

CBCS SCHEME

USN

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

18EE653

Sixth Semester B.E. Degree Examination, July/August 2022 Renewable Energy Resources

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Discuss causes of energy scarcity and solution to energy scarcity. (06 Marks)
b. Briefly explain energy resources and its classification. (08 Marks)
c. Explain worldwide renewable energy availability. (06 Marks)

OR

- 2 a. With necessary diagram, explain layers of the sun. (08 Marks)
b. Define the following terms:
i) Zenith angle
ii) Declination angle
iii) Altitude angle
iv) Incident angle.
c. With a neat diagram, explain Rankine cycle of electricity production. (08 Marks)
(04 Marks)

Module-2

- 3 a. With a neat sketch, explain important parts of flat plate air collectors and concentrating collectors. (08 Marks)
b. With the help of diagram, explain solar cooker and write advantages and disadvantages of it. (08 Marks)
c. Discuss the various material aspects of solar collector. (04 Marks)

OR

- 4 a. Explain any six applications of solar cells. (06 Marks)
b. Draw and explain I-V characteristics of solar cell and the factors limiting the efficiency of the cell. (08 Marks)
c. Explain solar cell material. (06 Marks)

Module-3

- 5 a. State and explain methods of hydrogen production technologies. (08 Marks)
b. Discuss the applications, advantages and disadvantages of hydrogen energy. (06 Marks)
c. Describe the main consideration in selecting a site for wind generators. (06 Marks)

OR

- 6 a. With a neat sketch, explain dry steam based geothermal power plant. (06 Marks)
b. With necessary diagram, explain waste recovery management scheme. (08 Marks)
c. Write the advantages and disadvantages of waste recycling. (06 Marks)

Module-4

- 7 a. With the help of diagram, explain gasifier and their classifications. (06 Marks)
b. Explain chemistry of reaction process in gasification. (08 Marks)
c. Explain biological and chemical stages of anaerobic digestion. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 8 a. With a neat sketch, explain fixed dome type biogas plant. (08 Marks)
b. With the help of diagram, explain two basin system in tidal power harnessing. (06 Marks)
c. Discuss problems faced in exploiting tidal energy. (06 Marks)

Module-5

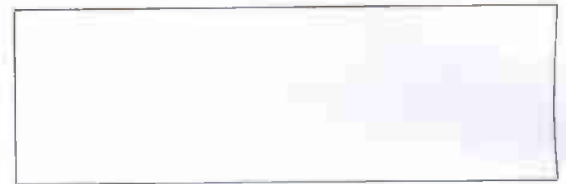
- 9 a. Discuss motion in the sea waves. (04 Marks)
b. Explain various devices for harnessing wave energy. (08 Marks)
c. Distinguish between land-based OTEC power plants and floating OTEC power plant. (08 Marks)

OR

- 10 a. Write the advantages and disadvantages of wave power. (06 Marks)
b. With a neat sketch, explain closed cycle and hybrid cycle in OTEC cycle. (08 Marks)
c. Discuss application of OTEC in addition to produce electricity. (06 Marks)



Visvesvaraya Technological University
Belagavi, Karnataka - 590 018.




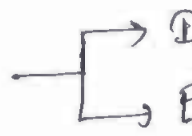

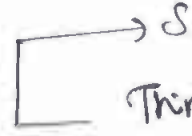
Scheme & Solutions

[Signature]
Signature of Scrutinizer

Subject Title: Renewable Energy Resources

Subject Code: 18EE653

| Question Number | Solution | Marks Allocated |
|-----------------|---|-----------------|
| 1. a | <p style="text-align: center;"><u>Module - 1</u></p> <p><u>Causes of energy scarcity</u></p> <ul style="list-style-type: none">* Increasing population & its explanation* Increasing energy usage & its explanation* Uneven distribution of energy sources* Lack of Technical knowhow & its explanation <p><u>Solution to Energy Scarcity</u></p> <ul style="list-style-type: none">* minimizing population growth exploitation* Development of energy conversion techniques* Energy management* The development of cheap and reliable energy storage system. | 3M |
| b. | <p>Explanation about energy resources</p> <p>Classification</p> | 4M. |
| c. | <p>Worldwide Renewable Energy availability</p> <p>Renewable Power Capacity</p> <p>Year</p> <p>(1) Renewable Power excluding hydro</p> <p>(2) Wind</p> <p>(3) Biomass</p> <p>(4) Solar PV</p> <p>(5) Geothermal</p> <p>Explanation</p> | 2M. 4M. |

