Menoufia University
Faculty of electronic engineering
Industrial Electronics and Control Dept.
Faculty of Electronic Eng.

Minufiya Univ.

Course: selected topic{5}
Fourth year

Jan. 2020
Time: 3-Hours

Answer all of the following questions

Question (1)   (20 Marks)

1- Sketch the on-grid solar energy system block diagram.

2- Explain how can you synchronize the output of the inverter with the grid voltage?

3- Design a pure sine wave inverter with the following specs:

   a- 50 Hz
   b- 220 Output voltage
   c- 24 volt input voltage

Draw the corresponding circuit diagrams and the concerned signals.

Question (2)   (20 Marks)

1- Explain in details the modified 3 phase sine wave inverter, draw then the different signals and the corresponding arduino control circuit. Write then the corresponding code/flowchart.

2- Explain why we perform maximum power point tracking? Illustrate with curves

3- Explain in details the MPPT P&O algorithm.

Question (3)   (30 Marks)

Design A solar energy system for a villa situated at Luxor city. The villa contains 5 rooms, two bathrooms one kitchen and 2000 meter garden. The energy needed for the villa is given in the following table:

	Load	quantity	Power (watt)	Time / day In Hours	#Days / week
1	Internal lamps	10	100	5	7
2	Led TV 55 inches	2	200	7	7
3	Air conditions	4	2000	8	7
4	Air conditions	1	3000	6	7

The kitchen and the bathrooms are equipped with the following appliances :

	Load	quantity	Power (watt)	Time / day In Hours	#Days / week
1	Washing m/c	20	10	7	7
2	frigo	1	250	12	7
3	Air condition	1	2000	5	6
4	Water heater	1	1000	6	7
5	others		1000	2	5

The garden has the following loads:

	Load	quantity	Power (watt)	Time / day In Hours	#Days / week
1	Pump	1	3000	2	3
2	External lamps	10	50	6	7

The design should include the number and specs of each of the following:

a) # Solar modules
c) Inverters
e) Array supports

b) Charge controllers
d) Batteries
f) Transistor of the Inverter ratings

Good Luck