chemical Engineering,Warren McCabe, Jubian Smith and Peter Harriot, Mc Graw Hill, 7th Ed., 2004

5. Transport Processes & Unit Operations in Chemical Engineering ,Gean Koplis, Prentice Hall, 2003
6. Coulson and Richardson's Chemical Engineering Volume 1 - Fluid Flow, Heat Transfer and Mass Transfer , Coulson, J.M.; Richardson, J.F.; Backhurst, J.R.; Harker, J.H. Elsevier, 6th Ed., 1999
7. Coulson and Richardson's Chemical Engineering Volume 2 – Particle Technology and Separation Processes,B J Blackhurst & J H Harker, Elsevier, 5th Ed., 2002
8. Coulson and Richardson's Chemical Engineering Volume 3 – Biochemical Reactors & Process Control, B J Blackhurst & J H Harker, Elsevier, 3rd Ed., 1994
9. Coulson and Richardson's Chemical Engineering Volume 4 – Solutions to the Problems in Chemical Engineering from Vol- 1, B J Blackhurst & J H Harker, Elsevier, 2001
10. Coulson and Richardson's Chemical Engineering Volume 5 – Solutions to the Problems in Chemical Engineering from Vol- 2 and Vol-3, B J Blackhurst & J H Harker, Elsevier, 2001
11. Chemical Enginnering Design Volume 6, R K Sinnott, Coulson and Richardson's Chemical Engineering Elseiver, 4th Ed, 2005