| Question Number | Solution | Marks Allocated |
|-----------------|--|-----------------|
| 2 a) | Diagram with labelling Explanation about each layer | 3M. 5M. |
| b) | Defining each term | 4x2=8M |
| c) | Neat diagram with labelling Explanation | 1M 3M. |
| <u>Module-2</u> | | |
| 3 a) | Flat plate Air collector  Diagram Explanation | 1M 3M. |
| | Concentrating Collector  Diagram Explanation | 1M 3M. |
| b) | Solar Cooker  Diagram Explanation | 1M 3M |
| | Advantages of Solar Cooker | 2M. |
| | Disadvantages of Solar Cooker | 2M |
| c) | Explanation about each material | 1x4=4M |
| 4 a) | Any six applications of Solar Cells | 1x6=6M |
| b) | Drawing I-V characteristics of Solar Cells & its Explanation | 2M 4M |
| | Any two factors limiting efficiency of cell | 1x2=2M |
| c) | Solar cell material  Silicon & its explanation Thin film & its explanation | 3M 3M. |

| Question Number | Solution | Marks Allocated |
|-----------------|---|---|
| | <u>Module-3</u> | |
| 5 a) | <p><u>Hydrogen Production technologies</u></p> <ul style="list-style-type: none"> * Thermochemical production technologies & its explanation * Electrolytic production technologies & its explanation * Photolytic production technologies & its explanation | <p>3m</p> <p>3m</p> <p>2m</p> <p>2m</p> |
| b) | <p>Applications</p> <p>Advantages</p> <p>Disadvantages</p> | <p>2m</p> <p>2m</p> |
| c) | <p>Any six parameters three parameters</p> | <p>3x2=6m</p> |
| 6 a) | <p>Neat labelled diagram</p> <p>Explanation</p> | <p>2m</p> <p>4m</p> |
| b) | <p>Diagram</p> <p>Explanation</p> | <p>2m</p> <p>6m</p> |
| c) | <p>Advantages of waste recycling</p> <p>Disadvantages of waste recycling</p> | <p>2m</p> <p>2m</p> |

| Question Number | Solution | Marks Allocated |
|-----------------|---|-----------------|
| 7/07 | <u>Module-4</u> | |
| 7 a) | Diagram | 2M |
| | Classifications & its explanation | 4M |
| | Four processes & its explanation | 4x2=8M |
| b) | Four processes & its explanation | 2M |
| c) | Diagram | 4x1=4M |
| | Four main stages | |
| | | |
| 8 a) | Diagram | 3M |
| | Explanation (Parts & working principle) | 5M |
| | | |
| b) | Diagram | 2M |
| | Explanation | 4M |
| | | 6x1=6M |
| c) | Any 6 problems | |
| | <u>Module-5</u> | |
| 9 a) | Necessary diagrams | 1M |
| | Explanation | 3M |
| | | |
| b) | Necessary diagram | 3M |
| | Explanation | 5M |
| | | → 4M |
| c) | Land-based OTEC power plant | |
| | Floating OTEC power plant | 4M |

| Question Number | Solution | Marks Allocated |
|-----------------|--|--|
| 10 a) | Any three advantages Any three disadvantages | $3 \times 1 = 3m$ $3 \times 1 = 3m$ |
| b) | Closed cycle $\left\{ \begin{array}{l} \rightarrow \text{Neat sketch} \\ \rightarrow \text{Explanation} \end{array} \right.$ | $1m$ $3m$ |
| | Hybrid cycle $\left\{ \begin{array}{l} \rightarrow \text{Neat sketch} \\ \rightarrow \text{Explanation} \end{array} \right.$ | $1m$ $3m$ |
| c) | Any 6 applications | $6 \times 1 = 6m$ |