NINH THUAN PROVINCIAL PEOPLE'S COMMITTEE

NINH THUAN VOCATIONAL COLLEGE

TRAINING CATALOGUE

NINH THUAN VOCATIONAL COLLEGE

Department of Training and Student Affairs – Tel: 0259 351 1544

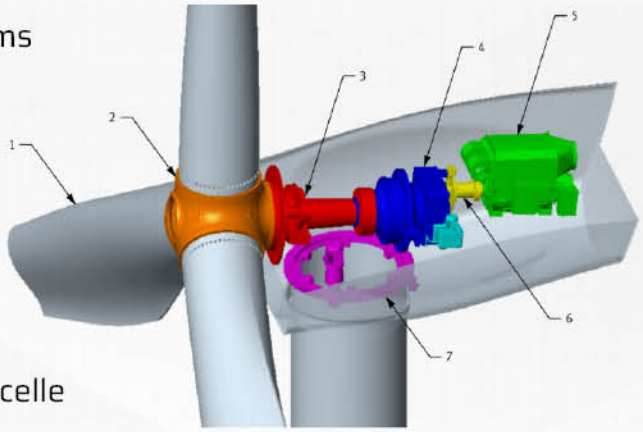
FUNDAMENTAL TRAINING PROGRAMME
WIND ENERGY

1. TRAINING DURATION: 40 hours

2. TRAINING CONTENT:

Overview of wind energy

- Current status of utilising wind power systems
- Wind and wind effects
- Wind energy systems

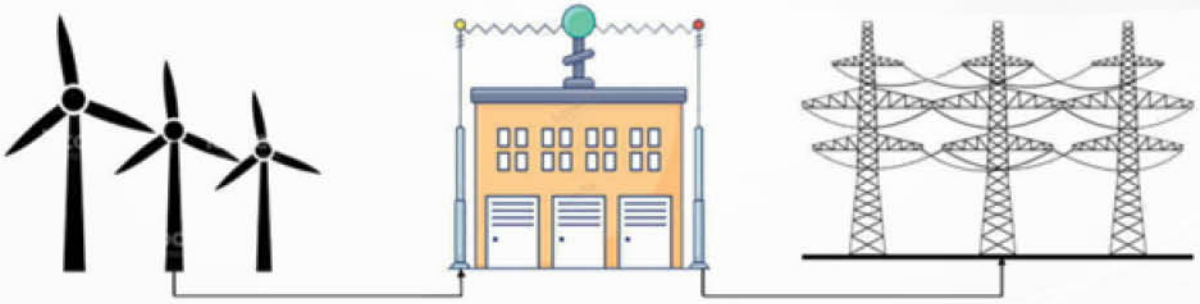


Wind energy training system - Nacelle

- Basic safety
- Wind turbine structure
- Wind turbine control and operation
- Wind energy training model application - Nacelle
- Mechanical and electrics training systems

Application of wind energy systems

- Introduction to wind energy systems
- Exercises



Wind turbines | Sub-station | Power grids

3. COMPETENCIES OBTAINED UPON COMPLETING THE COURSE:

- Demonstrate the overview of wind energy
- Demonstrate general safety rules when operating wind turbine generators
- Analyse the technological, economic, environmental strengths and weaknesses of wind energy sources
- Survey wind turbine generators
- Describe the main components of the Nacelle training system
- Recognize the components of the mechanical system, gearbox and drivetrain
- Identify the equipment used in the wind power system
- Simulate wind direction under normal wind conditions, low wind conditions, and extreme wind conditions
- Set up the reference position in the wind direction simulator
- Read parameters and warnings
- Troubleshoot during operation
- Check vibration on low-speed bearings, high-speed shafts, gearboxes
- Install and wire equipment according to diagrams in the wind turbine generator

4. PREREQUISITE

College graduates of teachnical majors
Technicians or technical staff working in renewable energy power plants

5. CONTACT:

Faculty of Electrics – Electronics
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Email: phatthuthinh@gmail.com (Mr Phat)

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FUNDAMENTAL TRAINING PROGRAMME
ROOFTOP SOLAR ENERGY

1. TRAINING DURATION: 80 hours

2. TRAINING CONTENT:

Overview of solar power system

- Application of solar energy
- Solar energy system
- Components of grid-tied rooftop solar system

