KRISHNA UNIVERSITY
COLLEGE OF ARTS & SCIENCE
DEPARTMENT OF BIOSCIENCES AND BIOTECHNOLOGY
RUDRAVARAM, MACHILIPATNAM – 521004,A.P

DIPLOMA IN GREEN TECHNOLOGIES (6 Months Evening Programme)

- **PROGRAMME OBJECTIVES:**

1. Provide foundational understanding of sustainability and green technologies.

2. Equip students with knowledge on renewable energy, green hydrogen, waste management, water conservation.

3. Develop practical skills in low-cost green solutions.

4. Create awareness about environmental challenges and responsible resource use.

5. Encourage eco-friendly lifestyle practices.

- **PROGRAMME OUTCOMES (POs):**

PO1: Understand sustainability and environmental challenges.

PO2: Explain renewable energy and green hydrogen systems.

PO3: Apply circular economy and waste minimisation principles.

PO4: Adopt eco-friendly lifestyle practices.

PO5: Propose practical green solutions for local needs.

PO6: Participate in community green initiatives.

PO7: Communicate sustainability concepts effectively.

- **PROGRAMME LEARNING OUTCOMES (PLOs):**

PLO1: Demonstrate foundational knowledge of sustainability, SDGs, and environmental laws.

PLO2: Evaluate renewable energy and green hydrogen technologies.

PLO3: Implement basic green practices (composting, waste segregation, RWH).

PLO4: Assess environmental problems and propose solutions.

PLO5: Present findings through reports and presentations.

PLO6: Display responsible sustainable behavior.

COURSE DESCRIPTION:

A 6-month diploma covering sustainability, clean energy, circular economy, pollution control, water conservation, and green hydrogen. Includes demonstrations and community projects. Suitable for Intermediate/Degree students.

- **COURSE STRUCTURE:**

Subject Code	Title of the Paper	Category	Max. Marks	External	Internal	Credits
DGT 101	Foundations of Sustainability & Green Technologies	Theory	100	70	30	4
DGT 102	Renewable Energy, Green Hydrogen, Waste & Water Management	Theory	100	70	30	4
DGT 103	Practical / Demonstration /Case study/ Community Project	Practical / Field Work	200	100	100	12

Total: 14 credits over 6 months, with approximately, 8 hours/week theory, 12 hours/week supervised practical/field work Overall diploma total: 400 marks for 3 papers. Passing and classification can mirror existing university rules (e.g., minimum 40% in each head and 50% aggregate, as applicable)

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PAPER 1 – DGT 101: Foundations of Sustainability & Green Technologies

UNIT I – Introduction to Sustainability

Meaning, definition and scope of sustainability; UN Sustainable Development Goals (SDGs); global environmental challenges – climate change, Ozone layer depletion biodiversity loss and acid rains; causes, effects and control measures; role of society, government and individuals in promoting sustainability.

UNIT II – Basics of Green Technologies

Concept and principles of green technologies; eco-friendly materials and biodegradable alternatives; energy-efficient devices and appliances; pollution prevention, cleaner production technologies and low-impact design approaches.

UNIT III – Climate Change Fundamentals

Greenhouse gases and global warming; carbon footprint and major emission sources; climate vulnerability and adaptation measures; mitigation strategies, global climate agreements and international conventions.

UNIT IV – Green Lifestyle Practices

Waste reduction and reuse; water conservation and greywater reuse; energy-saving practices for home, campus and community; eco-friendly lifestyle principles and sustainable behavioral choices.

UNIT V – Policy, Governance & Community Action

Indian Laws: Environment Protection Act (1986); Air (Prevention and Control of Pollution) Act (1981); Water (Prevention and Control of Pollution) Act (1974); Forest Conservation Act (1980); Swachh Bharat Mission (2014); Green Labelling policies in India – Ecomark scheme, BIS standards, promoting responsible consumer choices. Community-based environmental actions and citizen participation.

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PAPER 2: DGT 102 – Renewable Energy, Green Hydrogen, Waste & Water Management

UNIT I – Renewable Energy Technologies

Renewable resources: uses, limitations, and status in India; Solar energy – photovoltaic systems, solar thermal systems, and applications; Wind energy – principles, systems, and applications; Hydropower – types and applications; Geothermal energy – resources and applications; Bioenergy – biomass, biogas, biofuels, and waste-to-energy systems; National and state renewable energy missions and policies.

UNIT II – Green Hydrogen

Definition, importance and future potential, Production methods: electrolysis and methane reforming. Applications in transport, industry and power. National Green Hydrogen Mission.

