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
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 2023

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 wouldconsist of one tutor-marked 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 NO :……

NAME :……

ADDRESS :……

……

……

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.

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 2023,** you should submit your TMAs by **April 30, 2023.** Similarly, if you wish to appear in the **TEE, December 2023,** you should submit your TMAs by **September 30, 2023.**

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: MRW-005
Course Title: Solar Energy and Applications
Assignment Code: MRW-005/TMA/2023
Maximum Marks: 100
Last Date of Submission: April 30, 2023

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)	Explain spectral absorptivity, reflectivity and transmissivity.	5
	b)	State Stefan-Boltzmann law and Kirchhoff's law of thermal radiation.	5
Q.2	a)	What is I-V characteristics of a solar cell?	5
	b)	Draw the equivalent circuit of solar cell.	5
Q.3	a)	Explain the construction of solar module.	5
	b)	State various losses in the solar module.	5
Q.4		Write Energy Balance Equations of Flat-Plate Collectors.	10
Q.5		Explain the function of stand-alone solar PV system without battery with neat block diagram of any one configuration?	10
Q.6		List the various steps involved in the design of solar PV system.	10
Q.7		What is the effective life of a photovoltaic module? State the factors on which voltage output of a PV module depends.	10
Q.8		Explain the working principles of Solar Air Heating Systems.	10
Q.9		Describe the concept of direct gain heating and cooling of solar passive buildings. Which materials should be used in such designs?	10
Q.10	a)	Give five steps which you can follow in order to reduce the effect of greenhouse.	5
	b)	One tonne of rice is to be dried from 25% moisture content to 15% moisture contents. Determine the amount of water to be removed.	5

Assignment -2

(To be done **after** studying the course material)

Course Code: MRW-006
Course Title: Bioenergy Conversion and Utilization
Assignment Code: MRW-006/TMA/2023
Maximum Marks: 100
Last Date of Submission: April 30, 2023

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	Describe the techniques of biomass assessment.	10
Q.2	What do you mean by waste minimization? Explain the significance of waste recycling.	10
Q.3	Explain the process of controlled air incineration. Discuss the measures to mitigate environmental effects due to incineration	10
Q.4	Discuss the hydrothermal liquification process with neat sketch.	10
Q.5	Explain the process parameters of biomethanation process.	10
Q.6	Describe the National Biogas and Manure Management Programme in detail.	10
Q.7	Explain the method of hydrogen production.	10
Q.8	Discuss the characteristics of biomass.	10
Q.9	Discuss the fuel qualities essential for spark ignition engine.	10
Q.10	Write short notes on the following: (a) Distribution and marketing of biofuels (b) Knowledge-Based Control System for bioreactors.	10

Assignment -3

(To be done **after** studying the course material)

Course Code: MRW-007
Course Title: Energy Economics and Planning
Assignment Code: MRW-007/TMA/2023
Maximum Marks: 100
Last Date of Submission: April 30, 2023

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) Describe Herzberg's two factor theory in detail. 5

b) Why an effective control process is needed in an organisation? 5

Q.2 Explain the concept of elasticity of demand and explain its usefulness? 10

Q.3 a) Describe in detail the terms economic environment and business management. 5

b) How Infrastructure and Economic Growth are interrelated? 5

Q.4 What is Energy Pricing? Explain its significance in economics. 10
Explain in brief the Principle of Intergenerational Equity.

Q.5 In your opinion, is the UN an effective organisation for global environmental action? Justify your answer with facts and evidences. 10

Q.6 Mr. Laxman receives a provident fund amount of Rs. 100000. He deposits in a bank which pays 10 percent interest. If he withdraws annually Rs. 20000, how long can he do so? 10

Q.7 a) Explain the three phases in decision making process. 5

b) Explain in detail the utility of integrated rural energy planning. 5

Q.8 The details of a solar thermal plant is given below. Calculate the life cycle cost per unit for the power plant. Assume the suitable values if required. 10

Sr. No.	Item	Cost in Rs./KW	Life Period
1.	Heat energy collectors	25000	20years
2.	Boiler+ steam turbine	13900	10years
3.	Electric generator	5500	10years
4.	Accessories, tools	1000	5years

Q.9 Discuss the various factors which drives the energy pricing. 10

Q.10 Write short notes on the following: 10

a) Climate Change Convention, 1992
b) Econologic Model or Economic Man Model
c) Optimum hybrid energy system
d) Techno economic Evaluation