Photovoltaic (PV) cells and PV modules installation

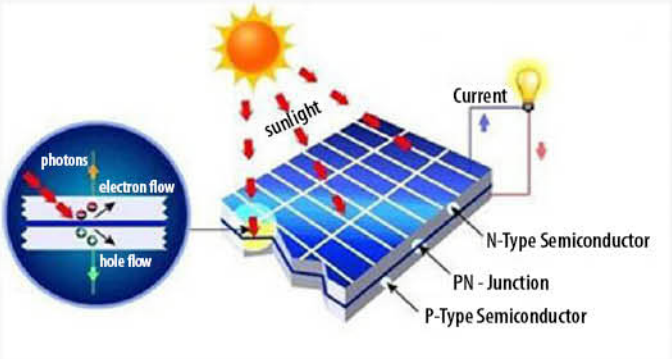
- Composition and types of PV cells
- Installation and connection of PV modules

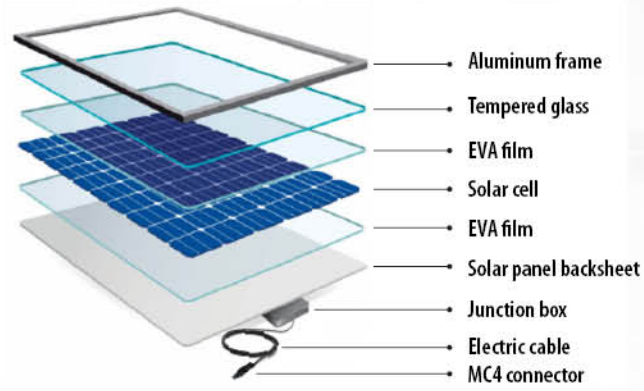
Grid-tied inverter

- Functions, categories and configurations of grid-tied inverters
- Regulations and standards for grid-tied inverters
- Practice: installing inverters

Inspection and commission of grid-tied PV systems

- Preparation for Inspection and commissioning
- System handover
- Practice session





3. COMPETENCIES OBTAINED UPON COMPLETING THE COURSE:

- Present an overview of the rooftop solar system, the operating principles of the rooftop solar system.
- Demonstrate the function and parameters of the inverter and measure the parameters of radiation, temperature, voltage, current and shade.
- Install and connect PV modules.
- Install inverters in accordance with technical standards.
- Calculate the basic parameters of the system.
- Inspect and commission the PV system.

4. PREREQUISITE

15 years old and above
Have an interest in technical fields and basic knowledge of electrics
Careful and diligent.

5. CONTACT:

Faculty of Electrics – Electronics
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Email: khuongtung1980@gmail.com (Mr. Tung)

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FUNDAMENTAL TRAINING PROGRAMME
GRID-TIED SOLAR SYSTEM WITH LIMITER

1. TRAINING DURATION: 80 hours

2. TRAINING CONTENT:

Overview of grid-tied solar system with limiter

- Overview of grid-tied solar system with limiter
  - *Solar energy overview*
  - *Rooftop solar systems*
  - *Components of a grid-tied rooftop solar system*
- Application of grid-tied solar system in everyday life.

Photovoltaic (PV) cells, PV modules, and PV array configurations

- PV Modules
- Approximate estimation of PV array/-module energy output
- Performance of different dypes of PV modules
- Module data sheet and installation guide
- Main factors affecting the power output of PV modules
- PV module temperature coefficient
- Nominal perating cell temperature (NOCT)
- Load resistance
- PV array configuration
- Practice session with PV modules.

Installation of grid-tied solar system with limiter

- Health, safety and signs
- Grid-tied inverters with limiter
- Inverter configuration/inverter definition
- Inverter performance
- Inverter with and without transformer
- Inverter for thin film Pv modules
- Compliance with regulations for grid-tied inverters
- Inverter installation
- Practice session: inverter installation.

Communication installation of grid-tied inverters with limiter

- Typical installation of grid-tied solar inverters.

Operation, testing and maintenance of grid-tied solar system with limiter

- Operation of grid-tied solar systems with limiter
- Testing and maintenance of grid-tied solar systems with limiter

3. COMPETENCIES OBTAINED UPON COMPLETING THE COURSE:

- Present the safety issues of grid-tied solar systems with limiter; commonly installed PV systems with limiter in Vietnam and commonly used measuring devices; types of PV modules and specifications used in rooftop PV arrays with limiter; specifications of the inverter; specifications of PV array cables on the DC/AC side; specifications of DC-side circuit breakers in PV systems; grounding guidelines/requirements
- Present the functions and classification of inverters in grid-tied solar systems with limiter; visual inspection method of an operating grid-tied solar power systems with limiter
- Identify the system configuration, its main components, and their location; DC fuses installed in PV array cabinets; solar cable connectors with limiter and tools used for making solar cable connections
- Install and connect PV modules
- Calculate the basic parameters of the system
- Install of grid-tied inverters with limiter
- Set up communication of inverters with limiter
- Operate, inspect and maintain PV system with limiter

4. PREREQUISITE

To participate in the course, learners must have basic knowledge of electrics and electronics.

