

- N.B. : (1) Question No.1 is compulsory  
(2) Attempt any three from the remaining  
(3) Figures to the right indicate full marks  
(4) Assume suitable data if necessary

1. (a) Compare Horizontal Axis Wind Technology and Vertical Axis Wind Technology. 20  
(b) List out the solar PV technologies. Illustrate anyone in brief.  
(c) Write a short note on Solar Pond.  
(d) Explain the role of renewable energy and energy storage systems in a futuristic power system scenario. Describe the renewable energy policy adopted by India.
2. (a) Explain the working principle of geothermal energy conversion. Write its advantages and disadvantages. 10  
(b) Explain the working of WES with its various components. What are the different power converter topologies used for WES? Explain any one of them in detail. 10
3. (a) Illustrate the significance of MPPT in PV system. Distinguish between mechanical and electrical means of MPPT. Explain perturb and observe MPPT algorithm with the help of suitable diagram. 10  
(b) Draw I-V and P-V characteristics of solar PV panels at standard test conditions. Clearly mark all essential parameters on the characteristics. Also show the impact of change in solar radiation and operating temperature on its characteristics. 10
4. (a) Explain the types of wind turbine and Wind turbine characteristics 10  
(b) What are the different ways to use solar thermal energy? Describe any one of them in brief with the help of a neat diagram. 10
5. (a) State the effect of the following on solar PV system performance i) Mismatch in modules ii) Hot spots in the modules iii) Bypass diode iv) Blocking diode. 10  
(b) Describe the working principle of proton exchange membrane fuel cell (PEMFC) and explain its electrical characteristics. Draw a PEMFC fed power converter topology that can be used to feed a single-phase standalone load. 10
6. (a) Explain the principles of the following technologies i) Tidal energy ii) wave energy 10  
(b) Describe the electrical power generation with the following technology in brief: Ocean thermal energy system 10

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