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**Training Delivery and Assessment Plan (TDAP)**

**REP C 35: Grid Tied PV Design**

**ITVET Belize City**

**1.0 COURSE ADMINISTRATION:**

**Qualification CODE: XXXXXXnnnnZ**

**Qualification TITLE:** **Grid Tied PV Design**

**PROGRAMS: Renewable Energy and Energy Efficiency Program (REP)**

**TRAINING CYCLE: August 29, 2022– December xx, 2022**

**Class Meeting Times: Monday (New Lab) as well as Wednesday and Friday mornings (Classroom)**

**Class Venue: New Lab as well as REP Classroom 01 / Google Classroom Platform**

**Program Instructor: Lloyd Wade**

**Consultation hours: By Class schedule**

**Telephone: ITVET Belize**: **(501) 203-4027**

**Personal cell: (501) 000-0000**

**E-Mail Address:** [**xxxxxxx@zzzzz.com**](mailto:xxxxxxx@zzzzz.com)

**Class Hours / Term: 68**

**Weeks / Term: 12**

**Classroom: Wednesday am (3 periods) and Friday am (2 periods) for 12 weeks**

**New Lab: Tues am (3 periods) plus Wed pm follow up (1 period) for 9 weeks (Weeks 3 – 11)**

**Course Description**

This course will introduce the learner to a definition of the electrical grid. It introduces the rules of today’s electrical grid. It introduces the basic concept of how electrical generating devices connect to the electrical grid. The course describes two types of solar electrical inverters that can tie into the electrical grid to produce power. The introduction to the NEC (National Electrical Code (USA)) and some of the basic code rules. These basic codes are discussed and are demonstrated in examples of grid tied solar inverters. There is no physical lab time for this course. Lab time will be used to complete research assignments.

**Rationale**

Knowledge of solar inverters and their specifications as a basis for later courses in installation and design. This course introduces the learner to the basic rules of grid synchronization. It also provides a basic introduction to the NEC code rules for grid interactive inverters.

**Assessment**

Tests – 15% Assignments – 25% Projects -10% Lab Work – 40 % Exam – 0 % Employability Skills - 10%

**Course Tasks:**

* Task 01 – Describe an electrical grid
* Task 02 – Describe single-phase and three-phase electrical services.
* Task 03 – Define the primary function of an inverter.
* Task 04 – Identify the different types of inverter technologies and list advantages and disadvantages.
* Task 05 – Identify options for PV system interconnection to utility grid as defined in the NEC.
* Task 06 – Describe why temperature is an important system design consideration for grid-direct PV systems.
* Task 07 – Describe criteria for different power electronics options in PV systems.
* Task 08 – Evaluate inverter choices and system configurations.

**2.0 PROFILE OF THE TRAINEE:**

1. Responsible
2. Dependable
3. Punctual
4. Proficient
5. Analytical
6. Enterprising
7. Self-confident
8. Team player
9. Technologically Oriented
10. Resourceful

**3.0 PROGRAM POLICIES AND REGULATIONS:** Trainees are expected to (by date specified):

1. Complete all assessment, assignments, reports and tests on due time.
2. Abide by the rules and regulations as stated in the trainee handbook, workshop rules, online class (netiquette).
3. Practice professional and ethical behavior at all times.
4. Competent in all practical, examination, test and or quizzes.
5. Be on time to each class period/online session. If you will be late for any session, please inform the Instructor via an e-mail, telephone, or text message.
6. Attend all scheduled class periods and online sessions in the Google Classroom assigned.
7. Show personal interest and exhibit class participation.
8. All Reading Assignments must be done prior to class/lab sessions.
9. In order to prevent plagiarism, all references used while conducting research must be cited. The American Psychological Association (APA) guidelines are the recommended format. This will be provided as a separate document and there are a number of websites that provide information on the APA format.

**4.0 TECHNOLOGY REQUIREMENTS**:

(Example text – Edit as appropriate for Course) Each trainee is required to have access to an electronic device, CD or flash drive, MSWord, Excel, and PowerPoint software and internet access as well as an up to date email address (Gmail account).

