

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Solar power generation through PV route, EPEC 8006

Semester: III

Programme: M.Tech. - REE

Time: 03 hrs.

Max. Marks: 100

Instructions: All questions are compulsory

SECTION A

S. No.		Marks	CO
Q 1	Describe the hot spot formation in a solar cell string.	4	CO1
Q.2	List the advantage of double layer super capacitor over ceramic plate capacitor.	4	CO3
Q.3	Differentiate between insulator, conductor and semiconductor in terms of fermi level.	4	CO3
Q.4	Define the required characteristic for an inverter connected between solar pv plant and grid.	4	CO5
Q.5	List any five application of solar PV power.	4	CO1

SECTION B

Q.6	Explain the P&O technique and incremental conductance technique for MPPT and also infer that which technique is more suitable for less oscillation in output power.	10	CO5
Q.7	Draw the equivalent circuit diagram of solar cell and derive an expression for open circuit voltage and short circuit current.	10	CO2
Q.8	Indicate the factors which affects the solar cell efficiency and also suggest the methods to improve it.	10	CO3
Q.9	Explain air mass, fill factor, quantum efficiency and IPCE and setup a relation between these factors.	10	CO1

SECTION-C

Q .10	(a) Explain the problem that occurs when a grid fault occurs and an island is created.	10	CO5
	(b) Discuss why mono-crystalline Si solar cell are more efficient than poly-crystalline Si solar cell.	10	CO3
Q.11	Evaluate the storage capability of Superconducting Magnetic Energy Storage (SMES) based on recent trends and research and submit your comparative conclusion with respect to other storage techniques.	20	CO4

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SECTION A

S. No.		Marks	CO
Q 1	Define Solar constant and also differentiate between beam and diffuse radiation.	4	CO1
Q.2	List the advantage of Li-ion battery over lead-acid battery.	4	CO4
Q.3	Describe fermi level energy and band gap energy for a semiconductor material.	4	CO2
Q.4	Identify which MPPT technique is more precise for rapid variation in solar irradiance.	4	CO5
Q.5	List any five application of solar PV power.	4	CO1

SECTION B

Q.6	Explain the working principle of solar cell and also draw its equivalent circuit diagram.	10	CO2
Q.7	Identify the factors which governs the selection of an inverter for a grid connected PV plant.	10	CO5
Q.8	Draw the chart for family tree of super capacitors and state how Hybrid Super capacitor more behave like rechargeable battery.	10	CO4
Q.9	Discuss the method to avoid the hotspot formation in a solar string. Assume that 9 solar cells are connected in series.	10	CO1,2

SECTION-C

Q.10	Suggest the methods to reduce the cost of solar cell with increased efficiency and also brief about Gratzel Solar Cells.	20	CO1,3
Q.11	Draw a single line diagram of grid integrated solar PV with BOS and conclude how characteristic resistance is responsible for maximum power output. Also discuss the methods employ to vary the duty cycle of DC-DC converter for extracting maximum output with their limitations.	20	CO2,5

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