

SEAT No. \_\_\_\_\_

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(68)

## SARDAR PATEL UNIVERSITY

M.Sc. Renewable Energy Examination (Semester –III)

Thursday, 02-11-2017, Time: 02.00 to 05.00P.M

PS03CSYT01: Solar Photovoltaic Technology

Total Marks: 70

Q-1 Select most appropriate answer

(8x1=8)

1. The average solar power incident on the earth surface is about
  - a.  $1000 \text{ mWcm}^{-2}$ .
  - b.  $100 \text{ Wcm}^{-2}$ .
  - c.  $1 \text{ kW m}^{-2}$ .
  - d.  $2000 \text{ Wcm}^{-2}$ .
2. A PV module is:
  - a. dozens of photovoltaic cells connected together
  - b. wired in series
  - c. wired in parallel
  - d. all answers a, b, c
3. The effect of PV panel temperature
  - a. Increasing the temperature reduces the band gap.
  - b. PV panels are more efficient at lower temperatures,
  - c. When silicon solar cell gets hotter, it generates more current but less voltage
  - d. All the above
4. The voltage of single solar cell :
  - a. 1.0V
  - b. 1.1V
  - c. 5W
  - d. 0.5V
5. The major disadvantage for solar power generation \_\_\_\_\_
  - a) Lack of availability.
  - b) Large area requirement.
  - c) Variable power
  - d) High cost
6. The contact grid \_\_\_\_\_
  - a. Is between the anti-reflective coating and the P-type silicon.
  - b. Is between the anti-reflective coating and the N-type silicon.
  - c. Is the third layer of a solar panel
  - d. Answer a and c correct
7. The battery \_\_\_\_\_
  - a. Is used in every solar energy system.
  - b. Is not used in every solar energy system.
  - c. Stores solar energy for use.
  - d. Answer b and c correct
8. Thin film solar cells are
  - a. Amorphous Si.
  - b. Cadmium telluride
  - c. Copper-Indium Selenide
  - d. All the above

Q-2 Answer any seven questions

(7x2=14)

1. Define solar grade silicon?
2. Define n-type and p-type semiconductors?
3. What are the major components of PV power generation system?
4. Explain the current losses in a silicon solar cell?

5. Define concentrating solar cell.
6. How does a battery work?
7. How are solar cells doped?
8. Explain copper indium gallium selenide solar cell
9. Explain Tandem solar cells

Q-3 A) Classify different types of solar PV cells with their efficiencies and its cost. Which solar panel type is best? (06)

Q-3 B) Explain principle of solar cell? How it is distinguished from a photo cell? Enumerate the advantage and disadvantage of solar photovoltaic technology. (06)

OR

Q-3 B) Describe the metallurgical grade silicon purification technology (06)

Q-4A) Explain amorphous silicon cells and its production technology with diagram (06)

Q-4B) Write in detailed about typical solar cell fabrication process with suitable figures. (06)

OR

Q-4B) Describe growth of silicon crystals by Czochralski method with neat diagram (06)

Q-5 A) Describe thin film solar cell with neat sketch diagram (06)

Q-5 B) Describe lead acid battery energy storage and its anode and cathode reactions (06)

OR

Q-5 B) Explain types of batteries in detailed with suitable example (06)

Q-6 A) Describe the rural electrification in (i) Domestic Supply mode (Stand-alone) (ii) Health care system (iii) Street lighting (iv) battery charging. (06)

Q-6B) Describe grid connected solar photovoltaic power generation system and its various methods. (06)

OR

Q-6B) Describe any case studies of grid connected solar photovoltaic power generation system. (06)

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