ELECTIVE ASSIGNMENTS

(Attempt the assignment of the elective subject for which you are registered)

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/2023
Maximum Marks:100
Last Date of Submission: April 30, 2023

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)	What is Nano Technology? Explain the basic concept of Nano Technology?	5
	b)	List out the various technologies used in Nano Technology for the measurement. Explain the working of Scanning Electron Microscope with suitable diagram (SEM).	5
Q.2	a)	Differentiate between SEM and TEM. Also list out the advantages and applications of SEM and TEM.	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. List out the various methods of Top-down and Bottom-up approach.	5
	b)	Explain any one method of Top-down and Bottom-up approach with suitable diagram.	5
Q.4	a)	Discuss the following (i) Nano Materials (ii) Carbon Nano Tubes (iii) Nano Wire (iv) Nano Composite Materials (v) Carbon Nano Materials	5
	b)	Explain the working of Atomic Force Microscopy (AFM) with suitable diagram. List out the advantages.	5
Q.5	a)	What is Nano Machine and Nano bot? List out its applications.	5
	b)	Discuss the various applications of Nano Technology and Nano materials?	5
Q.6	a)	What is Energy Conversion process? What are the methods in Energy Conversion process? Explain.	5
	b)	How the Nano Technology can applied in Solar Energy? Explain.	5
Q.7	a)	What do you understand about Micro Electro Mechanical Systems (MEMS) and Nano Electro Mechanical Systems (NEMS)? Explain. Also list out its advantages and applications.	5
	b)	Explain Hydrogen Storage Systems with suitable diagram. List out its applications.	5

Q.8	a)	Explain Solar Power Generator Mechanism with neat sketch and list out the suitable material for solar cell.	5
	b)	Explain Nano-Micro Silicon (Si) composite structures and what are the various technologies used in Silicon (si) deposition.	5
Q.9	a)	How do you monitor the various environmental factors by using sensors? Explain.	5
	b)	What is Nano Sensor? How do you design Nano Sensor? List out its various applications.	5
Q.10	a)	How do you prevent the pollution by using Nano Technology? Explain	5
	b)	What is Green Manufacturing and what do you understand about Green Manufacturing?	5

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

Course Code: MEV-021
Course Title: Introduction to Climate Change
Assignment Code: MEV-021/TMA/2023
Maximum Marks: 100
Last Date of Submission: April 30, 2023

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) Atmospheric composition b) Environmental degradation	20
Q.2	Explain the Global Heat Budget with suitable diagram.	20
Q.3	Write short notes on the following: a) Natural drivers of climate change b) Anthropogenic drivers of climate change	20
Q.4	Write short notes on the following: a) "Cloud feedback" and "Lapse-rate feedback" b) Representative Concentration Pathway	20
Q.5	Explain the sources of palaeo climatic data.	20
Q.6	Explain the features of the Paris Agreement on Climate Change.	20

Assignment -3

(To be done **after** studying the course material)

Course Code: MEVE-001
Course Title: Environmental Impact Assessment for Environmental Health
Assignment Code: MEVE-001/TMA/2023
Maximum Marks: 100
Last Date of Submission: April 30, 2023

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	Explain the basic principles of EIA?	20
Q.2	Describe the Environmental Auditing process	20
Q.3	What is the Strategic Environmental Assessment? Explain its process.	20
Q.4	Explain in detail about Cost Benefit Analysis?	20
Q.5	When can the public be involved in the EIA? What is the importance of public consultation during the EIA?	20
Q.6	What are the objectives and types of energy audit? Explain in detail.	20
Q.7	Give a brief account on EIA laws and guidelines.	20

Assignment -4

(To be done **after** studying the course material)

Course Code: MCS-224
Course Title: Artificial Intelligence and Machine Learning
Assignment Code: MCS-224/TMA/2023
Maximum Marks: 100
Last Date of Submission: April 30, 2023

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 all questions. All questions carry equal marks.**

Q.1	Differentiate between Artificial Intelligence, Machine Learning and Deep learning.	10
Q.2	Briefly discuss the concept of single agent search and two agent search in Artificial Intelligence.	10
Q.3	Compare and contrast the predicate logic and propositional logic, give suitable example for each. Also write De Morgan's laws for both.	10
Q.4	Discuss the concept of Resolution with the help of suitable example.	10
Q.5	What do you understand by Bayesian Theory, with reference to its utility in artificial intelligence?	10
Q.6	Explain the concept of semantic nets with the help of suitable diagram	10
Q.7	What are Fuzzy sets? How do they differ from Rough sets?	10
Q.8	Differentiate between Supervised learning and Unsupervised learning, give suitable example for each.	10
Q.9	Discuss the concept of Linear regression and its utility in context of machine learning.	10
Q.10	Give brief introduction to the concept of feature selection and feature extraction, give suitable example for each.	10

