7/01/2019.

# SOLAR ENERGY TECHNICIAN COURSE – PCP (THEORY & PRACTICAL) TRAINING SCHEDULE

| Total course duration (320 hrs) | | |
|---|---|---|
| PCP (120 hrs) | | Self learning (200 hrs) |
| Practical ( 80 hrs) | Theory ( 40 hrs) | |

| | Schedule | | PCP- Topic | | | | Learning outcomes |
|---|---|---|---|---|---|---|---|
| Week | Topic | Day | Duration (hr) | Theory | Duration (hr) | Practical | |
| Week 1 | Solar energy technology | Day 1 | 2 | • Introduction to Conventional & Non-conventional sources of energy<br>• Difference between conventional & Nonconventional energy & their limitations.<br>• Advantages & Disadvantages of Non-conventional energy<br>• Solar radiations. | 2 | • Demonstration of Conventional & Non-conventional energy sources by using charts or audio/video aid. | Learner would be able to -:<br>• Distinguish between the conventional and non-conventional sources of energy.<br>• Identify the devices that use these resources.<br>• Observes the limitations and advantages of the non-conventional sources of energy.<br>• Identify the use of solar radiation. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Day 2 | 2 | • Principles of conversion of solar energy to thermal energy.<br>• Modes of conversion of solar energy.<br>• Different type of solar energy devices. | 2 | • Measuring temperature difference by using glass bucket (full of water) with glass lid & without glass lid.<br>• List out the forms of solar energy storage with example of devices using it. | • State the principle of solar energy conversion to thermal energy.<br>• Identify different solar energy devices. |
| Week 2 | Solar collector systems | Day 1 | 2 | • Collection and storage of thermal energy.<br>• Solar energy collector.<br>• Radiation absorbing medium. | 3 | • Demonstration of solar flat plate collector system.<br>• Calculation of temperature achieved in the collector system. | Learner would be able to-:<br>• Categories different solar energy collector system.<br>• Demonstrate the parts of the collector system.<br>• Assemble the components of collector system.<br>• Identify the components of the PV cell.<br>• State the working principle of a PV cell.<br>• Identify the material used for the construction of a PV cell. |
| | | Day 2 | 2 | • Principles of photovoltaic cells | 2 | • Demonstration of a photovoltaic cell. | |
| Week 3 | Solar cookers | Day 1 | 2 | • -Basic working principle –<br>• Designs available in the market<br>• Information on solar cookers manufacturers in India.<br>• Introduction to solar cookers for house hold & community applications. | 4 | • Demonstration of box type solar cooker and its components<br>• Assembling of solar cookers | Learner would be able to-:<br>• State the working principle of solar cooker.<br>• Identify the important components of the solar cooker system.<br>• Purchase the different material required for constructing a solar cooker. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Day 2 | 2 | • Concentrator type solar cooker.<br>• Basket type solar cooker. | 4 | • Cook a given food item (cereal) in the given solar cooker and prepare an observation table for timing and ambient temperature, e.t.c | • Differentiate between different types of solar cooker system.<br>• Use & operate solar cooker.<br>• Observes the temperature achieved.<br>• Carry out assembling of the components of different type of solar cooker.<br>• Plan & Install Solar cooker.<br>• Carry out repair and maintenance of the solar cooker.<br>• Adapt appropriate safety measures while handling a solar cooker. |
| Week 4 | Solar cookers | Day 1 | 2 | • Construction details of basket type solar cooker. | 4 | • Construction and testing of basket type solar cooker using aluminium foil for preparing the reflecting surface. | |
| | | Day 2 | 2 | • Operation & maintenance.<br>• Serving schedule.<br>• Disadvantages & Limitations | 4 | • Demonstration of maintenance schedule for solar cooker components<br>• Fault finding & trouble shooting activity. | |
| Week 5 | Solar water heater | Day 1 | 2 | • Basic working principle of solar hot water system.<br>• Copper flat plate & Evacuated tube collectors (ETC).<br>• Parts of a SWH & criticality. - Types of system – Thermo Siphon / systems operating under pressure / no pressure / heat exchangers. - | 3 | • Demonstration of dismantle natural circulating type domestic solar water heater.<br>• Prepare a observation table describing various components and its function in solar water heater (storage tank, water pump, float valve, thermo controller, pipes and valves, M.S. Platform e.t.c). | Learner would be able to-:<br>• Identify various components & devices of domestic & Industrial solar water heaters.<br>• Use & operate solar water heater.<br>• Identify suitable location |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Day 2 | 2 | • Importance of insulation & insulation materials.<br>• Drawing of solar water heater. | 2 | • Demonstration of insulation material used in solar water heating system. | for installation of solar water heating system.<br>• Plan & Install Solar hot water system.<br>• Carryout first hand maintenance<br>• Work in manufacturing unit.<br>• Check all equipments, parts & instruments with safety |
