SEMESTER – III

17PHU314A	**RENEWABLE ENERGY AND ENERGY HARVESTING (PRACTICAL) (SEC 1 A)**	**L**	**T**	**P**	**C**
		-	**-**	**3**	**1**

Any 5 Experiments

1. Fuel value of wood/charcoal.
2. Study of sensible heat storage using liquid.
3. Selective and Non-selective coatings – Determination of Selectivity ratio.
4. Thermal efficiency of liquid – flat plate collector.
5. Study of box type solar cooker.
6. Determination of instantaneous thermal efficiency of parabolic collector.
7. Efficiency and fill factor of solar cells.

Reference Books:

1. Non conventional Energy sources, G. D. RAI (4th edition), Khanna Publishers, Delhi.
2. Solar Energy, S.P. Sukhatme (second edition), Tata Mc.Graw Hill Ltd, New Delhi.
3. Solar Energy Utilisation, G. D. RAI (5th edition), Khanna Publishers,Delhi.

CALIBRATION OF THERMOCOUPLE

AIM:

To calibration the given thermocouple.

APPARATUS:

Multimeter, Cu-Fe Thermocouple, hot plate, beaker.

PROCEDURE:

A copper thermocouple is taken one of the junction of the thermocouple is kept at a liquid container and the other junction is kept at the cold water.

The terminal of the thermocouple and connected to the digital multimeter for different hot junction temperature are taken and heated.

Tabulate the readings and plot the graph.

The resulting curve obtained is called calibration curve.

OBSERVATION:

TIME(minute)	DC(mv)

RESULT:

The given Cu-Fe thermocouple has been calibrated and graph has been plotted.

V-I CHARACTERSTICS OF SOLAR CELL

AIM:

To plot the V-I Characteristics of the solar cell and hence determine the fill factor.

APPRATUS REQUIRED:

Solar cell mounted on the front panel in a metal box with connections brought out on terminals. Two meters mounted on the front panel to measure the solar cell voltage and current. Different types of load resistances selectable using band switch also provided on the front panel. Three single points and two interconnectable patch chords for connections. Wooden plank with half meter scale fitted on it and a lamp holder with 100 watt lamp.

PROCEDURE:

When experiment is performed with 100 Watt lamp: 1. Place the solar cell and the light source (100 watt lamp) opposite to each other on a wooden plank. Connect the circuit as shown by dotted lines (Fig. 2) through patch chords. 2. Select the voltmeter range to 2V, current meter range to 250μA and load resistance (RL) to 50Ω. 3. Switch ON the lamp to expose the light on Solar Cell. 4. Set the distance between solar cell and lamp in such a way that current meter shows 250 μA deflections. Note down the observation of voltage and current in Table 1. 5. Vary the load resistance through band switch and note down the current and voltage readings every time in Table 1. 6. Plot a graph between output voltage vs. output current by taking voltage along X-axis and current along Y-axis

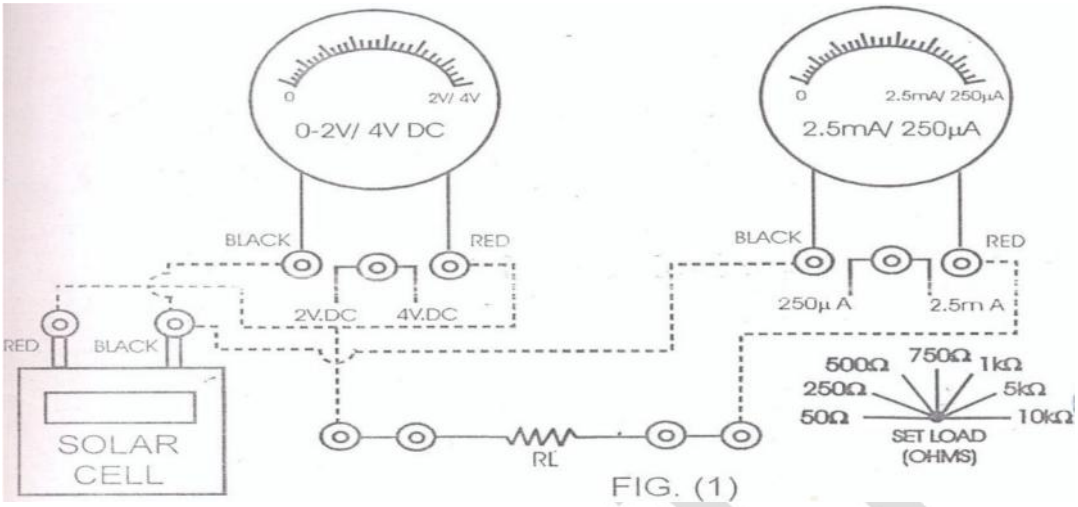

FIG. (1)

OBSERVATIONS:

Voltmeter reading for open cicuit, VOC = …. Volts

Milliammeter reading with zero resistance, ISC = . . . mA.

L=40 cm

Load resistance(Ω)	Current(I)	Voltage(V)

L=50

Load resistance(Ω)	Current(I)	Voltage(V)

Result:

The VI characteristics of solar cell has been drawn.

SOLAR RADIATION

AIM:

To analyses the total solar radiation in local climate condition.

APPARATUS:

Solar radiation, monitor, sensors.

PROCEDURE:

Connect the solar radiation monitor with the sensor and power supply.

Place the sensor in a open source in that the solar radiation falls directly on it.

Observe the reading on the monitor for every ten minute.

Tabulate the readings and plot the graph.

OBSERVATION:

TIME(minute)	Solar radiation (w/m^2)

RESULT:

The solar radiation has been analyzed in the climatic condition.

WIND VELOCITY

AIM

To determine the value of wind velocity.

APPARATUS

Anemometer Cup, Stop watch.

PROCEDURE:

Place anemometer in open space with along and find it on the ground and leave it undisturbed.

When the wind blows the cups fixed along anemometer rotates along with of wind space.

Observe the reading on the observation table and plot the graph.

Tabulate the reading on the observation table and plot the graph.

OBSERVATION:

Time (minute)	Speed(km/hr)

RESULT:

The total wind velocity has been determined

PLANCK'S CONSTANT

Aim:

To determine the value of Planck's constant 'n' by a photo cell.

Apparatus:

Photo cell, monochromatic source of light, color fitters, Planck's constant apparatus and connecting wire.

Formula:

The value of Planck's constant 'n' is given by

$$h = \frac{e(V2-V1)\lambda1\lambda2}{c(\lambda1-\lambda2)}$$

where

e-electronic charge

V2-stopping potential corresponding to wavelength λ2

V1- stopping potential corresponding to wavelength λ1

c-velocity of light.

Procedure:

The electrical connections made as follows

The lamp and scale arrangement adjusted to get a well focused spend on the zeromark of the scale, the photo cell in mounted at one and of the optical bench.At the same level and nearly 60-80cm from the photo cell a light source is arranged. The light is allowed to follow on the cathode of the photo cell a the photo cell. New a suitable filter of known wavelength .

The negative anode potential is in small steps and each time corresponding deflection of the ammeter is noted till ammeter reading reaches zero.

The experiment is repeated after replacing particular filter in succession by two more filter.

Talking negative anode potential on X-axis and corresponding deflection on Y-axis graphs are plotted to different filter.

Result:

The value of planck's constant is 6.689×10^{-23}