KU4VACPHY102 : Green Energy for Sustainability

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
IV	VAC	100	KU4VACPHY102	3	45

Learning Approach (Hours/ Week)		Marks Distribution			Duration of ESE (Hours)
Lecture+ Tutorial	Practical	CE	ESE	Total	
3	0	25	50	75	1.5

Course description:

This course is great for beginners who want to learn about clean energy and help the planet.

Course Prerequisite: NIL

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Gain a comprehensive understanding of energy scarcity causes, explore energy source classifications, examine solutions to energy crises, focus on global and Indian perspectives on renewable energy, and study solar energy, including challenges, applications, and solar cell systems.	*R, U*
2	Acquire foundational knowledge of hydrogen energy, including its benefits, storage methods, and applications, while critically evaluating both	*U, An*

	advantages and disadvantages along with associated problems.	
3	Comprehend principles of wind energy, assess its status in India, explore geothermal energy classifications and utilisation, and analyse tidal energy resources, availability, power generation, and associated advantages and disadvantages.	*U*
4	Understand the impact of solid waste and agricultural refuse on health, explore biomass energy, study biomass production, energy plantations, and biogas energy, including composition, production, construction, working, and the benefits of biogas plants.	*U*

Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)

Mapping of Course Outcomes to PSOs

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	3	3	2	3	2	2
CO 2	3	3	2	3	2	3	3
CO 3	3	3	3	3	2	3	2
CO 4	3	3	3	3	3	2	2

Correlation level 0-None, 1-Slight, 2-Medium, 3-High

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION	HOURS
1	**Solar Energy**		**9**
	1	Causes of Energy Scarcity - Energy sources and classification - Solution to energy crisis or scarcity- Renewable energy	2
	2	Worldwide Renewable Energy Availability - Renewable Energy in India- Energy from the Sun - Sun Earth geometric relationship	2
	3	Solar energy reaching the Earth's surface - Problems Associated with Harnessing Full Solar Energy	2
	4	Solar thermal energy applications- Solar thermal energy storage - Solar cells - Need for solar cells - Components of a Solar Cell System - Solar cell materials -Applications of solar cell systems	3
		Sections: 1.5,1.6, 1.9, 1.12, 1.12.1, 1.12.2, 2.1, 2.4, 2.4.1, 2.5, 2.6, 4.1, 4.1.1, 4.2, 4.2.1, 4.2.2, 4.8	
2	**Hydrogen Energy**		**9**
	1	Hydrogen Energy - Introduction- Benefits of hydrogen energy	2
	2	Hydrogen energy storage - Use of hydrogen energy	2
	3	Applications of hydrogen energy- Advantages of hydrogen energy- Disadvantages of hydrogen energy	3
	4	Problems associated with hydrogen energy	2
		Sections: 5.1, 5.3 to 5.8	
3	**Wind and Tidal Energy**		**9**
	1	Wind Energy - Windmills - Wind Turbines - Wind energy in India	2
	2	Geothermal energy- Geothermal systems- Classifications - Geothermal resource utilisation	3
	3	Prospects of Geothermal Fields in India - Associated problems- Environmental effects	2

	4	Tidal energy - General - Tidal energy resources - Tidal energy availability - Tidal power generation in India - Advantages and disadvantage of tidal power	2
		Sections: 6.1, 6.2, 6.4.2, 7.1, 7.2,7.3, 7.4.1, 7.6, 7.7, 11.1 -11.4, 11.9	
4	**Biomass energy**		**9**
	1	Solid waste and agricultural refuse - Waste is health - Biomass energy	3
	2	Biomass production- Energy plantation - Biogas energy	2
	3	Introduction - Biogas and its composition - Biogas production	2
	4	Construction parts of Biogas plants - Working of Biogas plant - Benefits of Biogas	2
		Sections: 8.1, 9.1, 9.2, 10.1, 10.2, 10.4, 10.4.1, 10.4.2, 10.5	
5	**Teacher Specific Module**		**9**
	Directions: Can be designed by the course faculty		

Essential Readings:

1. Non-Conventional Energy Resources, Shobh Nath Singh, Published by Pearson India Education Services Pvt. Ltd, 2015.

Suggested Readings:

1. Non-conventional energy sources-G. D. Rai, Khanna Publishers

Assessment Rubrics:

Evaluation Type		**Marks**
ESE		**50**
CCA		**25**
a)	*Test Paper	10
c)	**Assignment/ Book-Article Review	5
d)	Seminar/ Viva -Voce	10
Total		**75**

*Best out of two test papers

** or any other activities like quiz, open book exam, group activity.