5. CONTACT:

Faculty of Electrics – Electronics

Mobile: 025 9351 1544 (Training Department) / 090 967 5863 (Mr. Thuan)

Email: thaithuan8183@gmail.com (Mr. Thuan)

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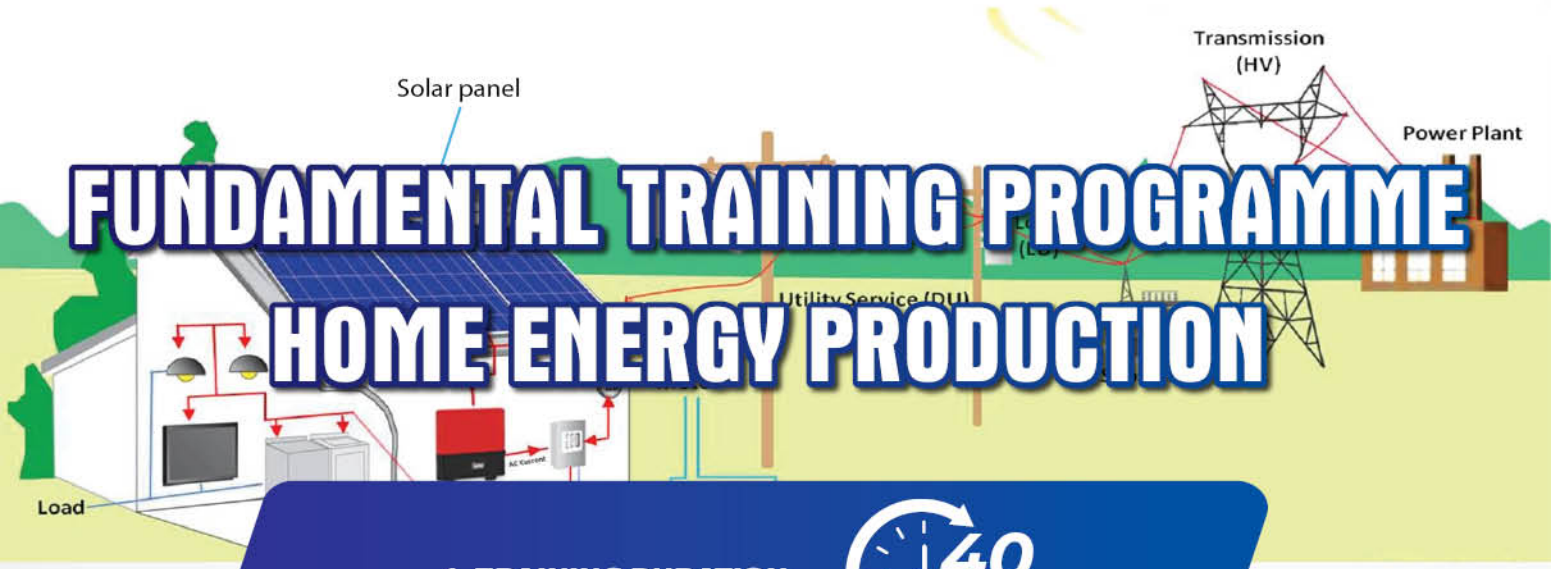

FUNDAMENTAL TRAINING PROGRAMME

HOME ENERGY PRODUCTION

1. TRAINING DURATION: 40 hours

2. TRAINING CONTENT:

Overview of home energy production

- Home energy production
- Off-grid home energy production
- Grid-tied and smart-grid home energy production

Off-grid home energy production from renewable energy

- Diagrams of off-grid home energy production using wind turbines or solar panels
- Frequency and root mean square (RMS) value of the system's output voltage
- Operation of the voltage feedback loop
- Power limiting circuit
- Insulated off-grid inverter
- Battery protection circuit against undervoltage

Inspection and commissioning of grid-tied PV systems

- Preparation for inspection and commissioning
- System handover
- Practice session