Assignment -5

(To be done **after** studying the course material)

Course Code: MCS-226
Course Title: Data Science and Big Data
Assignment Code: MCS-226/TMA/2023
Maximum Marks: 100
Last Date of Submission: April 30, 2023

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 all questions. All questions carry equal marks.**

Q.1	What is data science? What are its applications? Define the terms Descriptive, Exploratory and Predictive in the context of data analysis. What is the difference between Causal inference and prediction?	10
Q.2	Explain the following with the help of an example in the context of statistics and Probability: Conditional Probability, Bayes Theorem, Normal distribution, Central limit theorem and Statistical Hypothesis	10
Q.3	A class has 25 students. Create a data set of marks of the students in Mathematics out of a maximum of 50 marks. Make the histogram and box plot for this data. Can you draw scatter plots using this data? Give reasons in support of your answer	10
Q.4	Explain Big data and its characteristics. How is Big data different to relational data? Explain with the help of an example. Define the characteristics of HDFS. Explain purpose of name node, data node and job tracker in this context.	10
Q.5	What is Map-Reduce programming? Explain the map phase, shuffling and sorting and reduce phase with the help of an example of word counting problem.	10
Q.6	What are NoSQL databases? How are they different from relational database management system? List the features of any four types of NoSQL databases.	10
Q.7	Explain the Jaccard similarity of sets with the help of an example. What are the ways of finding similarity between two documents? Also, define the term collaborative filtering.	10
Q.8	What is a data stream? How is it different to relational data? List the issues and challenges of handling data streams. What is the role of bloom filter?	10

Q.9	Explain the role of link analysis. Explain a page ranking algorithm with the help of an example. What is link spam? Explain the role of hubs and authorities for finding page rank.	10
Q.10	Create a sample data of the marks of 20 students in five different subjects using MS-Excel. How can you use this data for programming in R? Write programs using R programming language to create four different plots using this data.	10

Assignment -6

(To be done **after** studying the course material)

Course Code: MCS-227
Course Title: Cloud Computing and IoT
Assignment Code: MCS-227/TMA/2023
Maximum Marks: 100
Last Date of Submission: April 30, 2023

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 all questions. All questions carry equal marks.**

Q.1 Cloud Service models like Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (Saas) were discussed in the course. Explore the features, benefits and relevant use cases for other service models like Security as a Service (SECaaS), Database as a Service (DBaaS), Analytics as a Service (AaaS) and API as a Service (APIaaS). 20

Q.2 a) What do you understand by Resource Virtualization and its underlying abstraction? 20

b) Describe various Hypervisor based virtualization approaches like full virtualization, para virtualization and h/w-assisted virtualization.

c) Compare Xenserver Vs VMware with respect to the features like Guest O/S support, Backup facility, Thin provisioning, asset management and configuration mapping, dynamic resource allocation and failover, graphics support, licensing, host server management and storage specifications.

Q.3 Define scaling concept in cloud computing. Explain the following scaling strategies: 20

(a) Proactive Scaling

(b) Reactive Scaling

(c) Combinational Scaling

Q.4 Compare and contrast Cloud Computing, Fog Computing and Edge Computing. Briefly discuss two applications for each of Fog Computing and Edge Computing. 20

Q.5 Briefly discuss any two (for each of the sector) Use Cases of IoT in the following sectors: 20

(a) Agriculture

(b) Transportation

Assignment -7

(To be done **after** studying the course material)

Course Code: MCS-231
Course Title: Mobile Computing
Assignment Code: MCS-231/TMA/2023
Maximum Marks: 100
Last Date of Submission: April 30, 2023

Note:

1. **For any question worth 20 marks the word limit is 550 words, for a 25 mark question it is 650 words.**

2. **Attempt all questions. All questions carry equal marks.**

Q.1	Briefly explain the terms "Guided Transmission" and "Unguided Transmission".	25
Q.2	What is meant by Modulation? Explain any one type of Modulation.	25
Q.3	What is meant by Multiplexing? How does TDMA differ from FDMA?	25
Q.4	What are the advantages and disadvantages of 4G networks in comparison to 3G networks?	25