UNIT III – Circular Economy & Waste Management

Circular Economy – principles and basic concepts; resource efficiency and closed-loop systems; 3Rs: Reduce, Reuse, Recycle; source segregation and zero-waste approaches; e-waste management; home composting and community composting practices.

UNIT IV – Water Conservation

Water conservation techniques; rainwater harvesting; groundwater recharge methods; greywater reuse and wastewater management; protection and restoration of water bodies. Blue Economy – concept and scope; sustainable use of ocean and coastal resources;

UNIT V – Pollution Control

Air pollution: sources, effects, and control measures; water pollution: types, impacts, and treatment methods; soil pollution: causes, effects, and remediation techniques; integrated pollution control approaches; case studies on air, water, and soil pollution management from India.

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PAPER 3: DGT 103 – Practical / Demonstration & Community Project

UNIT I – Practical Demonstrations

- Simple composting using kitchen waste (small container model)
- Demonstration of rainwater harvesting using a miniature model
- Basic solar energy demonstration (solar light/charger)
- Waste segregation practice using 2–3 bin system
- Any other similar hands-on demonstration related to sustainable practices

UNIT II – Eco-friendly Product Making

- Seed ball preparation (clay/Flour + seeds)
- Preparation of simple natural cleaners (lemon peel enzyme / soapnut water)
- Low-cost sustainable household solutions (cloth bags, paper bags, repurposed bottles)
- Any other similar eco-friendly product preparation activity

UNIT III – Energy & Water Audit

- Quick home/hostel energy audit (using a simple checklist: fans, lights, appliances)
- Simple water usage assessment (bucket/flow method)
- Preparation of a short audit report (1–2 pages only)
- Any other related energy or water assessment activity relevant to sustainability

UNIT IV – Field Visits / Demonstrations

Visit to renewable energy site or water-treatment unit and Visit to compost unit / zero-waste facility

Option A (Preferred): On-campus demonstration of composting unit / solar setup **or**
Option B (If possible): One-time Saturday visit to a renewable energy or water-treatment facility or zero waste facility

UNIT V – Community Project

Planning and designing an eco-project; documentation and record preparation; presentation and community impact assessment. [Model: Small group project with 2–3 students; examples include waste-segregation awareness, seed-ball preparation and distribution, home composting demonstration, or water-saving awareness]. Documentation: 2–3 pages with objectives, activities, geo-tagged photos, recorded videos (if possible), and outcomes followed by a short presentation in class.

OR

Field visit case study (A case study based on the field visit**):** Students shall visit a renewable energy unit, composting/zero-waste facility, water-treatment plant, or any sustainability-related site identified by the department. Each student (or group of 2–3 students) must prepare a brief case study based on the visit, highlighting observations, key technologies demonstrated, and relevance to green practices. The report should be 2–3 pages, covering the purpose of the visit, technologies/processes observed, photographs (geo-tagged if possible), discussions with field experts, and major learnings. A short presentation of the case study will be made in class.

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MODEL QUESTION PAPER – DGT 101

Foundations of Sustainability & Green Technologies

SECTION–A (Short Answers) – 5×4=20

1. Define sustainability

2. What are SDGs?

3. Define carbon footprint.

4. Define Ecomark scheme

5. Name two Greenhouse gases

SECTION–B (Essay Questions) – **Answer any FIVE questions** 5×10=50

1. Explain sustainability and role of green technologies.

2. Discuss Global warming.

3. Describe Green lifestyle practices

4. Make a note on energy-efficient devices and appliances

5.Write an essay on Water conservation techniques

6. Discuss about Environmental protection act (1986)

7. Role of Ecofriendly technologies in sustainability

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MODEL QUESTION PAPER – DGT 102
Renewable Energy, Green Hydrogen, Waste & Water Management

SECTION–A – 5×4=20

1. Define renewable energy.

2. Draw a wind mill?

3. Mention limitations of Wind energy.

4. What is grey water?

5. Define Blue Economy.

SECTION–B – Answer any FIVE questions 5×10=50

1. Explain sustainability and role of green technologies.

2. Discuss Air pollution in India.

3. Describe E-waste management

4. Make a note on National green hydrogen mission in India.

5.Write an essay on Water conservation techniques.

6. Discuss about Environmental protection act(1986).

7. Role of circular economy in sustainability.

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Scheme of evaluation – DGT 103

Practical / Demonstration & Community Project

Section A: Record + Viva -Voce– 70 +30 marks (external)

Section B: Community Project/Field visit case study – 100 marks (internal)