

4/6/18

E (Electrical) Sem VIII CBGS May 18

Renewable Energy & Energy
Storage Sys
(3 Hours)

Q.P. Code: 50312

[Total Marks: 80]

(1/1)

- N.B.: 1. Q.1 is compulsory
2. Answer any Three out of remaining Five questions
3. Assume any suitable data wherever required but justify the same
4. Use graph paper wherever necessary

- Q.1 (A) What are different types of solar thermal systems used in practice? How electrical power can be generated using solar thermal systems? 06
(B) Describe the working principal of power generation system for the following in brief: (i) Flywheel (ii) Micro-hydro 08
(C) What is partial shading problem in solar PV system? What are the means and ways by which it can be mitigated? 06
- Q.2 (A) Explain the basic operation of wind energy system with the help of diagram showing its various components. Explain and compare the features of horizontal axis wind turbine (HAWT) and vertical axis wind turbine (VAWT). 10
(B) Draw the power topology of wind energy system based on Doubly Fed Induction Generator (DFIG) and SCIG. Also explain its working of both. 10
- Q.3 (A) What type of energy storage is suitable for hybrid combination with (i) solar PV source (ii) Fuel cell source? Justify your answer? 08
(B) Draw a power topology of a hybrid system comprising of Solar PV, Fuel Cell, ultracapacitor and battery sources feeding the standalone load and explain the working and power sharing scenario briefly. 12
- Q.4 (A) State and explain the following parameters of the batteries: SOC, DOD, C-rate and Energy efficiency. 10
(B) Describe the working principle of Proton Exchange Membrane Fuel Cell (PEMFC) and explain its electrical characteristics. 05
(C) Explain the working of a PEMFC fed power converter/inverter topology that can be used to feed a single phase AC standalone load. 05
- Q.5 (A) Compare various solar PV technology like mono-crystalline, poly-crystalline & thin film. 10
(B) Explain the principles of following technologies: 10
(i) Tidal Energy system (ii) Wave Energy system
- Q.6 (A) How a solar PV system performance gets affected due (i) mismatch in modules (ii) Hot-spots in PV panels? Explain means to minimize these effects? 06
(B) Describe the use of Energy Storage components in Smart-grid and Electric vehicle applications. 06
(C) Draw and describe the operation of a hybrid power system using the solar PV (8kW), PEM fuel (2kW) cell and a ultra capacitor (UC) of 165F/48V to feed a standalone load. The standalone load varies from 1.5kW to 7 kW depending on the requirement. Describe at least three scenarios in which all three sources viz. SPV, FC and UC power shared with the load changes. 08
