SARVAJANIK UNIVERSITY
SarvajanikCollege of Engineering and Technology
Masters of Technology
Environmental Engineering

M.Tech.I Semester I

Subject Name: Climate Change Issues, Challenges and Mitigation **Subject Code:**MTEN14102

Type of course: PE -I

Prerequisite: Basic understanding of the environmental Science, Ecology, Ecosystem, Global Warming, Climate Change, etc.

Rationale: To equip students for understanding of the environmental and climate change dimensions of development trends and interventions.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Basics Of Climate Change Study:** Climate, weather and Climate Change, Overview of Earth's Atmosphere, Layers of Atmosphere, Temperature, Radiation and Variation, Heat- Balance of Earth Atmosphere System, Temporal Variation of Air temperature, Climate modeling	6	15%
2.	**Global Warming:** Greenhouse gases and its sources, Enhanced greenhouse gas effect, Global warming and Greenhouse gases policy issue, Effects and causes of global warming, Sources of aerosols, Direct and indirect effects, Production mechanisms of aerosols, Trends in aerosols, Carbon dioxide & climate change, Methane & climate change, Nitrous oxide & climate change, CFCs & climate change, Role of countries and citizens in containing in global warming, Role of Indian industry in production of CFC products, Role of plants, Innovative approaches	8	20%
3.	**Policies And Legislation:** International and national legislative frameworks- UNFCCC, IPCC and Kyoto protocol: Scientific and implementation bodies of Kyoto, Kyoto mechanisms- CDM, Joint implementation and Emission Trading, Decisions of Conference of Parties (COP) and Meeting of Parties (MOP), Carbon markets- CERs.	6	15%
4.	**Environmental Economics:** Issues include the costs and benefits of alternative environmental	4	10%

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	policies to deal with air pollution, water quality, toxic substances, solid waste, and global warming.		
5.	**Climate Change Impacts And Adaptation:** Concept of climate change impacts and adaptation,Causes and severity of impacts, Vulnerability of various sectors like water resources, agriculture, forest, energy sector, coastal zones, human health, linkages between climate change adaptation and development	**8**	**20%**
6.	**Climate Change Mitigation:** Introduction to Climate Change Mitigation and Low Carbon Development, Strategic Frameworks and Policy Approaches for Mitigation and Low Carbon Development, Sectors with High Mitigation Potential, Mitigation technologies for transport, infrastructure, industry, waste, energy sector, Renewable and alternative energy, Green building, International Initiatives to Support Climate Change Mitigation	**10**	**20%**

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	**30**	**15**	**15**	**10**	**10**

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students andteachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Climate change: Critical Concepts in the environment	Frank Chambers, Michael Ogle	Routledge	31 October 2002	1st
2	Global Warming-A very short introduction	Mark Maslin	Oxford publication	January 15, 2009	2nd
3	Climate Change and Sustainable Development: Prospects for Developing Countries	Anil Markandya	Routledge	1 June 2002	1st
4	Climate Change Policy - Facts, Issues and	Jepma, C.J., and Munasinghe, M.	Cambridge University Press	1998	

	Analysis				
5	IPCC Fourth Assessment Report		Cambridge University Press, Cambridge, UK		
6	Climate change: Causes, Effects and Solutions	John T. Hardy	Willey publication	June 27, 2003	1st
7	Climate Change- A very short introduction	Mark Maslin	Oxford publication	December 1, 2014	3rd

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Understand the basic concept of Climate Change and its science (*R, U - Cognitive level*)	10%
CO-2	Understanding Climate Change in Atmosphere, Soil and Water, its reasons and indicating parameters, gases leading to climate change and methods to mitigate the same. (*R, U, E- Cognitive level*)	20%
CO-3	Understand the laws, policies, and legislation pertaining to climate change, norms regarding air pollutants, study about framework of legislative bodies at national and international level. (*R, U, A- Cognitive level*)	20%
CO-4	Learn about the economics involved in mitigation methodologies, alternate sources of energy, and alternate methods of energy generation to reduce air pollutants. (*U, E, N- Cognitive level*)	30%
CO-5	To know the impacts, adaptation and mitigations for climate change. (*U, E, A- Cognitive level*)	20%

LIST OF PRACTICALS:

Assignment will comprise of Graduate Report, Research paper, Calculation of Carbon Credit, Methods and case study on Climate Change.

List of Open Source/learning website:

- https://www.youtube.com/watch?v=zQi3C_eZkLs
  - Introduction to climate change
- https://www.youtube.com/watch?v=QcBbC1xbn58
  - Climate change and its science
- https://www.youtube.com/watch?v=IpSbQRl99Oo
  - Climate change adaptation
- https://www.youtube.com/watch?v=I90q5WMD_TU
  - Impacts of climate change
- https://www.youtube.com/watch?v=_DtVX1OQPnk
  - Climate change mitigation and way forward