



## **C.U.SHAH UNIVERSITY – WADHWAN CITY**

**FACULTY OF:** -Technology and Engineering (Diploma Engineering)

**DEPARTMENT OF:** -Electrical Engineering

**SEMESTER:** V      **CODE:** - 2TE05WSS1

**NAME –** Wind and Solar System (WSS)

### **Teaching & Evaluation Scheme:-**

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evaluation Scheme								
		Th	Tu	Pr	Total		Theory				Practical (Marks)				Total Marks
							Sessional Exam		University Exam		Internal		University		
							Marks	Hours	Marks	Hours	Pr	TW	Pr	TW	
2TE05WSS1	Wind And Solar System (WSS)	04	00	02	06	05	30	1.5	70	03	---	20	30	---	150

### **Objectives:-**

- Gujarat is One of the Several States in India Where Large Number of Wind and Solar Grid Connected Electric Power Installations.
- Competent Technicians to maintain these Vital Renewable Energy Power Plants is a Dire Need of The Industry.
- Diploma Engineer Would is able to maintain the Renewable Installations.

**Prerequisites:** - Basic Knowledge of Wind and Solar Energy

### **Course Outlines:-**

Sr. No.	Course Contents	No Of Hours
1	<b>Constant Speed Wind Power Plants</b> Explain the Working Principle of Type-A WPP, Describe the Starting Methods of Stall and Pitch Controlled Type-A WPPs, Working Principle, Different Topologies, Starting Methods, Maintenance Procedure. The Working Principle of Type-B WPP, Working Principle, Different Types Maintenance Procedure, Compare the Major Differences in the Maintenance of Type-A and Type-B WPPs.	14
2	<b>Variable Speed Wind Power Plants</b> The Working Principle of Type-C WPP, Working Principle, Working Principle Back- To-Back Control, Maintenance Procedure of Type-C WPPs, Describe the Working Principle of a Back-To-Back Power Electronic Controller Used in Type-C WPPs, The Working Principle of Type-D Geared WPP, Type-D Geared WPP, Working Principle, Maintenance Procedure of Type-D Geared WPPs, The Need for Direct Drive WPPs, The Working Principle of a Type-D Direct-Drive WPP, Type-D Direct-Drive WPP, Working Principle, Maintenance Procedure of Type-D Geared WPPs.	13
3	<b>Solar Power Plant Performance</b> The Concept and Construction of Solar Thermal Power Plants, Describe the Performance of a Typical CSP Plant, Solar Thermal Power Plants, Working of a Typical Concentrated Solar Power (CSP) Plant, The Maintenance Procedure of a Typical CSP Plant	10
4	<b>Wind and Solar Power Quality</b> The Phenomenon of Local Impact of Wind Power on the Grid , Suggest Ways to	08

	Handle These Local Impacts Safely, The Phenomenon of System Wide Impact of Wind Power, Suggest Ways to Handle These System Wide Impacts Safely, Power Quality of Solar PV Systems, Differentiate the Features of Power Obtained from the Solar PV and CSP Power Plant, Power Quality of CSP Solar Plant, Power Quality of Solar PV Power Plant	
5	<b>Grid Connection of Wind and Solar Power Plants</b> State the Grid Interface Issues of Wind Power and Methods to Resolve Them, State the Grid Operational Issues of Wind Power and Methods to Resolve Them, State the Methods of Integrating into the Grid, The Power Obtained from a CSP Plants with Sketches, The Power Obtained from Solar PV Power Plants with Sketches, Describe with Sketches and Labels the Concept of a Grid Connected Wind Solar Hybrid System, The Maintenance Procedure of a Typical Grid Connected Wind-Solar PV Hybrid System.	07

#### List of Experiments:-

- Assemble and Dismantle a Small Planetary Gearbox Used in Type-A WPPs.
- Identify the Various Parts of a Squirrel Cage Induction Generator (SCIG) Commonly Used in Type-A WPPs.
- Identify the Various Parts of a Type-B WPP.
- Identify the Various Parts of a Type-C WPP.
- Identify the Various Parts of a Type-D Geared WPPs.
- Assemble and Dismantle a CSP System.
- Assemble and Dismantle a Solar PV Cell, Module, Array System with and without Battery Connection.
- Install and Test the Performance of a Solar PV Cell, Module, Array System with and without Battery Connection.
- Connect the Solar PV Modules in Series and Parallel.
- Test the Solar PV Tracking System.
- Test the Effect of Light and Temperature Intensity on the Solar PV System.
- Dismantle a Wind-Solar PV Hybrid System.
- Test the Performance of a Wind-Solar PV Hybrid System.

#### Learning Outcomes:-

- Maintain Constant Speed Wind Power Plants.
- Maintain Variable Speed Wind Power Plants.
- Maintain Concentrated Solar Power (CSP) and Solar Photovoltaic (PV) Wind Power Plants.
- Check the Grid Compatibility of the Power from Wind and Solar Power Plants.
- Resolve the Grid Integration Issues of Wind and Solar Power Plants.

#### Reference Books:-

- Wind Power Technology by **Earnest , Joshua** - Phi Learning, New Delhi, 2014
- Solar Photovoltaic: A Lab Training Module by **Solanki, Chetan Singh, Arora, Brij M., Vasi Juzer, Patil, Mahesh B.** - Cambridge University Press, New Delhi, 2009
- Solar Photovoltaic: Fundamentals, Technologies and Application by **Solanki, Chetan Singh** - Phi Learning, New Delhi, 2009
- Wind Power Plants and Project Development by **Earnest , Joshua And Wizelius, Tore** - Phi Learning, New Delhi, 2011