

Assignment Booklet

MSCRWEE Programme
M.Sc (Renewable Energy and Environment)

First Semester	
MRW-001	Energy Conversion
MRW-002	Heat Transfer
MST-001	Foundation of Mathematics and Statistics
MED-003	Energy and Environment



***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 would consist of one tutor-marked assignment** for this Programme. The assignment for MSCRWEE (first 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 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-001

Course Title: Energy Conversion

Assignment Code: MRW-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.
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Q.1	a) What is heat transfer? What are its positive and negative directions? Explain with the help of some examples.	5
	b) Explain the difference between generator and motor on the basis of mode of energy conversion.	5
Q.2	Describe the function of spark plug in a petrol engine. How does combustion occur in diesel engine?	10
Q.3	Differentiate between boiler mountings and boiler accessories. Give two examples of each. Also explain any one of the boiler mountings with a neat sketch.	10
Q.4	a) What are the differences between axial flow and mixed flow double-motion reaction turbines?	5
	b) Briefly describe the major components of closed cycle gas turbine power plants.	5
Q.5	Explain the knocking and anti knocking characteristics of a fuel.	10
Q.6	Classify different types of coal. Explain any one of them. Which of these coals contains maximum moisture and which contains maximum carbon?	10
Q.7	Define biogas and enlist various sources of biogas. How can we use biogas for power generation?	10
Q.8	In how many different ways the solar energy can be used for generating power? Despite solar energy being free, use of solar energy for power is very less. Give reasons.	10
Q.9	Write short notes on the following:	
	a) Heat of combustion	5
	b) Tidal Energy	5
	c) Wind Energy	5
	d) Heat of Atomization	5

Assignment -2

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

Course Code: MRW-002

Course Title: Heat Transfer

Assignment Code: MRW-002/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. Marks for the questions are shown within brackets on the right-hand side.

Q.1	Discuss in detail the aims of studying heat transfer and its various applications.	10
Q.2	a) What is convection heat transfer? Why is it considered to be a mode of heat transfer?	5
	b) Give two examples each of natural and forced circulation	5
Q.3	A hot plate of area 0.5 m^2 is maintained at a temperature of 60°C by a 100W electric heater when room temperature is 30°C . The appropriate convection coefficient is $2.15 (\Delta T)^{1/3} \text{ W/m}^2\text{K}$. What fraction of the heat supplied is lost by natural convection? What happens to the rest of the heat supplied?	10
Q.4	The quantity of radiation received by earth from the sun is 1.4 kW/m^2 (solar constant). Assuming that sun is an ideal radiator, calculate the surface temperature of the sun. The ratio of the radius of earth's orbit to the radius of the sun is 216.	10
Q.5	a) What is Fourier's law? What are its key features?	5
	b) Calculate the net thermal resistance and the net heat transfer for a composite wall comprising of three walls of lengths L_1 , L_2 , L_3 and thermal conductivities K_1 , K_2 , K_3 respectively in series. Area of cross-section is the same for all three walls and is given as A .	5
Q.6	Derive the expression for critical radius of insulation for a cylinder and also discuss how thickness of insulation affects the heat transfer rate from a particular body.	10
Q.7	Derive the expression for the temperature reached by a solid at a given time 't' in case of transient heat conduction.	10
Q.8	Explain with the help of a diagram the concept of hydrodynamic and thermal boundary layer for a laminar flow over a thin flat plate. Also define critical Reynolds number and the physical significance of Prandtl number?	10
Q.9	a) Explain the following terms: i) Radiosity ii) Emission iii) Spectral Intensity	6
	b) What is a black body and what are its characteristics?	4
Q.10	State Kirchoff's law and derive the expression for the law. Also explain what is a gray surface?	10

Assignment -3

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

Course Code: MST-001

Course Title: Foundation of Mathematics and Statistics

Assignment Code: MST-001TMA/2023

Maximum Marks: 100

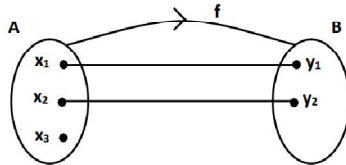
Last Date of Submission: April 30, 2023

Note:

1. For any question worth 5 marks the word limit is 200 words, for a 10 mark question it is 350 words and for a 20 mark question it is above 500 words.
 2. All questions are compulsory. Marks for the questions are shown within brackets on the right-hand side.
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Q.1 State whether the following statements are True or False and also give the reason in support of your answer.

