Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B,Tech.

SEM: III - THEORY EXAMINATION (2022 - 2023)

Subject: Energy Science & Engg.

Time: 3 Hours   Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A   20

1. Attempt all parts:-

1-i.   Which one of the following cause global warming? (CO5)   1

               (a) Carbon dioxide

               (b) Oxygen

               (c) Nitrogen

               (d) Hydrogen

1-a.   The second law of thermodynamics states that (CO1)   1

               (a) Entropy of an isolated system can never decrease over time

               (b) Entropy of a pure crystalline substance at 0K is 0

               (c) Energy is conserved

               (d) Entropy of a system can never decrease

1-j.   What is the unit of nuclear radiation? (CO5)   1

               (a) Reaumur

               (b) Roentgen

               (c) Rankine

(d) Pascal

1-b.   The Stirling cycle consists of (CO1)   1

        (a) two isothermal and two constant pressure processes

        (b) two isothermal and two constant volume processes

        (c) two isothermal and two adiabatic processes

        (d) none of the mentioned

1-c.   Why neutrons with lower energy should be capable of causing fission? (CO2)   1

        (a) For faster reaction process

        (b) For sustained reaction process

        (c) For Safety purpose

        (d) In order to not waste the nuclear fuel

1-d.   In which of the following process are Neutrons emitted? (CO2)   1

        (a) Inverse beta Decay

        (b) Nuclear fission

        (c) Spontaneous Fission

        (d) Nuclear fusion

1-e.   Solar radiation which reaches the surface without scattering or absorbed is called (CO3)   1

        (a) Beam Radiation

        (b) Infrared radiation

        (c) Ultraviolet radiation

        (d) Diffuse radiation

1-f.   The amount of energy received in unit time on a unit area perpendicular to the sun's   1
direction at the mean distance of the earth from the sun is called (CO3)

        (a) Solar radiation

        (b) Solar constant

        (c) Intensity of solar radiation

        (d) Air Mass

1-g.   Which of the following is a disadvantage of Hydro Power? (CO4)   1

        (a) They cause deforestation and affect wildlife

        (b) They cause harmful emissions

        (c) They are an unstable source of energy

(d) They are not suitable for long-distance electricity transmission

1-h.   Which of the following statement is true about conventional energy sources? (CO4)   1

            (a) They cause minimum pollution

            (b) They are available in limited quantity

            (c) Coal is the most used conventional energy source in the world

            (d) There are sufficient reserves of Coal, Petroleum and Natural gas for the next 300 years

2. Attempt all parts:-

2.a.   Define Thermodynamic Equilibrium. (CO1)   2

2.b.   What do you mean by Electromagnetic Force? (CO2)   2

2.c.   What is solar constant? (CO3)   2

2.d.   Write the differences between geothermal power plant and thermal power plant. (CO4)   2

2.e.   What is green building? (CO5)   2

<div align="center">SECTION B   30</div>

3. Answer any <u>five</u> of the following:-

3-a.   Bring out the differences between closed cycle and open cycle gas power plant. (CO1)   6

3-b.   Explain the concept of electromagnetic energy and its conversion. (CO1)   6

3-c.   Describe the criteria used in selection of nuclear power plant. (CO2)   6

3-d.   Explain the working of a condenser system in a Power plant. (CO2)   6

3.e.   Explain the importance of solar energy in the present day energy crisis. (CO3)   6

3.f.   Briefly discuss the different types of small hydro-power generating plants. (CO4)   6

3.g.   What are the four levels of LEED certification? (CO5)   6

<div align="center">SECTION C   50</div>

4. Answer any <u>one</u> of the following:-

4-a.   Define Refrigeration and COP of refrigeration. Also draw P-V and T-S diagram for vapour   10
            compression refrigeration cycle and derive its efficiency. (CO1)

4-b.   A simple Brayton cycle uses Helium as the working fluid, has a maximum temperature of   10
            1000 K, and a pressure ratio of 4. At the start of the compression, the Helium pressure and
            temperature are 50 kPa and 250 K. Based upon cold-air standard analysis assumptions,
            calculate the thermal efficiency of the cycle. (CO1)

5. Answer any <u>one</u> of the following:-

5-a.   Describe the working of nuclear power station. (CO2)   10

| 5-b. | With a neat sketch, explain boiling water reactor (BWR), highlighting its merits and demerits. (CO2) | 10 |

6. Answer any <u>one</u> of the following:-

| 6-a. | Explain and derive expressions for beam and diffuse radiation. (CO3) | 10 |
| 6-b. | Explain in detail the different types of solar energy measuring instruments. (CO3) | 10 |

7. Answer any <u>one</u> of the following:-

| 7-a. | Explain the working of floating drum type biogas plant with neat sketch. (CO4) | 10 |
| 7-b. | Explain the working of Horizontal axis wind mill with neat sketch. (CO4) | 10 |

8. Answer any <u>one</u> of the following:-

| 8-a. | Describe in detail the economical benefits of green or sustainable building development. (CO5) | 10 |
| 8-b. | How Bureau of Energy Efficiency (BEE) facilitates energy efficiency programs in India? (CO5) | 10 |