# **Assignment Booklet**

### **MSCRWEE Programme**

M.Sc (Renewable Energy and Environment)

Third Semester (Compulsory)			
MRW-005	Solar Energy and Applications		
MRW-006	Bioenergy Conversion and Utilization		
MRW-007	Energy Economics and Planning		

Third 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 tutormarked assignment for this Programme. The assignment for MSCRWEE (Third 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	۲ NO :
Ν	JAME :
ADDI	RESS :
PROGRAMME CODE:	
COURSE CODE:	
COURSE TITLE:	
STUDY CENTRE:	DATE:

## PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION ANDTO 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.

- 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 -1

(To be done after studying the course material)

#### Course Code: MRWE-001 Course Title: Nano Technology in Energy & Environment Assignment Code: MRWE-001/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.

Q.1	a)	Define Nano-Technology. Explain the basic concepts of Nano-Technology.	5
	b)	Describe Nano Size and Nano Seale with suitable examples.	5
Q.2	a)	What are techniques used in Nano Technology? Explain any one.	5
	b)	What is synthesis of Nano Materials? Also describe the various properties of Nano Materials.	5
Q.3	a)	Discuss top-down and bottom-up approach with suitable sketch and list out the various methods of top-down and bottom-up approach.	5
	b)	What is Nano bot? List out the various applications of Nano bot.	5
Q.4	a)	Explain the working of Scanning Electron Microscopy (SEM) with suitable diagram. List outs its advantages and applications.	5
	b)	Difference between SEM and TEM.	5
Q.5	a)	How do you apply or use Nano Technology into energy sector? Explain in brief.	5
	b)	What is Energy Conversion Process? Explain single stage and multistage energy conversion process.	5
Q.6	a)	Explain briefly how Nano-Technology could be applied in Solar Energy.	5
	b)	What do you understand about Micro Electro Mechanical Systems (MEMS) and Nano Electro Mechanical Systems (NEMS)? Explain and list out its application.	5
Q.7	a)	Explain the working of Hydrogen Storage System with suitable diagram.	5
	b)	How Green Nano Technology could be developed? Explain with steps by step procedure.	5
Q.8	a)	Explain Nano-Micro Silicon (Si) composite structure and what are the various technologies used in silicon (Si) deposition.	5
	b)	How do you monitor the various environmental factors by using sensors?	5
Q.9	a)	How do you prevent the pollution by using Nano Technology? Explain with suitable examples.	5
	b)	Discuss the various applications of Nano Technology in Environment.	5

	Write short notes of the following:	
a)	Carbon Nano Tubes	5
b)	Green Nano Material	5
c)	Pollution Abatement	5
d)	Nano Sensor	5
	a) b) c) d)	<ul> <li>Write short notes of the following:</li> <li>a) Carbon Nano Tubes</li> <li>b) Green Nano Material</li> <li>c) Pollution Abatement</li> <li>d) Nano Sensor</li> </ul>

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

#### Assignment -3 (To be done **after** studying the course material)

#### Course Code: MEV-021 Course Title: Introduction to Climate Change Assignment Code: MEV-021/TMA/2025

Assignment Code: MEV-0217 IMA/2025 Maximum Marks: 100 025 (Ear June TEE) September 20, 2025 (Ear December TEE)

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

- 1. For any question worth 10 marks the word limit is 350 words, for a 20 mark question it is 550 words.
- 2. Attempt ANY FIVE questions. All questions carry equal marks.

Q.1	Write short notes on the following: a. Radiative Forcing	20
	b. "Cloud feedback" and "Lapse-rate feedback"	
Q.2	Explain the features of the Paris Agreement on Climate Change.	20
Q.3	Explain the National Action Plan on Climate change.	20
Q.4	<ul><li>Write short notes on the following:</li><li>a. Representative Concentration Pathway</li><li>b. General Circulation Models</li></ul>	20
Q.5	Explain the sources of palaeoclimatic data.	20
Q.6	Explain the natural drivers of climate change.	20