Grid-tied home energy production from renewable energy

- Introduction to single-phase grid-tied inverters
- Adjustable values of effective and reactive current
- Active and reactive power control in single-phase grid-tied inverters
- Operation of current control loop
- Feed-in voltage control
- DC bus voltage compared to local AC grid voltage
- Practice session

3. COMPETENCIES OBTAINED UPON COMPLETING THE COURSE:

- Present of AC power generation from DC power using renewable energy
- Demonstrate the operation of single-phase grid-tied inverters
- Demonstrate how to use single-phase grid-tied inverters to control effective and reactive power
- Explain DC-to-DC conversion, DC-to-AC conversion
- Present how to store energy on a large scale and how to deploy smart grids
- Present the frequency and RMS values of the output voltage of the system
- Demonstrate the operation of the voltage feedback loop
- Analyze power-limiting circuits
- Analyze circuits for protecting batteries against undervoltage
- Use software for controlling inverters in both off-grid systems with storage and single-phase grid-tied systems
- Explain the operation of current control loop
- Analyze the DC bus voltage compared to the local AC grid voltage
- Read diagrams to connect inverters in off-grid and grid-tied systems
- Connect the hardware of renewable energy equipment, both in off-grid and grid-tied systems, to produce household electricity from DC to AC
- Control isolated off-grid inverters within the system
- Set the parameters for off-grid inverters to operate
- Control grid-tied inverters in the system
- Set the parameters for grid-tied inverters

4. PREREQUISITE

To participate in the course, learners must have basic knowledge of electrics and information technology.

5. CONTACT:

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Email: vong0810@gmail.com (Mr. Vong)

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FUNDAMENTAL TRAINING PROGRAMME
HYDROPOWER PLANT

1. TRAINING DURATION: 48 hours

2. TRAINING CONTENT:

Overview of hydropower plants

- History of hydropower plants
- Types of hydropower plants: Dam hydropower plants; River hydropower plants; Tidal hydropower plants
- Dam, reservoir, water outlet, and spillway
- Inlet, penstock, control gate, and guide vanes
- Water turbine and discharge pipe
- Generator, transformer, and AC transmission lines
- Available energy in hydropower plants
- Advantages and disadvantages of hydropower generation
- Disadvantages of hydropower

Principles of generator frequency and voltage control

- Impact of variations in resistive loads on the operation of turbine-driven synchronous generators
- Impact of variations in inductive load on the operation of turbine-driven synchronous generators
- Frequency control of turbine-driven synchronous generators
- Voltage control of synchronous generators
- Brushless self-excited synchronous generators
- Practice session

Synchronization of generators using ROWLE SYNCHRON_CHECK

- Synchronization of generators using synchronization check relays
- Key synchronization parameters of synchronization relays: (Δf); (ΔE); (Δφ)
- Synchronization window
- Circuit breaker operating time
- Distinguishing between live bus, infinite bus, and dead bus
- Connecting synchronous generators to a dead bus
- Practice session

3. COMPETENCIES OBTAINED UPON COMPLETING THE COURSE:

- Present the method of generating electricity through hydropower.
- Understand the principles governing the control of frequency and voltage of turbine-driven synchronous generators.
- Explain the synchronization of synchronous generators with the AC power system using synchronization check relays.
- Present the speed control of turbine-driven synchronous generators using a governor operating in isochronous or droop mode, as well as the adjustment of generator voltage using an automatic voltage regulator operating in fixed voltage or droop mode.
- Present the synchronization and operation of multiple synchronous generators connected in parallel.
- Present the effect of variable resistive loads on the operation of turbine-driven synchronous generators.
- Explain the effect of variations in inductive load on the operation of turbine-driven synchronous generators.
- Present the synchronization of generators using synchronization check relays.
- Explain the key synchronization parameters of synchronization check relays, such as frequency difference (Δf), voltage difference (ΔE), and phase angle difference (Δφ).
- Distinguish between live bus, infinite bus, and dead bus.
- Read the diagrams of synchronous generators.
- Connect turbine-driven synchronous generator hardware following practical steps.
- Control the frequency of turbine-driven synchronous generators using specialized computer software.
- Control the voltage of synchronous generators.
- Control brushless self-excited synchronous generators.
- Connect synchronous generator hardware to a dead bus following practical steps.
- Control the synchronization of synchronous generators with a dead bus using specialized computer software.

4. PREREQUISITE

To participate in the course, learners must have a basic knowledge of electris, electronics, automation, and information technology.

5. CONTACT:

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EXCELLENT TRAINING

PERFECT SKILLS

REACHING NEW HEIGHTS