

**MASTER OF SCIENCE
(RENEWABLE ENERGY AND
ENVIRONMENT) (MSCRWEE)**

Term-End Examination

June, 2025

MRW-003 : RENEWABLE ENERGY SYSTEM

Time : 3 Hours

Maximum Marks : 70

Note : (i) Attempt any **seven** questions.

(ii) All questions carry equal marks.

(iii) Use of scientific calculator is permitted.

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1. (a) What is the difference between renewable energy and non-renewable energy ? 5
- (b) What are the common minerals found in coal ? How do you select the type of coal mining ? 5

2. (a) What are the environmental impacts of photovoltaic solar energy ? 5
- (b) Define solar water heaters. State the temperature of hot water available from a solar water heater. 5
3. (a) A solar PV cell is irradiated by solar insulation of 900 W/m^2 . The maximum power output per unit area of the cell is 100 W/m^2 . Determine the following : 5
- (i) The maximum conversion efficiency
- (ii) The cell area for an output of 950 W at the condition of maximum power.
- (b) What is the effective life of a photovoltaic module ? State the factors on which voltage output of a PV module depends. 5
4. (a) Describe the utilization wind energy for water pumping and off grid power generation. 5

- (b) Classify the water turbines based on the name of the originator and mention the specific speeds under which they work. How is the performance of water turbines expressed ? 5
5. (a) What are the various ways in which tidal power can be harnessed ? What is tidal stream generator ? 5
- (b) What is the difference between synthesis gas and biogas ? How is electricity generated from biomass ? 5
6. (a) How is ethanol produced ? 5
- (b) What is biogas ? What is its composition ? Explain the applications of biogas. 5
7. (a) Discuss the characteristics and applications of geothermal energy. 5
- (b) What is energy harvesting and why is it required ? Explain. 5

8. Write short notes on any *two* of the following : 5+5=10

- (a) Piezoelectric energy harvesting
- (b) Cryogenic storage of hydrogen
- (c) Hydrogen production from electrolysis
- (d) Horizontal axis wind turbine

9. What is pyrolysis ? Explain the types of pyrolysis in detail. 10

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