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Total No. of Printed Pages: [01]

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B.Tech. (ME) (Semester – 5th/7th/8th)
RENEWABLE ENERGY SOURCES
Subject Code: BELE0F94
Paper ID: [OE2112314]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a) Which are the main sources of conventional energy?
- b) Define the Betz limit?
- c) What is the energy balance equation for solar collectors?
- d) Describe the benefits and difficulties of utilizing solar cookers in off-grid or rural locations.
- e) What are the main stages of the thermal gasification process?
- f) How can hydrogen be utilized in thermionic generators.
- g) What are the key aerodynamic forces acting on the blades of a wind turbine during operation?
- h) Describe a geothermal system that uses hot dry rock (HDR).
- i) What is the basic principle behind energy generation from tides,
- j) What are the key components of an OTEC system, and how do they work together to produce electricity?

Section – B

(5 marks each)

- Q2. Discuss the solar constant, and how does it affect the amount of solar energy available at the Earth's surface.
- Q3. What are the main types of biomass conversion technologies, and how do they differ in terms of efficiency and output?
- Q4. Describe how a solar collector's efficiency is calculated and the factors that affect it. How might solar collector systems reduce energy losses?
- Q5. What are the prime movers used in geothermal power plants, and how do they convert thermal energy into mechanical energy?
- Q6. Explain the magneto hydrodynamic (MHD) power generation, and how does it differ from conventional electrical power generation methods? What are the advantages and disadvantages of using MHD power generation?

Section – C

(10 marks each)

- Q7. What are concentrated solar collectors, and how do they focus sunlight to generate higher temperatures for industrial applications? In what ways do flat-plate solar collectors absorb solar radiation and transform it into thermal energy?
- Q8. Discuss the characteristics of small-scale hydroelectric systems, and how do they differ from large-scale hydroelectric power plants? What are the key advantages and disadvantages of small-scale hydroelectric development compared to large-scale projects?
- Q9. What are the basic principles behind the conversion of wind energy into mechanical or electrical energy? What factors must be considered when selecting a site for a wind energy system?