



**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**Syllabus for Bachelor of Vocation (B.Voc.), 3<sup>rd</sup> Semester**  
**Branch: Solar & Renewable Energy**  
**Subject Name: Solar PV Installer-Electrical**  
**OJT Elective Subject**  
**Subject Code: 1130707**

**Type of course:** Elective

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical		
			ESE (E)	PA(M)	ESE (V)	PA (I)		
0	0	30	15	0	0	100	100	200

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment

**Content:**

Sr. No.	Module	Total Hrs.	Module % Weightage
1.	<p><b>Module 1: Introduction to Solar PV Installer Course</b>  <b>Mapped to: SGJ/N0101</b>  <b>Theory – Key Learning Outcomes:</b>            Explain the role of Solar PV Installer and emerging jobs &amp; entrepreneurial opportunities.            Illustrate the advantages of doing this course.            Explain the importance of basic skills for communication; along with how to work effectively with others while respecting gender and disability concerns.</p> <p><b>Practical – Key Learning Outcomes:</b>            Demonstrate general discipline during the training program.            Demonstrate how to interpret signs, notices, and/or cautions at the project site.</p>	12	8
2.	<p><b>Module 2: Basics of Solar Energy and Electrical Concepts</b>  <b>Mapped to: SGJ/N0101</b>  <b>Theory – Key Learning Outcomes:</b>            Explain Ohm’s Law.            Explain the basics of solar energy/electricity and electrical concepts.            Explain the relevance of Diffused Normal Irradiance (DNI) and Global Horizontal Irradiance (GHI) along with differences in Irradiance &amp; Irradiation.</p> <p><b>Practical – Key Learning Outcomes:</b>            Demonstrate how the movement of the sun affects the performance of the solar power plant.            Perform simple calculations to illustrate the fundamental concepts of power and energy.</p>	24	10



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3.	<p><b>Module 3: Basics of Solar Photovoltaic system and its Components</b>  <b>Mapped to: SGJ/N0102</b>  <b>Theory – Key Learning Outcomes:</b>          Explain various terminologies used in the solar industry.          Identify the different components of a Solar PV system and explain its basic operation.          Explain the working of different types of Solar PV systems.          Discuss the latest and innovative technologies used in system configurations like ‘Plug &amp; Play’ or ‘Behind the Meter’ energy systems.</p> <p><b>Practical – Key Learning Outcomes:</b>          Describe the different types, sizes, and specifications of modules, inverters, charge controllers, cables, conduits, junction boxes, solar batteries, and allied accessories.          Explain about the manufacturing data specification sheets of different types of solar PV components.          Demonstrate how to acquire know-how of different types, sizes, and specifications of foundations/footings.          Demonstrate to select the right footing/foundation as per site location including suitability of roof condition or suitability of soil.</p>	30	15
4.	<p><b>Module 4: Site Survey for Installation of Solar PV System and assess the customer’s Solar PV Requirement</b>  <b>Mapped to: SGJ/N0101</b>  <b>Theory – Key Learning Outcomes:</b>          Describe how to observe Sun path diagram and explain the importance of shading analysis.          Explain the importance of assessing various site conditions for safe installation of solar PV system.          Identify and list the load to be connected to the Solar PV system.          Describe load profile.</p> <p><b>Practical – Key Learning Outcomes:</b>          Demonstrate how to observe Sun path diagram and perform shading analysis.          Demonstrate how to assess the site conditions for safe installation of Solar PV system.          Demonstrate how to assess the load to be connected to the Solar PV system and how to prepare the load profile.</p>	15	8
5.	<p><b>Module 5: Interpretation of Drawings, Material Handling and storage of components on-site</b>  <b>Mapped to: SGJ/N0102</b></p>	24	12