**5.0 PORTFOLIO OF THE TRAINEE:**

(Example text – Edit as appropriate for Course) At the end of each unit, each trainee is required to produce a portfolio which will contain all assignments, quizzes, reflections per unit and /or cluster, and practical assessments. In addition, for trainees to be promoted to the next level, he/she must have a **completed portfolio**. An outline of the portfolio will be provided by your instructor.

**6.0 MODES OF INSTRUCTION:**

(Example text – Edit as appropriate for Course) In this program, we will utilize both face to face and online learning (blended learning) in Google Classroom using the following methodologies: Lecture (traditional and power point methods), small and large group discussion; individual and group presentations, slide show, video presentations, interactive presentations, blogs, tutorial, community of inquiry (COI), expert teaching, and guided practical. Furthermore, you will be expected to use email and WhatsApp to respond to the course instructor and peers about assigned topics.

**7.0 INSTRUCTIONAL METHODS:**

**Face to Face Contact:**

**1.**

1. Lecture,
2. Videos
3. Practical demonstration
4. Discussion
5. Guided practice
6. Independent practice
7. Cooperative learning activities
8. Textbook and computer-based information

**2. Online Contact: (2 hrs. /Week)**

1. Google Classroom Platform
2. Zoom
3. Microsoft Office
4. Tutorials
5. PowerPoint with voice lessons
6. Videos on concepts
7. Online quizzes and tests
8. Discussion
9. Cooperative Learning Activities

**8.0 RESOURCES:**

1. Manual, Book, Industry Materials, Handouts, Powerpoint Slides
2. YouTube videos
3. Live Practice Sheets
4. Guest Lecturers

**Underpinning knowledge and Skills**

**Knowledge of:**

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**Skills**

The ability to:

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**9.0 DELIVERY SCHEDULE**

| **Date** | **Element of Competency** | **Description** | **Instructional strategies** | **Readings ,Assignments and Due Dates** | **Resources** |
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| **Week 1** | Module 1 Power Grid  Task 01: Describe an electrical grid | -Introduction/ Orientation  -Housekeeping (rules & expectations)  -Course Outline review  -Using Google meet and classroom  - Present the basic terms used in the solar industry | -Discussion  -Forum Discussion  - Peer Discussion  - Presentations  - Lecture  - Videos  - Practice Sheets | **Assignment #1 World power grids** | - Rule book  -Course outline  -PowerPoint presentations  - handouts  - worksheets  - videos and You Tube  - computer |
| **Week 2** | Module 1 Power Grid  Task 02: Describe single-phase and three-phase electrical services. | Power Point “Power Grid” |  | **Assignment #2 Neighbour hood distribution network** |  |
| **Week 3** | Module 2 Synchronizing  Task 01 and Task 02 | Power Point “Synchronizing” |  | **Power Grid Test** | Classroom |
| **Week 4** | Module 3 Grid Tied Inverters.  Task 03 Define the primary function of an inverter | Power Point “Grid Tied Inverters” |  | **Synchronizing Test**  **Assignment 1 microinverters** | Classroom  Use lab time to start microinverter assignment |
| **Week 5** | Module 3 Grid Tied Inverters.  Task 04 Identify the different types of inverter technologies and list advantages and disadvantages. | Power Point “Grid Tied Inverters” |  | **Assignment 1 microinverters** | Classroom  Use lab time for microinverter assignment |
| **Week 6** | Module 3 Grid Tied Inverters.  Task 04 Identify the different types of inverter technologies and list advantages and disadvantages.  Task 06 Describe why temperature is an important system design consideration for grid-direct PV systems. | Power Point “Grid Tied Inverters” |  | **Assignment 1 microinverters** | Classroom  Use lab time for microinverter assignment |
| **Week 7** | Module 3 Grid Tied Inverters.  Task 06 Describe why temperature is an important system design consideration for grid-direct PV systems. | Power Point “Grid Tied Inverters” |  | **Assignment 2 string inverters**  **Test 1 Grid interactive inverters** | Classroom  Use lab time for string inverter assignment |
| **Week 8** | Module 3 Grid Tied Inverters.  Task 06 Describe why temperature is an important system design consideration for grid-direct PV systems. |  |  | **Assignment 2 string inverters** | Classroom  Use lab time for string inverter assignment |
| **Week 9** | Module 3 Grid Tied Inverters.  Task 06 Describe why temperature is an important system design consideration for grid-direct PV systems. |  |  | **Assignment 2 string inverters**  **Test 2 Grid interactive inverters** | Classroom  Use lab time for string inverter assignment |
| **Week 10** | Module 4 Services and the NEC.  Task 02 Describe single-phase and three-phase electrical services.  Task 05 Identify options for PV system interconnection to utility grid as defined in the NEC | Power point Services and the NEC |  | **Grid interactive microinverter assignment 2** | Classroom  Use lab time for assignment 2 |
| **Week 11** | Module 4 Services and the NEC.  Task 05 Identify options for PV system interconnection to utility grid as defined in the NEC  Task 06  Task 07 Describe criteria for different power electronics options in PV systems.  Task 08 Evaluate inverter choices and system configurations. | Power point Services and the NEC |  | **Grid interactive microinverter assignment 2**  **Grid interactive string inverter assignment 2**  **Grid inverter NEC test 1** | Classroom  Use lab time for assignments 2 |
| **Week 12** | Module 4 Services and the NEC.  Task 05 Identify options for PV system interconnection to utility grid as defined in the NEC  Task 06  Task 07 Describe criteria for different power electronics options in PV systems.  Task 08 Evaluate inverter choices and system configurations. | Power point Services and the NEC |  | **Grid interactive assignment 2**  **Grid inverter NEC test 2** | Classroom  Use lab time for assignments 2 |

