INDUSTRIAL AERODYNAMICS

PROFESSIONAL ELECTIVE - III

VII Semester

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A5AE48	**PCC**	3	0	0	3	30	70	100

COURSE OBJECTIVES:
To familiarize non-aeronautical uses of aerodynamics in road vehicles, buildings and problems of flow induced vibrations.

UNIT-I	ATMOSPHERE

Types of winds, Causes of variation of winds, Atmospheric boundary layer, Effect of terrain on gradient height, Structure of turbulent flows.
Case Study – Measurement of basic wind parameters in open atmospheric condition

UNIT-II	WIND ENERGY COLLECTORS

Horizontal axis and vertical axis machines, Power coefficient, Betz coefficient by momentum theory.

UNIT-III	VEHICLE AERODYNAMICS

Power requirements and drag coefficients of automobiles, Effects of cut back angle, Aerodynamics of trains and Hovercraft.

UNIT-IV	BUILDING AERODYNAMICS

Pressure distribution on low rise buildings, wind forces on buildings. Environmental winds in city blocks, Special problems of tall buildings, Building codes, Building ventilation and architectural aerodynamics.

Case Study – Experimental analysis of high rise buildings

UNIT-V	FLOW INDUCED VIBRATIONS

Effects of Reynolds number on wake formation of bluff shapes, Vortex induced vibrations, Galloping and stall flutter.

Text Books:

1. M.Sovran (Ed), "Aerodynamics and drag mechanisms of bluff bodies and road vehicles", Plenum press, New York, 1978.

2. N.G. Calvent, "Wind Power Principles", Charles Griffin & Co., London, 1979.

Reference Books:

1. P. Sachs, "Winds forces in engineering", Pergamon Press, 1978.

2. R.D. Blevins, "Flow induced vibrations", Van Nostrand, 1990

COURSE OUTCOMES:
1. To familiarize the learner with atmosphere and its effect on the structures.
2. To explore the aerodynamics of different structures
3. To estimate the performance of the vehicle at different speeds
4. To devise methods for constructing various tall structures.
5. To understand the effect of wind on different structures