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	<p><b>Theory – Key Learning Outcomes:</b>          Explain the importance of reading and rightly interpreting Single Line Diagram (SLD), Layout Diagrams, Civil/Mechanical and Electrical Drawings.          Describe the DO's and Don'ts of material handling.          Explain how to read and interpret the Bill of Material to verify with the delivery of components on-site.</p> <p><b>Practical – Key Learning Outcomes:</b>          Demonstrate how to read and rightly interpret Single Line Diagram (SLD), Layout Diagrams, Civil/Mechanical and Electrical Drawings.          Demonstrate the process of safe material handling.          Show how to check materials received as per final BoM to ensure that the correct material for the job arrives on site and is damage-free.</p>		
6.	<p><b>Module 6: Installation of Electrical components of a Solar PV System</b>  <b>Mapped to: SGJ/N0104</b>  <b>Theory – Key Learning Outcomes:</b>          Identify tools and tackles for electrical component installation for Solar PV Power plant.          Describe the process of installing the electrical components including inverter, batteries, junction boxes, energy meters, cables and conduits other electrical components.          Explain the Do's and Don'ts of DC wiring.</p> <p><b>Practical – Key Learning Outcomes:</b>          Demonstrate how to install electrical components of solar PV system; including inverter, batteries, junction boxes, energy meters, cables and conduits other electrical components.          Analyze how to perform DC wiring.          Demonstrate the application of tools &amp; tackles used for cable and conduit installation.</p>	22	10
7.	<p><b>Module 7: Test and Commission Solar PV system</b>  <b>Mapped to: SGJ/N0105</b>  <b>Theory – Key Learning Outcomes:</b>          Describe the importance of conducting testing of all solar PV components and performing fault finding and analysis, continuity checks, polarity check and other commissioning activities.          Explain the concerned regulations &amp; standards for grid interconnection.          Describe the commissioning process for the solar PV system.</p>	17	10



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	<p><b>Practical – Key Learning Outcomes:</b>          Demonstrate how to perform testing of all components, along with fault finding &amp; analysis, continuity checks, polarity check and other commissioning activities.          Examine concerned regulations &amp; standards for grid interconnection.          Demonstrate the commissioning process for the Solar PV System.</p>		
8.	<p><b>Module 8: Maintain Personal Health &amp; Safety at project site</b>  <b>Mapped to: SGJ/N0106</b>  <b>Theory – Key Learning Outcomes:</b>          Explain the requirements for safe work area.          Explain the importance of administering first aid.          Identify the personal protective equipment used for the specific purpose.  <b>Practical – Key Learning Outcomes:</b>          Demonstrate how to administer first aid.          Demonstrate the usage of personal protective equipment for ensuring safety during installation and O&amp;M work.          Demonstrate good housekeeping and infection control &amp; prevention practices.</p>	26	12
9.	<p><b>Module 9: Employability Skills</b>  <b>Mapped to: DGT/VSQ/N0102</b>  <b>Theory – Key Learning Outcomes:</b>          Discuss the Employability Skills required for jobs in various industries.          List different learning and employability related GOI and private portals and their usage Constitutional values - Citizenship.          Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen.          Show how to practice different environmentally sustainable practices.  <b>Practical – Key Learning Outcomes:</b>          Discuss importance of relevant 21st century skills.          Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.          Describe the benefits of continuous learning.</p>	30	15



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<b>Total</b>	<b>200</b>	<b>100</b>
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**Course Outcomes:**

Sr. No.	CO Statement	Marks % Weightage
CO-1	Understand solar energy and electrical principles for PV system design using Ohm's Law effectively.	25
CO-2	Assess site requirements, recommend optimal PV system configurations, and conduct thorough site surveys.	30
CO-3	Install, commission, and maintain PV systems adhering to industry standards and safety protocols.	30
CO-4	Develop employability skills for effective integration into the solar energy sector and contribute to sustainable initiatives.	15

**Reference Books:**

1. Solar Photovoltaic Systems: Principles and Practice Author: Sukhmeet Singh Publisher: McGraw-Hill Education Publication Date: 2019 ISBN: 978-9388511777
2. Solar PV Power: Practical Handbook Author: Saurabh Kumar Rajput Publisher: Notion Press Publication Date: 2018 ISBN: 978-1949066453
3. Solar PV Systems: Fundamentals, Design, and Installation Author: S. Bhattacharjee Publisher: CRC Press Publication Date: 2016 ISBN: 978-1498772774
4. Solar Energy: Principles of Thermal Collection and Storage Author: S.P. Sukhatme and J.K. Nayak Publisher: Tata McGraw-Hill Education Publication Date: 2008 ISBN: 978-0070648189
5. Renewable Energy Engineering and Technology: Principles and Practice Author: V. Ramamurthy Publisher: PHI Learning Pvt. Ltd. Publication Date: 2014 ISBN: 978-8120349488