| Week 6 | Solar water heater | Day 1 | 2 | • Equipment handling, moving to location & erection (sequentially).<br>• Basic Electrical knowledge.<br>• Basic plumbing knowledge / pipe sizes | 4 | • Assembling and installation of solar water heater.<br>• Leakage testing<br>• performance testing | |
| | | Day 2 | 2 | • Overall operation of system, safe use & basic maintenance & trouble shooting.<br>• Common operational problems and trouble shooting. | 4 | • Demonstration of maintenance schedule of a solar water heater.<br>• Inspect the damaged solar water heating system | |
| Week 7 | Field visit | Day 1 | --- | • Study the operation of an industrial solar water heating system | 6 | • Prepare a trouble shooting chart for common operational problems on industrial solar water heating system. | • Observes the common operational problems on Industrial solar water heating system and identify the scope of working as a solar technician. |
| Week 8 | Solar dryer | Day 1 | 2 | • Introduction of solar dryer.<br>• Component & working method of solar dryer.<br>• Application of solar dryer.<br>• Construction details of | 4 | • Demonstration of cabinet type solar dryer.<br>• Construct a bamboo type solar dryer of 65x 140 cm base. | Learner would be able to-:<br>• Identify various components of a solar dryer.<br>• Distinguish between |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | solar dryer. | | | |
| | | Day 2 | 2 | • Different types of solar dryer.<br>• Operational maintenance of solar dryer. | 4 | • Carry out drying of various items (washed grains or vegetables) in the constructed dryer and prepare an observation table for % drying of different items in given time. | different types of solar dryer.<br>• Use & operate the solar dryer.<br>• Carry out assembling of the components of a solar dryer.<br>• Carry out repair and maintenance of the solar dryer. |
| Week 9 | Solar distillation plant | Day 1 | 2 | • Working principle of a solar distillation plant.<br>• Constructional details of a solar distillation plant.<br>• Types of solar distillation plant.<br>• Application. | 4 | • Demonstration of dismantle solar distillation system used for purification of saline water.<br>• Construct a simple basin type solar still using given materials. | Learner would be able to-:<br>• Identify various components of a solar distillation unit.<br>• Distinguish between different types of solar distillation units.<br>• Use & operate the solar distillation plant.<br>• Carry out assembling of the components of a solar distillation plant.<br>• Carry out repair and maintenance of the solar distillation plant. |
| | | Day 2 | 2 | • Operational maintenance of solar distillation unit. | 3 | • Operate a basin type solar distillation unit and note the amount of distilled water collected at hourly intervals.<br>• Suggest changes in construction for improving efficiency. | |
| Week 10 | Solar photovoltaic lighting systems | Day 1 | 2 | • Introduction of photovoltaic system.<br>• Basic principle of photovoltaic system.<br>• Components and their | 3 | Demonstration of -:<br>• Photovoltaic plates & Solar Array.<br>• Lead acid storage battery 12/24V. | Learner would be able to-:<br>• Identify various components & devices of solar PV lighting system. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | functioning.<br>• Material used for construction.<br>• Constructional details. | | • Electronic controller.<br>• invertors | • Use & operate Solar PV lighting system.<br>• Undertake assembling, installation, testing & commissioning of Solar PV lighting system.<br>• Carryout first hand maintenance<br>• Check all equipments, parts & instruments with safety. |
| | | Day 2 | 2 | • Installation of solar photovoltaic street lighting system.<br>• Maintenance of battery. | 4 | • Assembling, installation of solar PV lighting system.<br>• Carry out preventive maintenance on storage batteries. | |
| Week 11 | Solar water pumping | Day 1 | 2 | • Introduction of solar photovoltaic pumps.<br>• Basic principle of solar photovoltaic pumps<br>• Constructional details of solar photovoltaic pumps. | 4 | • Demonstration of parts of solar PV pumps.<br>• Connect pump with solar array, inlet pipes, outlet pipes, storage tanks. | Learner would be able to-:<br>• State the working principle of solar PV Pumps.<br>• Identify the important components of the solar PV Pumps.<br>• Purchase the different material required for constructing of a solar pump.<br>• Use & operate solar pump.<br>• Carry out assembling of the components and installation of solar pumps.<br>• Carry out repair and maintenance of the solar |
| | | Day 2 | 2 | • Installation & Operational maintenance of solar photovoltaic pumps. | 4 | • Operate given solar powered pumping system and note the discharge for various heads.<br>• Install the given system and test it for rated operation. | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | pump. |
| Week 12 | Visit to Solar photovoltaic electricity power plant | Day 1 | ---- | • Introduction to solar PV electricity generation for mass uses.<br>• Components and working principles of solar power plants. | 6 | • Visit to solar energy power plant<br>• Study its operation and Prepare a trouble shooting chart for common operational problems | Learner would be able to-:<br>• Identify various components & devices of solar power plant.<br>• Identify common operational problems of solar power plant.<br>• Identify the scope of work as solar technician. |