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MRWE–002

MASTER OF SCIENCE (RENEWABLE ENERGY AND ENVIRONMENT) (MSCRWEE)

Term-End Examination

June, 2024

MRWE-002 : ENERGY STORAGE

Time : 3 Hours *Maximum Marks : 70*

Note : (*i*) *Answer any* ***seven*** *questions.*

(*ii*) *All questions carry equal marks.*

1. (a) Discuss the compressed air energy storage system. 5

   (b) How do policy and regulatory frameworks influence the deployment and adoption of energy storage system ? 5

2. (a) Discuss the safety considerations and measures implemented in flywheel energy storage systems to prevent accidents. 5

   (b) Explain the charging and discharging process of flywheel. 5

3. (a) Explain in brief synthetic fuel energy storage. 5

   (b) Discuss the various parameters or factors essential for the selection of batteries. 5

4. Distinguish between any *four* of the following :

   $2\frac{1}{2} \times 4 = 10$

   (a) Primary and secondary battery

   (b) Hydrogen fuel cell and direct methanol fuel cell

   (c) Capacitor and batteries

   (d) Solid and Liquid hydrogen storage systems

   (e) Short duration energy storage system and Long duration energy storage system

   (d) Stratified storage system and rock bed storage system

5. Discuss the different modes of hydrogen storage and their suitability for various applications. 10

6. (a) Explain the function of catalyst in fuel cell. 5

   (b) What are the safety concerns associated with fuel cell ? 5

7. (a) Describe the working principle of super-conducting magnetic storage system (SMES) with the help of a neat sketch. 5

(b) Discuss the characterization of Phase change materials. 5

8. (a) Explain the innovative strategies for thermal energy storage in buildings. 5

(b) Discuss the potential of grid connected energy storage in supporting electric vehicle. 5

9. (a) Choose a specific renewable energy technology and explain how sensible heat storage can enhance the performance and stability of the chosen technology. 5

(b) What is Latent Heat Thermal Energy Storage (LHTES) and how does it work ? 5

10. Write short notes on any *two* of the following : 5+5

(a) Advanced Batteries

(b) Earth storage

(c) Photochemical energy storage

(d) Flywheel energy storage system