B. Tech. Civil Engineering				
Course code: Course Title	**Course Structure**		**Pre-Requisite**	
CE 412: Climate Change and Sustainable Development	**L**	**T**	**P**	Nil
	3	1	0	

Course Objective: To familiarise students with the concept of sustainability in view of climate change

S. No	Course Outcomes (CO)
CO1	Introduction to importance of climate
CO2	Understanding fundamental concepts of climate and its implications to environment
CO3	
CO4	Familiarisation with sustainable development and practices

S. No	Contents	Contact hours
UNIT 1	Climate systems: Overview, climate change and variability and indicators; Earth atmosphere- structure, composition, interactions; biogeochemical cycles; radiative budget; Indian Summer Monsoon- clouds, precipitation, storms; Essential Climate Variables (ECV); National Information System for Climate and Environmental Studies (NICES)	8
UNIT 2	Climate change and modelling: Global warming- Causes, GHGs, RCPs; Policies- IPCC and ither initiatives; climate models- energy balance, radiation, GCM	6
UNIT 3	Climate change impact on Natural resources: Impact assessment on agriculture, and crop systems; drought; impact assessment on biodiversity, forest fires and species migration; carbon sequestration; geomorphological hazards; cryosphere impacts	10
UNIT 4	Sustainable Development and Policies: SDGs and reliance; SDGs with specific targets for Climate action; Target achievements in relation to RCPs; international climate policies- IPCC, Kyoto, UNFCC, Paris agreement	8
UNIT 5	Renewable energy and climate mitigation- solar and wind and hydro energy systems; energy efficiency; green infrastructure; bioenergy and biofuels; carbon capture utilisation and storage (CCUS)	4
UNIT 6	Climate resilient cities and sustainable development- smart cities and low carbon urban development; sustainable transportation; waste management and circular economy; green infrastructure and nature-; urban microclimate studies; based solutions; urban temperature and urban precipitation issues	6
	TOTAL	**42**

REFERENCES		
S. No.	**Name of Books/Authors/Publishers**	**Year of Publication /**

		Reprint
1	Anil Markandya & Kirsten Halsnaes, "Climate Change and Sustainable Development: Prospects for Developing Countries", Earthscan, USA	2013
2	Mishra, R. K., Janaki-Krishna, P. S., & Kumari, L., "Climate Change and Sustainable Development: Global Perspective", Academic Foundation	2017
3	Mitsova, D., & Esnard, A. M., "Geospatial Applications for Climate Adaptation Planning", Routledge, T&F	2019
4	Palme, M., & Salvati, A., "Urban Microclimate Modelling for Comfort and Energy Studies", Springer	2021