Assignment Booklet

MSCRWEE Programme
M.Sc (Renewable Energy and Environment)

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

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THE PEOPLE'S
UNIVERSITY

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

JANUARY 2022

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 (first semester) has been given in this booklet.

<center>**Instructions for Formatting Your Assignments**</center>

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:

<center>ENROLLMENT NO :…………………………………………</center>
<center>NAME :…………………………………………</center>
<center>ADDRESS :…………………………………………</center>
<center>…………………………………………</center>
<center>…………………………………………</center>

PROGRAMME CODE: ………………………..

COURSE CODE: ……………………………….

COURSE TITLE: ………………………………

STUDY CENTRE: …………………..……….   DATE: …………….……………....

<center>**PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION ANDTO AVOID DELAY.**</center>

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) **This assignments submitted should be hand written in your own hand writing.**

<center>*We strongly suggest that you should retain a copy of your answer sheets.*</center>

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 2022,** you should submit your TMAs by **May 15, 2022.** Similarly, if you wish to appear in the **TEE, December 2022,** you should submit your TMAs by **September 30, 2022.**

7) Assignments will be submitted at **Block C, SOET, IGNOU, Maidan Garhi-110068.**

We wish you good luck!

TUTOR MARKED ASSIGNMENT

MRW-001

ENERGY CONVERSION

Maximum Marks : 100   Course Code: MRW- 001
Weightage : 30%   Last Date of Submission: May 15, 2022

Note : All questions are compulsory and carry equal marks.

Q.1 (a) Describe different types of wastes. How can waste be used? What is municipal solid waste? Describe different categories of MSW.

(b) What is the solid waste scenario in Indian cities? What is integrated solid waste management?

Q.2 (a) How do you classify waste? What functions are identified in waste management? What is an incinerator?

(b) How are particulate matters removed from flue gas of an incinerator? Distinguish between pyrolysis and starved air incineration.

Q.3 (a) Discuss different treatments given to hazardous waste before final disposal. Why are such treatments necessary? Give names of such disposal methods which do not require pretreatments.

(b) What is incineration? What are different incineration technologies? What are the advantages of rotary kiln?

Q4. (a) Why does a fire occur? Describe fire classes and portable extinguishers used against them.

(b) What is the role of first aid in responding to emergency? Describe contents of a first aid kit. What are different elements of emergency planning?

Q5. (a) "Safety alone is not the objective of Safety Engineering. Health of worker should also be included in the objective." Justify the statement.

(b) What is occupational safety? Describe reasons for risks to the safety and health of a worker in work place.

Q6. (a) Enumerate the health problems arising out of industrialization. Discuss the measures for health protection of workers.

(b) Describe the types of Accidents and discuss the preventive measures.

Q7. (a) Describe principles on which gas detection in industrial environment is made.

(b) What is acid rain? Which pollutants cause acid rains?

Q8. (a) Describe a typical landfill cross-section and bring out the significance of each layer.

(b) What is incineration? What are different incineration technologies? What are the advantages of rotary kiln?

Q9. (a) What are safety inspections? Discuss the objectives and roles of inspectors.

(b)   What is a disaster? Distinguish between a man-made and natural disaster. Describe briefly the after effects of such disasters as earthquake, floods and cyclone.

Q10   What is safety training and why is it necessary? Discuss the role of trainer of safety engineering. Describe four steps of training – preparation, presentation, application and evaluation for safety engineering.

TUTOR MARKED ASSIGNMENT
MRW 002
HEAT TRANSFER

Maximum Marks : 100
Weightage : 30%

Course Code : MRW 002
Last Date of Submission :May 15, 2022

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Computer Aided Process Planning.

Q.1 Describe the mechanism of heat transfer through conduction. Also discuss the Fourier's law of heat conduction.

Q.2 (a) The heat flow rate through a wood board with a 5cm thickness is 500 W/m^2. Temperature difference along the direction of flow of heat between the faces of the wood board is 55^0 C. Calculate the thermal conductivity of wood.

(b) Air at 30^0 C flows over a hot plate (50 c x 75 cm) maintained at 200^0 C with the help of an electric heater. The convection co-efficient is 20 W/m^2. Calculate the heat transfer.

(5 + 5 = 10)

Q.3 Derive the expressions for i) rate of heat transfer through a thin cylinder ii) temperature distribution along the radial direction of cylinder.

Q.4 Discuss, in detail flow over a flat plate.

Q.5 Explain in detail the properties of absorptivity, reflectivity and transmissivity

Q.6 State and derive the expression for kirchoff's law.

Q.7 Derive the general expression for view factor.

