GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma in Architecture

Level: Diploma

Branch: Architecture

Course / Subject Code : DA02063081

Course / Subject Name : Environmental Sustainability

w. e. f. Academic Year:	2025-26
Semester:	Second
Category of the Course:	Building Sciences and Applied Engineering (BS&AE)

Prerequisite:	Basic science, Environmental Science and Earth science
Rationale:	This course is designed to introduce engineering students to the principles and practices of environmental sustainability. It will cover the scientific, technical, and policy aspects of sustainability, with an emphasis on practical applications in engineering.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand the basic principles of environmental sustainability, Eco system and Biodiversity	R & U
02	Develop strategies for waste management and pollution control.	R, U & A
03	Evaluate renewable energy technologies.	R, U & A
04	Analyze the impact of climate change	R, U & A
05	Adopt cleaner technologies in relevant field in compliance with various environmental policies	R, U & A

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+P	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	P	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
2	0	0	2	70	30	20	00	120

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction to Environmental Sustainability, Ecosystem and Biodiversity** 1.1 Definition and scope of sustainability, Structure and function of ecosystems, 1.2 Various natural cycles like carbon, Nitrogen, Sulphur, Phosphorus, 1.3 Importance of biodiversity, Threats to biodiversity and conservation strategies	4	10
2.	**Waste Management and Pollution Control** 2.1 Air pollution, classification and its sources, Air pollution control Equipments, 2.2 Water pollution parameters like BOD,COD, pH, Total suspended solids, Turbidity, Total Solids, 2.3 Waste water treatment like primary, secondary and tertiary, Solid waste generation, sources and characteristics, 2.4 Collection and disposal of Municipal solid waste and Hazardous waste, 2.5 Noise pollution and its effects, Plastic waste and its hazard, E waste and its hazard	7	25
3.	**Renewable Energy Technologies** 3.1 Importance of renewable energy in reducing carbon footprint and combating climate change, 3.2 Comparison of renewable energy with non-renewable energy sources, 3.3 Photovoltaic (PV) solar cells: Principles of PV technology and types of solar cells, 3.4 Wind Energy Technologies: Horizontal-axis wind turbines (HAWT) vs. vertical-axis wind turbines (VAWT), Components and operation of wind turbines, Bladeless wind turbines, 3.5 Bioenergy: Biofuels (ethanol, biodiesel, biogas), Biomass (solid, liquid, gaseous forms), Algae biofuels, Biomass gasification, 3.6 New energy sources: Geothermal energy, Ocean energy sources, Tidal energy conversion, Hydrogen energy	7	25
4.	**Climate Change: Science and Solutions** 4.1 Earth's climate system and the greenhouse effect, Greenhouse gases (GHGs) and their sources, 4.2 Evidence of climate change like Temperature records, Melting ice	6	20

	caps and glaciers, Rising sea levels, Changes in precipitation patterns, Increased frequency and intensity of extreme weather events 4.3 Impacts of Climate Change: Biodiversity loss, Ocean acidification, Desertification, Social and economic impacts 4.4 Climate Change Mitigation: Strategies to reduce greenhouse gas emissions like Energy efficiency and conservation, Transition to renewable energy sources, Carbon capture and storage (CCS), Sustainable land use and forestry		
5.	**Environmental Policy and Governance** 5.1 Environmental policies in India like Air act, water act, Environment protection act, wild life protection act, Forest conservation act, Biodiversity act 5.2 Sustainable practices like Environmental management system: ISO 14000, definition and benefits 5.3 Rain water harvesting, Green building and rating system in India, Cradle to cradle concept and Life cycle analysis, Green label, Carbon credit system its advantages and disadvantages, 5.4 Concept of 5R(Refuse, Reduce, Reuse, Repurpose, Recycle), 5.5 Eco tourism: advantages and disadvantages	6	20
	Total	**30**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
30	**50**	**20**	**-**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:
(a) Books:

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Renewable Energy Technologies: A Practical Guide for Beginners	Solanki, Chetan Singh	PHI Learning, New Delhi, 2010 Print Book ISBN: 9788120334342 eBook ISBN: 9789354437151

2	Ecology and Control of the Natural Environment	Izrael,Y.A.	Kluwer Academic Publisher eBook ISBN: 978-94-011-3390-6 Softcover ISBN: 978-94-010-5499-7
3	Green Technologies and Environmental Sustainability	Singh, Ritu, Kumar, Sanjeev	Springer International Publishing, 2017 eBook ISBN 978-3-319-50654-8
4	Environmental Noise Pollution and Its Control	G.R. Chhatwal, M.Satake, M.C. Mehra, MohanKatyal, T. Katyal, T. Nagahiro	Anmol Publications, New Delhi ISBN: 8170411378 ISBN: 8170411378
5	Wind Power Plants and Project Development	Earnest, Joshua & Wizelius, Tore	PHI Learning, New Delhi, 2011 ISBN-10: 8120351274 ISBN-13: 978-8120351271
6	Renewable Energy Sources and Emerging Technologies	Kothari, D.P. Singal, K.C., Ranjan, Rakesh	PHI Learning, New Delhi, 2009 ISBN-13 - 978-8120344709
7	Environmental Studies	Anandita Basak	Pearson Publications ISBN 8131785688, 9788131785683 ISBN: 9788131721186, 8131721183
8	Environmental Science and Engineering	Aloka Debi	University Press ISBN: 9788173718113 ISBN-10: 8173716080 ISBN-13: 978-8173716089
9	Coping With Natural Hazards: Indian Context	K. S. Valadia	Orient Longman ISBN-10: 8125027351 ISBN-13: 978-8125027355
10	Introduction to Engineering and Environment	Edward S. Rubin	Mc Graw Hill Publications ISBN-10 : 0071181857 ISBN-13 : 978-0071181853
11	Carbon Capture and Sequestration Integrating Technology, Monitoring, Regulation.	Elizabeth Wilson and David Gerard	Wiley–Blackwell (15 March 2007); CBS Publishers & Distributors Pvt. Ltd. -PH: 011-49344934, ISBN-13 : -978 0813802077

(b) Open source software and website:

a) www.nptel.iitm.ac.in

b) www.khanacademy
c) https://gpcb.gujarat.gov.in
d) https://cpcb.nic.in
e) http://www1.eere.energy.gov/wind/wind_animation.html
f) http://www.nrel.gov/learning/re_solar.html
g) http://www.nrel.gov/learning/re_biomass.html
h) http://www.mnre.gov.in/schemes/grid-connected/biomass-powercogen/
i) http://www.epa.gov/climatestudents/
j) http://www.climatecentral.org
k) http://www.envis.nic.in/

Suggested Course Practical List: NIL

List of Laboratory/Learning Resources Required: NIL

Suggested Project List: Undertake micro-projects in teams based on Wind energy, Solar Energy, Natural cycles, Best out of waste and field visits

Suggested Activities for Students:

a) Prepare specification of some renewable sources of energy.
b) Undertake micro-projects in teams
c) Give seminar on any relevant topic.
d) Undertake a market survey of different green materials.
e) Prepare report on various issues related to environment, climate change and sustainable development
f) Compare the pollution (water, air and noise) data of various cities with standard values laid by pollution control board.
g) Undertake some small mini projects on various issues related to environment and sustainable development.
h) Submit a report on visit to an energy park
i) Prepare power point on clean and green technologies
j) Submit a report on visit to garbage disposal system in your city/town.
k) Submit a report on Carbon capture and storage
l) Submit a report on analysis of the life cycle of any one or two eco-friendly product/s.

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