- a) Collection of rich persons in India forms a set. 2
- b) Following rule is a function from A to B. 2



- c) $\frac{d}{dx}(9-7x)^5 = 45(9-7x)^4$ 2
- d) In exclusive method, upper limit of a class is included in the same class. 2
- e) The order of the matrix $\begin{bmatrix} 2 & 5 & 6 \\ 4 & 3 & 1 \end{bmatrix}$ is 3×2 . 2

Q.2 a) If four cards are chosen from a pack of 52 playing cards then find the number of ways that all four cards are:

- a) of same suit 2
- b) red 2
- c) face cards 2
- d) king 2
- e) of different suit 2

Q.3 Arrange the numbers 49, 36, 42, 19, 22, 27, 14, 13, 24, 48, 23, 28, 17, 42, 39, 45, 22, 24, 17, 41, 18, 42, 38, 43, 11, 27, 36, 13, 40, 30, 24, 10, 18, 47, 18, 19, 23, 12, 27 in stretched stem-and-leaf display that has single-digit starting parts and leaves, but has stem width of 5. 10

Q.4 If the universal set is $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ and $A = \{2, 3, 6, 7\}$, $B = \{4, 6, 8\}$, $C = \{6, 7, 8\}$ are the subsets of U , then verify

- a) De-Morgan's laws 5
- b) left distributive law 5

Q.5 Evaluate the following:

- a) $\int x^2 e^{2x} dx$ 5

b) $\frac{dy}{dx}$, where $y = (4x + 5)^4 (9x + 4)^5$ 5

Q.6 a) Prove that $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = (a + b + c)(ab + bc + ca - a^2 - b^2 - c^2)$ 5

b) What do you mean by primary data and secondary data? Also give an example in each case. 5

Q.7 Draw a box plot with whisker, +ve sign and outliers for the following data: 20
42, 37, 28, 23, 32, 25, 26, 39, 38, 41, 22, 38, 21, 31, 26, 36, 42, 52, 50, 47, 24, 53, 28

Q.8 a) Find the values of **a** and **b**, if the function **f** given below is continuous at $x=2$ 8

$$f(x) = \begin{cases} a + b & x < 2 \\ a + bx + 4, & x = 2 \\ 5, & x > 2 \end{cases}$$

b) Draw a histogram for the following data: 12

Wages	40-49	50-69	70-99	100-109	110-119
No of workers	2	20	60	35	4

Also draw frequency polygon in the same graph

Assignment -4

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

Course Code: MED-003

Course Title: Energy and Environment

Assignment Code: MED-003/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. Marks for the questions are shown within brackets on the right-hand side.
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Q.1	Explain how the Earth's carrying capacity can be estimated using various parameters.	10
Q.2	Explain the basic principle of electricity generation underlying the thermal and the nuclear power plant.	10
Q.3	Analyse the impact of liberalisation and privatisation of the energy sector on the people of developing countries.	10
Q.4	Highlight a few measures that can be used to save energy in the residential and industrial sectors in India.	10
Q.5	Explain the demand side, end-use, and energy-services approach in energy economics.	10
Q.6	Analyse energy in relation to sustainability and explain the requirements of governance and finance for sustainable energy.	10
Q.7	Discuss the role of individuals in effecting energy savings and developing energy infrastructure.	10
Q.8	a) Discuss the measures that can help in achieving the goals of energy policy.	5
	b) Discuss the measures that need to be taken for sustainable energy use in the future.	5
Q.9	Write short notes on the following:	
	a) Applications of solar energy	5
	b) Advantages and limitations of small hydropower plant	5
	c) Applications of biomass technologies	5
	d) Criteria to set up wind energy system	5