Semester Plan

Name of the college: Government College of Arts, Science and commerce, Sanquelim- Goa.

Name of Faculty: Mr. Gandesh Gaonkar	**Subject: Green Energy System**
Paper code: VAC-112	**Program: F.Y.B. Sc** / **Division: B**
Academic year: 2025 - 2026	**Semester: II** / **Total Lectures: 30**

Course Objectives: To demonstrate the importance of solar energy collection and storage.

To understand the principles of wind energy and biomass energy.

To gain knowledge on geothermal and ocean energy.

To gain knowledge on geothermal and ocean energy.

To understand the concepts of green manufacturing systems

Expected Course Outcome: At the end of the successful completion of this course, students will be able to:

1. Explain the importance of solar energy collection and storage
2. Apply the principles of wind energy and biomass energy.
3. Analyze knowledge on geothermal and ocean energy.
4. Learn about energy efficient systems.
5. Discuss the concepts of green manufacturing systems

	Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books	
	December	09-12-2025	11-12-2025	02	SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships,	Students are required to list at least five Solar-Related Elements from each of the three groups—(A) Sun–Earth Relationship Concepts, (B) Types of Solar Radiation, and (C) Solar Energy Technologies	Smart Board - Power Point Presentation	Sukhatme S.P. and Nayak J.K. Solar Energy – Principles of Thermal Collection and Storage, Tata McGraw Hill,1984.	
	December	16-12-2025	18-12-2025	02	Coordinate systems and coordinates of the sun, extra-terrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar		Smart Board - Power Point Presentation	Sukhatme S.P. and Nayak J.K. Solar Energy – Principles of Thermal Collection and Storage, Tata McGraw Hill,1984.	

					radiation data, numerical problems. Photo voltaic energy conversion – types of PV cells.				
	December	19-12-2025	23-12-2025	02	SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation.		Smart Board - Power Point Presentation	Sukhatme S.P. and Nayak J.K. Solar Energy – Principles of Thermal Collection and Storage, Tata McGraw Hill,1984.	
	January	06-01-2026	13-01-2026	03	SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.	Students will be given a blank world map on which they need to highlight the major global regions that have high potential for Solar Energy, Wind Energy, and Biomass Energy. Each student must	Smart Board - Power Point Presentation, Discussion	D.Yogi Goswami, Frank Krieth & John F Kreider Principles of Solar Engineering,4th edition,Taylor & Francis, 2022.	

						colour or mark these zones using different colours and label at least two examples from each energy type.			
	January	15-01-2026	20-01-2026	02	WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.		Smart Board - Power Point Presentation, Discussion	Khan B.H ,Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006.	
	January	22-01-2026	27-01-2026	02	BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, utilization for cooking, bio fuels, I.C. engine		Smart Board - Power Point Presentation,	Khan B.H, Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006.	

					operation and economic aspects.				
	January-February	29-01-2026	03-02-2026	02	GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy		Smart Board - Power Point Presentation	Khan B.H, Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006.	
	February	05-02-2026	10-02-2026	02	OCEAN ENERGY: OTEC, Principles of utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques.		Smart Board - Power Point Presentation	K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Rao Alternative Building Materials and Technologies 2 nd edition,New Age International,2017.	
	February	12-02-2026	17-02-2026	02	ELECTRICAL SYSTEMS: Energy efficient motors, energy efficient lighting and control, selection of luminaire, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation, and air	Discuss in groups how energy-efficient motors, lighting, HVAC, and demand-side management save energy and reduce costs, then write a short note with at		K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Rao Alternative Building Materials and Technologies 2 nd edition,New Age International,2017.	

					conditioning), demand site management.	least one reference.			
	February	19-02-2026	26-02-2026	03	MECHANICAL SYSTEMS: Fuel cells- principle, thermodynamic 15 Hours aspects, selection of fuels & working of various types of fuel cells, environmentally friendly and Energy efficient compressors and pumps.		Smart Board - Power Point Presentation	Khan B.H ,Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006.	
	March	03-03-2026	05-03-2026	02	Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing Environmental impact of the current manufacturing practices and systems, benefits of		Smart Board - Power Point Presentation	Khan B.H, Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006.	

					green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing,				
	March	10-03-2026	12-03-2026	02	Design and implementation of efficient and sustainable green production systems with examples like environmentally friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.	Observe current sustainable green production practices and prepare a chart or diagram showing their adoption in industries or regions.	Smart Board - Power Point Presentation	Khan B.H, Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006.	
	March	17-03-2026	30-03-2026	04	Revision				

	*** Assessment Rubrics**								
		Component	**Max Marks**						
		ISA 1	05						
		ISA 2	05						
		Semester End Exam	40						
		Total	**50**						