Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	**Course Name**	**Course Code**	**Marks:100**
M. Tech. in Thermal Engg.	Convective Heat and Mass Transfer	MET 505	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
I	3	3-0-0	3 Hours

Unit - I

Introduction: Convection; Review of conservation equations; Forced convection in laminar flow; Exact and approximate solutions of boundary layer energy equation for plane isothermal plate in longitudinal flow; Problems. **(06 Hours)**

Unit - II

Forced Convection: Heat transfer in laminar tube flow; Forced convection in turbulent flow; Internal flows; Empirical correlations for internal flow; Liquid-metal heat transfer; Problems. **(08 Hours)**

Unit - III

Free Convective: Approximate analysis of laminar free convective heat transfer on a vertical plate; External flows; Empirical correlations; Free convection from vertical and horizontal cylinders; Problems. **(08 Hours)**

Unit - IV

Boiling and Condensation: Analysis of film condensation on a vertical surface; Film condensation inside the horizontal tubes; Pool boiling; Forced convection boiling inside tubes; Problems. **(08 Hours)**

Unit - V

Mass Transfer: Definitions of concentration and velocities relevant to mass transfer; Fick's law; species conservation equation in different forms; Steady state diffusion in dilute solutions in stationary media; Transient diffusion in dilute solutions in stationary media; One dimensional non dilute diffusion in gases with one component stationary. **(07 Hours)**

Unit - VI

Convective Mass Transfer: Governing equations; Forced diffusion from flat plate; Dimensionless correlations for mass transfer. Simultaneous heat and mass transfer - analogy between heat; mass and momentum transfer. **(08 Hours)**

Recommended Books:

1. Heat and Mass Transfer Transfer; Y. A. Cengel; McGraw-Hill; 3rd Edition; 2007.
2. Fundamentals of Heat and Mass Transfer; Frank P. Incropera et. al.; John Wiley & Sons; New York; 7th Edition; 2011.
3. Heat & Mass Transfer; P K Nag; Tata-McGraw hill; 3rd Edition; 2011.
4. Fundamentals of Engineering Heat and Mass Transfer; R C Sachdev; New Age International (P) Limited; New Delhi; 2nd Revised edition; 2006.
5. Heat transfer; J. P. Holman; Tata-McGraw hill; 9th Edition; 2004.
6. Convective Heat Transfer; A. Bejan; John Wiley & sons; 4th Edition; 2013.