B. Tech. Civil Engineering/ Elective Subject				
Course code: Course Title	**Course Structure.**			**Pre-Requisite**
CE326: Cyclonic Risk and Management	L	T	P	Nil
	3	0	2	

Course Objective: To impart knowledge of the basics of cyclones, hazard assessment techniques of cyclones, and protection against cyclones.

S. No	Course Outcomes (CO)
CO1	Understand the concept of Cyclones and classification, and its impact
CO2	Understand the wind characteristics and analyse wind effects on structures
CO3	Understand and analyse the quantification of damage and behaviour of structures in past cyclones.
CO4	To analyse and assess the risk using a direct and component-based approach
CO5	Describe the Mitigation measures, planning, and design under cyclonic wind

S. No.	Contents	Contact Hours
1	**Tropical Cyclones:** Introduction, types of high wind, hurricanes, typhoons, cyclones, Concept of Tropical Cyclones, General structure of Cyclones, Quantification of Cyclones, Various scales for measuring wind storms, Climate change and its impact on tropical cyclones, Nature of cyclonic wind, wind storm/cyclone hazard in India, wind speed map of India, Frequency of cyclones in India.	7
2	**Wind Characteristics**: Global atmospheric circulation-pressure gradient force, Coriolis force, frictional force, geostrophic flow, wind profile, effects on structures due to cyclone, Building codes with particular reference to IS875(part-III). Probabilistic description of cyclonic wind speed, Exceedance Probabilities.	8

3	**Quantification of damage**: Classification of Buildings, damaging effects of high wind speeds on housing in the coastal region of India. Classification of damages according to Indian standard procedure (IS 15499:2004), Behavior of structures in past cyclones and wind storms - lessons learnt.	8
4	**Risk Assessment:** Vulnerability and risk assessment in high cyclone-prone areas, Concept of cyclonic micro-zonation, Different techniques used to describe the vulnerability of buildings. Concept of vulnerability of houses to cyclonic wind, fragility curve, damage ratio, Direct and component-based approach, Concept of damage probability matrix.	10
5	**Mitigation measure:** Cyclonic risk mitigation and preparedness. Life–line structures such as cyclone shelters. Retrofitting and strengthening of structures. Rehabilitation. General planning and design considerations under wind storms and cyclones.	7
	Total	40

References:

S. No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Simiu, E.,& Scanlan, R.H.. "Wind effects on structures: An Introduction to Wind Engineering."- John Wiley.	1986
2	Goyal P.K. and Gupta Anil "Disaster Management" AICTE New Delhi	2023
3	IS: 15498: "Guidelines for Improving the Cyclonic Resistance of Low-Rise Houses and other Buildings/Structures"-Bureau of Indian Standards, New Delhi.	2004
4	Bhandari, N.M., Krishna, P. and Krishen, K. "Wind storms, damage and guidelines for mitigative measures." -Department of Civil Engineering, Indian Institute of Technology, Roorkee, p. 11, Document No. IITK-GSDMA-Wind03-V3.0	2011
5	Goyal P.K. "Cyclone Disaster Mitigation and Management in India: An Overview" Chap. 7 , Disaster Risk and Management Under Climate Change, Disaster Resilience and Green Growth, Springer	2024
6	Goyal P.K. and Datta T.K.. Cyclonic Micro-zonation. Natural Hazards, Springer.	2012