* 1. **PRACTICAL GRADING CRITERIA**

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| RATING | DESCRIPTOR |
| **5**  **Competent**  Can perform the task with initiative and adaptability to problem situation. | Mastery of technical skills; can perform the task demonstrating mastery, autonomy, responsibility and control in a wide range of working conditions. Trainee applies and extends the key concepts, processes and skills. Works independently and can support the learning of others. |
| **4**  **Competent**  Can perform the task proficiently without assistance and/or supervision. | Proficient in technical skills; can perform the task in a wide range of working conditions, demonstrating good working knowledge and application of the key concepts, processes, skill, initiative, and adaptability to problem situations. Ability to work independently. |
| **3**  **Competent**  Can perform the task satisfactorily but requires periodic assistance and/or supervision. | Satisfactory technical skills; can perform the task demonstrating sufficient knowledge of the key concepts, processes, skills, and an ability to operate satisfactorily displaying some initiative and adaptability to problem situations. Works with some support. |
| **2**  **Not Yet Competent**  Can perform some parts of the task but requires considerable assistance. | Insufficient technical skills; can perform limited parts of the task but not to required standards. Trainee is well below the course level expectations and performance is inconsistent even with support. |
| **1**  **Not Yet Competent**  Cannot perform the task but has some knowledge of the task. | Inadequate evidence of attainment of competence, processes,and skill on which a judgment can be made. |

**11.0 THEORY GRADING CRITERIA**

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| RATING | DESCRIPTOR |
| **90-100 Excellent**  Can insightfully and creatively apply an in-depth understanding of learning standards in complex situations. | Mastery of the related knowledge and attitude; trainee develops a sophisticated understanding of the concepts and competencies relevant to the expected learning. |
| **80 -89 Very good**  Can transfer understanding of learning standards to both predictable and new situations. | Proficient in the related knowledge and attitude; trainee demonstrates a complete understanding of the concepts and competencies relevant to the expected learning. |
| **70 -79 Satisfactory**  Can understand the learning standards in basic or familiar situations. | Satisfactory level of the related knowledge and attitude; trainee demonstrates a partial understanding of the concepts and competencies relevant to the expected learning. |
| **57-69 Unsatisfactory**  Can demonstrate some progress towards the learning standards. | Insufficient knowledge and attitude; trainee demonstrates an initial understanding of the concepts and competencies relevant to the expected learning. |
| **Below 57 Insufficient**  Progress is not shown. | Has not demonstrated sufficient knowledge and attitude on which a judgment can be made |