

Assignment Booklet

MSCRWEE Programme M.Sc (Renewable Energy and Environment)

Third Semester / Fourth Semester (Electives)	
MRWE-001	Nano Technology in Energy & Environment
MRWE-002	Energy Storage
MEV-021	Introduction to Climate Change
MEVE-001	Environmental Impact Assessment for Environmental Health
MCS-224	Artificial Intelligence and Machine Learning
MCS-226	Data Science and Big Data
MCS-227	Cloud Computing and IoT
MCS-231	Mobile Computing



**SCHOOL OF ENGINEERING & TECHNOLOGY
INDIRA GANDHI NATIONAL OPEN UNIVERSITY**
Maidan Garhi, New Delhi – 110 068

January 2025

Dear Student,

Please read the information on assignments in the Programme Guide that we have sent you after your enrolment. A weightage of 30%, as you are aware, has been earmarked for continuous evaluation, **which would consist of one tutor-marked assignment** for this Programme. The assignment for MSCRWEE (Third semester / fourth semester) has been given in this booklet.

Instructions for Formatting Your Assignments

Before attempting the assignment, please read the following instructions carefully:

1) On top of the first page of your answer sheet, please write the details exactly in the following format:

ENROLLMENT NO :

NAME :

ADDRESS :

.....

.....

PROGRAMME CODE:

COURSE CODE:

COURSE TITLE:

STUDY CENTRE:

DATE:

PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.

- 2) Use only foolscap size writing paper (but not of very thin variety) for writing your answers.
- 3) Leave 4 cm margin on the left, top and bottom of your answer sheet.
- 4) Your answers should be precise.
- 5) **These assignments submitted should be hand written in your own hand writing.**

We strongly suggest that you should retain a copy of your answer sheets.

- 6) **You cannot fill the Exam Form without** submission of the assignments. So solve it and **submit it at the earliest**. If you wish to appear in the **TEE, June 2025**, you should submit your TMAs by **April 30, 2025**. Similarly, if you wish to appear in the **TEE, December 2025**, you should submit your TMAs by **September 30, 2025**.
- 7) Assignments will be submitted at **your respective regional centre**.

We wish you good luck!

Assignment -2
(To be done **after** studying the course material)

Course Code: MRWE-002
Course Title: Energy Storage
Assignment Code: MRWE-002/TMA/2025
Maximum Marks: 100

Last Date of Submission: April 30, 2025 (For June TEE), September 30, 2025 (For December TEE)
Note:

- 1. For any question worth 5 marks the word limit is 200 words, for a 10 mark question it is 350 words.**
 - 2. All questions are compulsory. All questions carry equal marks.**
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| Q.1 | What are the challenges and opportunities associated with integrating energy storage systems into the electrical grid? | 10 |
| Q.2 | Explain the design considerations for a flywheel rotor, including material selection, shape, and balancing techniques. Discuss the factors that affect the maximum achievable energy storage capacity. | 10 |
| Q.3 | Discuss the concept of redox flow batteries and their advantages over other battery technologies. | 10 |
| Q.4 | Discuss the safety aspects associated with hydrogen energy storage. Explain the measures, regulations, and best practices implemented to ensure safe storage, handling, and transportation of hydrogen. | 10 |
| Q.5 | a) Compare different fuel cells based upon efficiency, operating temperature and fuel used. | 05 |
| | b) What are the main components of a fuel cell? How does a fuel cell generate electricity? | 05 |
| Q.6 | What are the factors need to be considered while designing PCM? What are the different applications of PCM? | 10 |
| Q.7 | Explain the innovative strategies used for Thermal Solar Energy Storage in buildings to achieve 3E goals. | 10 |
| Q.8 | Compare and contrast the capital costs and operational costs of pumped-storage hydroelectricity and lithium-ion battery storage systems. What factors contribute to the cost differences between these two technologies? | 10 |
| Q.9 | Discuss the economic viability of implementing sensible heat storage systems in different sectors. Analyze the factors that influence the cost- effectiveness and return on investment of such systems, considering both the initial capital costs and long-term operational benefits. | 10 |
| Q.10 | a) What are the challenges or limitations associated with implementing LHTES systems? | 05 |
| | b) Provide examples of real-world applications or case studies where LHTES systems have been successfully implemented. | 05 |