|  |  |
| --- | --- |
|  |  |
| DACUM Panel**Engr. Safdar Qureshi**Safroon Energy Services (Pvt.) Ltd.**Malik Sameen Khan**CEO Sky Green, Nowshera**Engr, Asfandyaar Khan**Sr. Engr. SPT (Solar Wing)**Engr. Ashraf Khan**GATTC Peshawar**Mr. Muhammad Sadiq Orakzai**Principal GATTC Peshawar**Mr. Wisal Khan** GATTC, Peshawar**Mr. Muhammad Ayaz Khan**GATTC, Peshawar **Engr. Shahab**Project Engineer renewable Power**Mr. Muhammad Sohail**Trade testing Board Peshawar**Mr. Sajjad Ali**Ali Hyder and Co.**Mr. Sohaib Fida Khan Tanoli**GIZ Pakistan**Mr. Muhammad Naeem Akhtar**GIZ PakistanDACUM Facilitator**Engr. Abdul Maqsood**Principal GPI, Mardan**Co-Facilitators****Ms. Bisma Sahir**Akhund Consultants, Faisalabad | Occupational AnalysisofNational Vocational Qualification for Building Electrician “Solar PV system Technician level 4”Image result for NAVTTC logoNovember, 2017Peshawar KPKNational Vocational & Technical Training Commission (NAVTTC)Government of Pakistan |

|  |  |  |  |
| --- | --- | --- | --- |
| **A1.** Carryout load assessment1. **Conduct site assessment for Solar PV system installation**
 | **A2.** Perform shadow analysis | **A3**. Assess wiring requirements | **A4**. Identify the south direction for mounting structure |
| **A5.** Evaluate the site for Solar PV system installation |  |  |  |
| **B1.** Prepare checklist for job**B. Interpret job document**  | **B2.** Interpret schematic diagram | **B3.** Record the data | **B4**. Prepare log sheet for general maintenance |
| **C1.** Arrange required tools and eqipment**C. Install solar PV system**  | **C2.** Perform PV test | **C3.** Erect the mounting structure  | **C4.** Fix PV modules |
| **C5.** Connect the PV modules as per circuit diagram |  |  |  |
| **D1.** Interpret wiring diagram**D. Perform wiring for Solar PV system** | **D2.** Lay cables | **D3.** Perform continuity test | **D4**. Carryout battery test |
| **D5.** Connect PV system with battery and invertor | **D6.** Configure invertor | **D7.** Verify proper working of the system through load execution test |  |
| **E1.** Assess existing condition of unit**E. Troubleshoot Solar PV system** | **E2.** Identify nature of the fault | **E3.** Perform diagnostic test | **E4**. Document the fault |
| **E5.** Identify solution of the faults | **E6**. Report the fault to the concerned persons | **E7**. Rectify the faults | **E8**. Carryout post rectification function test  |
| **F1.** Prepare check list for maintenance **F. Maintain PV solar system** | **F2.** Follow routine maintenance log sheet | **F3.** Maintain Solar PV modules  | **F4.** Maintain invertor |
| **F5.** Maintain battery bank | **F6.** Maintain protective circuits  | **F7.** Perform post verification function of the system |  |
| **G1**. Ensure Personal saftey**G. Adopt safety precautions**  | **G2.** Ensure workplace safety. | **G3**. Ensure saftey of tools and equipment | **G4**. Ensure PV system safety |
| **H1**. Calculate load**H. Perform basic Design**  | **H2.** Assess working schedule of load | **H3**. Determine backup time | **H4**. Workout size and configuration of PV panels, batteries, invertor, convertors cables and protection devices  |
| **I1**. Develop basic computer operating skills**I. Develop basic professional skills** | **I2.** Develop basic communication skills. | **I3**. Develop basic marketing skills | I4. Identify Need of the market |
| **I5.** Follow environmental health and saftey standards |  |  |  |

Additional Information for Building Electrician “Solar PV system Technician”

|  |  |  |  |
| --- | --- | --- | --- |
| Worker traits * Dedicated
* Honest
* Supportive
* Physically fit
* Weather adaptive
* Committed
* Decision maker
 | Entry RequirementsLiterate and have working knowledge  | Duration of Training RequiredTo be decided later | Career PathsEntrepreneur TrainerSupervisorMarketer / Merchandiser |
| **Related Knowledge** * Basic measurements
* Basic calculations
* Uses of measuring tools and instruments
* Use of shadow detector and PV Analyzer
* Basic concepts of electricity and solar technology
* Understand schematic symbols of components
* Understanding of Electrical Drawings
* Mechanical Aptitude and accessories
* Sizes and capacities of wiring cables
* Types of building wiring accessories and channel ducts, conduits etc.
* Difference between AC and DC cables and appliances
* Types of Jointing and insolation
* Uses of MC4 connector
* Concepts of parallel and series connections
* Use of operational manuals
* Data Sheets of equipment
* Types of diagnostic tests
* Use of Gravity meter and Battery tester
* Cleaning materials and appropriate timings
* Uses of personal protective equipment
* Features and configuration of charge controller, invertors, converters
* PWM and MPPT devices
* Understanding of strings and Array of PV Panels
* Types of Batteries and their configuration
* Sequence of connecting power sources with invertor/charge controllers
* How to deal with hazardous
* Risk Management
* Product knowledge
* Importance of junctions box, breaker box
* Earthling equipment including surge protector and light arrester
* Technical drawings
 | Combination plier long nose PlierCable CutterCable CutterCable CutterClaw HammerHammerScrew Driver Setmini Screw Driver SetScrew Driver Set (metal head type)HammerCable Knife/paper cutter Wire Striper/insulation removerSoldering Iron with StandSucker Tool box Bench viceAngle GrinderMini Drill machineDrill Machine Rotary HammerDrill Machine Cordless Drill machineExtension board ChiselChiselTorpedo level / spirit levelCompassAdjustable WrenchAdjustable WrenchRichet SetSpanner SetTorque wrench with deep socketspipe wrenchwelding plant With holder and lead Thimble pressElectric blowerHeat gunMeasuring Tape Measuring Tape Measuring Tape Hack Saw With bladesFile SetFile SetL-key SetFish Tapewood Saw Hole Saw For panelHole Saw For panelHole Saw For panelWooden Bit Settwist Drill bit SetTap and Die Set [Hand Tin Scissors](http://www.ebay.com/itm/Hand-Tin-Scissors-Sheet-metal-cutter-Nibbler-straight-/231840138781?hash=item35fabfc61d:g:3LAAAOSwMmBViblp)pipe vice with StandsScissorTuserGas Cutting torch with Oxygen And LPG CylindersMagnetic wristband for holding bits and partsHot Melt Glue Gun 20W Tool Belt  |