

Roll No.

Total Pages : 3

013602

August/September 2022

B.Tech. (ME) VI SEMESTER

Renewable Energy System (MPS-103A)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) State three reasons for the pressing need to use renewable energy sources. (1.5)
- (b) Distinguish between low & high temperature fuel cells. (1.5)
- (c) Does induction generator run at synchronous speed, or at less than synchronous speed or at what speed? Is induction generator better than synchronous generator for application in renewable energy systems? (1.5)

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- (d) On what considerations is the location of wind power plant based? (1.5)
- (e) Draw the equivalent model of a PV cell. What are its main parameters? (1.5)
- (f) Briefly state the role of ultra capacitors & flywheel in energy storage. What is the typical feature of a flywheel? (1.5)
- (g) Can an islanded A.C. generating system be connected to grid randomly at any moment of time? If not what are the considerations of such interconnection? (1.5)
- (h) Power injection is called for in what situations & with what benefit(s)? (1.5)
- (i) What are the options of demand side management? How do these compare with options of supply side management? (1.5)
- (j) If air velocity is not constant, is the A.C. produced by a wind generator of a constant frequency? If not, how is such power fed to the grid. (1.5)

PART-B

- 2. (a) Classify wind turbines. Discuss any *three* types of wind turbines. (10)
- (b) Briefly describe the modern controls of power systems. How do they outperform the conventional control techniques? (5)

- 3. (a) Discuss the precautions with regard to fuel cells. What are their disadvantages? (5)
- (b) Describe the characteristics of a solar PV cell. Are these influenced by temperature? (10)
- 4. Explain the stand-alone and grid-interconnected behaviour/operation of an induction generator. With what levers/ tools the speed and voltage controls are effected / executed? (15)
- 5. (a) How can superconducting media be used as storage system? (5)
- (b) Compare & contrast the compressed air energy storage system to pumped hydroelectric energy storage system. (10)
- 6. (a) In integration of different renewable sources of energy, what are the issues of interconnection & of islanding. How are these dealt with? (10)
- (b) Distinguish between bus bar & grid. Classify grids. What are the causes of grid failure? (5)
- 7. Write technical notes on :
 - (a) Standards & Codes for Interconnection of renewable energy systems with Grid.
 - (b) Hydrogen as fuel cell. (8, 7)