GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications

Level: UG

Course / Subject Code: BC04001071

Course / Subject Name: Environmental Science and Sustainability

w. e. f. Academic Year:	2025-26
Semester:	4
Category of the Course:	Value added Courses (VAC)

Prerequisite:	Basic understanding of computer systems, software development, and IT infrastructure; no prior knowledge of environmental science is required.
Rationale:	• To sensitize MCA students to environmental challenges and sustainability principles. • To connect environmental science concepts with computing technologies and industry practices. • To analyse sustainability issues using real-world computing-related case studies. • To encourage self-learning and reflection on sustainable use of computing resources.

Course Outcome:

After Completion of the Course, the Student will be able to:

No	Course Outcomes	RBT Level
01	Discuss the basic principles of environmental science and sustainability.	UN
02	Analyze the environmental impacts of computing technologies.	AN
03	Evaluate sustainability initiatives in IT and software industries.	UN
04	Demonstrate awareness of green computing practices through self-study and case analysis.	UN

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA(I)	ESE (V)	
1	0	0	1	70	30	0	0	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage	Teaching Methodology
1.	Introduction to Environmental Science: Environment, ecosystems, sustainability concepts	1	8	Interactive lecture
2.	Global Environmental Challenges: Climate change, pollution, energy demand	1	8	Discussion with examples
3.	Sustainability and SDGs: UN Sustainable Development Goals relevant to IT	1	8	Lecture + group activity
4.	Computing & Environment: Environmental footprint of computing	1	8	Case example: Data centers
5.	Energy Consumption in IT: E-waste, power use of cloud and servers	1	8	Case study: Google/Meta data centers
6.	Green Computing: Principles of energy-efficient computing	1	8	Discussion + self-reflection
7.	Software's Role in Sustainability: Algorithms, optimization, energy-aware coding	1	8	Case study: Software efficiency
8.	Cloud & Edge Computing Sustainability: Pros & cons, carbon-aware cloud scheduling	1	8	Case analysis
9.	Blockchain & AI: Environmental costs of blockchain mining, AI training	1	8	Debate-style discussion
10.	Digital Divide & Sustainability: ICT for development, social sustainability	1	8	Case study: Rural India ICT projects
11.	Policy & Governance: E-waste regulation, IT industry green policies	2	10	Lecture
12.	Industry Practices: Sustainability reporting in IT firms, case studies, sustainable IT innovations (IoT, smart grids, green AI)	3	12	Case study: Microsoft, Infosys, etc., group discussion
	Total	**15**	**100**	

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20%	50%	0%	30%	0%	0%

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:

1. Erach Bharucha – Textbook of Environmental Studies for Undergraduate Courses (UGC model curriculum).
2. Harvey, Brian W. – Introduction to Environmental Science and Technology.
3. Murugesan, San – Harnessing Green IT: Principles and Practices.
4. Richard T. Watson – Energy Informatics: Sustainable Energy Use.

(b) Articles/Reports

- UN Sustainable Development Goals (SDGs) official documents.
- IEEE & ACM papers on green computing and sustainability.
- Corporate sustainability reports (Google, Infosys, Microsoft, TCS).
- Lecture notes on "Environmental Science and Sustainability" by Chetan B. Bhatt

(c) Online Resources

- **MOOCs**: NPTEL – *Environmental Studies*; Coursera – *Sustainability and Green IT*.
- **Websites**: UN SDGs portal, Greenpeace ICT sustainability reports.
- **TED Talks**: "How Green is Your Internet?"

CO- PO Mapping:

Semester 4	Course Name: Environmental Science and Sustainability										
	POs										
Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	2	1	1	-	1	2	-	2	3	1
CO2	2	3	2	2	2	1	2	1	2	3	2
CO3	2	2	3	2	3	2	2	2	3	3	2
CO4	1	2	2	3	3	3	3	1	3	3	3

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

Note: The CO-PO mapping is indicative; the institute/faculty member can change as required.

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