Q.8 12 (twelve) number of fins each having thermal conductivity k=75 W/mK and 0.75 mm thickness protrude 25 mm from a cylindrical surface of 50 mm diameter and 1 m length placed in an atmosphere of 40^0 C. If the cylindrical surface is maintained at 150^0 C and the heat transfer coefficient is h=23 W/m^2. K, calculate a) rate of heat transfer b) percentage increase in heat transfer due to fins

Q.9 Define Reynolds number and give the difference between free and forced convection. Also explain viscosity and its unit in SI system.

Q.10 Derive the expression for critical thickness of insulation for a cylinder or a tube.

TUTOR MARKED ASSIGNMENT

MED-003

Energy and Environment

Maximum Marks : 100
Weightage : 30%

Course Code : MED-003
Last Date of Submission : May 15, 2022

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Industrial Engineering and Operations Research.

Q.1   Describe the production technologies used to process wind energy.

Q.2   Analyze the use of energy in relation to sustainability.

Q.3   Discuss the factors that need to be considered in energy economics.

Q.4   Elaborate on "Cleaning-Up" of fossil and nuclear technologies.

Q.5   Explain the working of small hydropower plant.

Q.6   Discuss the principle underlying solar thermal technologies.

Q.7   Elaborate on Power to the people: A Ten-Point agenda for change.

Q.8   Write short notes on the following (not exceeding 200 words):

   a) Biomass potential and its advantages   (5)

   b) Benefits of Demand Side Management   (5)

   c) Non-hydro renewable energy resources   (5)

   d) Limitations of Clean Development Mechanism   (5)

   e) Radioactive waste   (5)

   f) Energy end use in commercial sector   (5)

TUTOR MARKED ASSIGNMENT

MST-001: Foundation in Mathematics and Statistics

Note: All questions are compulsory. Answer in your own words.

1. State whether the following statements are **True** or **False**. Give reason in support of your answer: **(5×2=10)**

    (a) Between any two different rational numbers there is another rational number.

    (b) $\displaystyle\int_{-1000}^{1000} \left(x^{1001} + x^{2001} + x^{3001}\right)dx = 0$

    (c) 210 is 51st term of the sequence 10, 15, 20, 25, …

    (d) $\begin{vmatrix} a & x & b+c \\ b & x & c+a \\ c & x & a+b \end{vmatrix} = 0$

    (e) The range of the data shown in the following frequency distribution is 350.

Classes	200-250	250-300	300-350	350-400	400-450	450-500	500-550
Frequencies	0	7	3	8	4	0	0

2. (a) A carpenter was hired to build 192 window frames. The first day he made five frames and each day thereafter he made two more frames than he made the day before. How many days he will take to finish his job? **(4)**

    (b) Set having values $\dfrac{1}{4}, \dfrac{1}{9}, \dfrac{1}{16}, \dfrac{1}{25}, \dfrac{1}{36}, \dfrac{1}{49}, \ldots$ is countable. **(3)**

    (c) How many words each of three vowels and two consonants can be formed from the letters of the words INVOLUTE? **(3)**

3. (a) Express 700.1400.2100.2800.3500.42000 in terms of factorial.

    (b) How many different signals are possible with 5 blue, 4 red, 3 white and 2 green flags by using all at a time in a queue?

    (c) If in a hall there are 10 randomly selected students then how many numbers of ways are there such that all of them have different birthday. Assume that all of them have their birth day in non-leap years. **(2+4+4)**

4. Discuss the continuity and differentiability of the following function at x = 2/3. **(5+5)**

$$f(x) = \begin{cases} \left| x - \dfrac{2}{3} \right|, & x \neq \dfrac{2}{3} \\ 0, & x = 2/3 \end{cases}$$

5. Evaluate the following integrals: **(5+5)**

(i) $\int \left(10x^9 + 40x^4 + 3\right) \sqrt{x^{10} + 8x^5 + 3x + 5}\, dx$

(ii) $\int \dfrac{1}{(x-5)(x^2+4)}\, dx$

6. Find values of x, y and z given that

$5x + y + z = 36$

$x + y + z = 16$

$10x + 2y + 2z = 72$

You are bound to use the matrix techniques to solve the given equations.

7. **(a)** Write flow charts of Cramer rule and matrix method. **(10)**

(b) Write whether the following data are discrete or continuous. Give reason in support of your answer.

   i) Number of children in a family in a colony of 100 families.

   ii) Number of pages in each of the 50 books having some mistake.

   iii) Height of students of IGNOU who enrolled in 2021.

   iv) Waiting time of metro when a person reaches metro station.

   v) Monthly income of the family. **(5×2=10)**

8. **(a)** Write any 10 principles of data visualisation.

   (b) What is the relation of unit on y-axis with unit on x-axis in histogram. **(10+10)**