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SARDAR PATEL UNIVERSITY

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

Saturday, 22-10-2016, Time: 02.00 to 05.00P.M

PS03CSYT01: Solar Photovoltaic Technology

Total Marks: 70

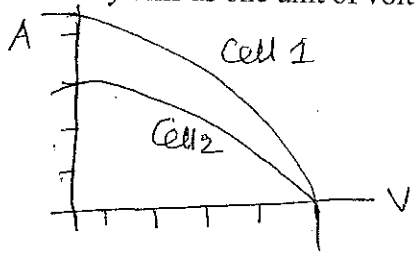
Q-1 Select most appropriate answer (8x1=8)

1. The purity of MG-Si is
   a) 98-99%
   b) 99.99-99.99999%
   c) 98-99.99999%
   d) 98-97%
2. Si mainly occurs in the form of
   a) Si
   b) Si,SiO2
   c) Si, SiO2, Quartz, Sand
   d) Quartz
3. Nickel-cadmium is the _____?
   a) Primary battery.
   b) Dry batteries.
   c) Secondary batteries
   d) Non-rechargeable batteries
4. In a house to connect the load for 2 days autonomy and required capacity of battery is 806.6 Ah. So the available capacity of battery in market is 12V, 150Ah. Therefore total number of batteries required are:
   a) 6 batteries
   b) 300 batteries
   c) 1 batteries
   d) 403 batteries
5. At what temperature the MGS produced
   a) 1600°C
   b) 600°C
   c) 1200°C
   d) 1500°C
6. The Siemens type reactor is the most commonly used reactor for producing
   a) MGS
   b) Wafer
   c) Solid EGS
   d) High purity gases Si containing gases
7. Atomic number of Silicon
   a) 14
   b) 8
   c) 12
   d) 16
8. The PV system is designed to supply 2.82kWh for home lighting and initial investment cost of system is Rs.4480. Instead of diesel generator the annual cost saving made by PV system is Rs.257.3. What is the payback period of the system?
   a) 17.4
   b) 12.63
   c) 5.4
   d) None of the above

(P.T.O.)

Q-2 Answer any seven questions (7x2=14)

1) What is the electronic configuration of Si and Germanium?
2) How are metals, Insulators and semiconductor classified? Give an example for each category?
3) What are the principle of current losses in a silicon solar cell?
4) Define an electrochemical cell. What is the principle of charging and discharging of cell?
5) What is grid-connected system and draw a simplified diagram
6) Explain Cadmium telluride's cells
7) What is Si ingot? How it is obtained
8) What are the stages in producing Si from raw material, Sand?
9) I-V curves of two solar cell are given in Fig. What will be the Isc and Voc of the cell. a)if they are connected in series and b) if they are connected in parallel?. Assume that each section on the x-axis and y-axis as one unit of voltage and current respectively.



Q-3 A) Explain how temperature and radiation of a cell affect its efficiency. (06)
Q-3 B) Describe photo-voltaic principles. How it is distinguished from a photo cell? Enumerate the advantage and disadvantage of solar photovoltaic technology. (06)

OR

Q-3 B) Describe electronic structure of semiconductor in detailed with neat sketch diagram. (06)
Q-4 A) Write main advantages of distributed PV system over centralized power stations? (06)
Q-4B) Describe various types of rural electrification system in detailed with diagram (06)

OR

Q-4 B) Explain in detailed how PV system used for telecommunication services. (06)
Q-5A) Describe various method used for obtaining EGS with neat diagram (06)
Q-5B) Describe CZ process with detailed diagram (06)

OR

Q-5B) Describe FZ processes with details diagram. Write advantages of FZ process over CZ process. (06)
Q-6 A) Describe lead acid battery energy storage with chemical reactions. (06)
Q-6B) Explain the concept of direct and indirect band gap. Give some examples of direct and indirect band gap of materials. (06)

OR

Q-6 B) Explain types of batteries in detailed with suitable example (06)