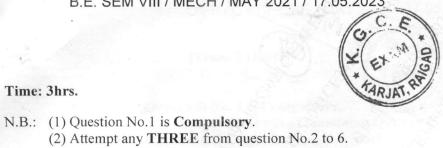
## Paper / Subject Code: 53356 / Renewable Energy Systems

B.E. SEM VIII / MECH / MAY 2021 / 17.05.2023



Time: 3hrs.

**Total Marks: 80** 

|     |    | ) Use illustrative diagrams whenever possible. ) Assume suitable data if necessary and mention it clearly.   |     |
|-----|----|--|-----|
| 01) |    |  | 20  |
| Q1) |    | Solve any Five   | 20  |
|     | a) | State the various direct applications of solar energy.   |     |
|     | b) | Factors affecting the biogas production  |     |
|     | c) | Present status of power generation of India  |     |
|     | d) | Define Slope, Zenith angle, Surface azimuth angle, Air mass  |     |
|     | e) | What is geothermal energy? State its limitations   |     |
|     | f) | State and explain methods of hydrogen production technologies.   |     |
| Q2) | a) | What is importance of renewable energy sources? What is the present energy scenario in India?  | 10  |
|     | b) | Estimate the monthly average daily global radiation on a horizontal surface at Vadodara (22°00°N, 73°10°E) during the month of March; If the average | 10  |
|     |    | sunshine hour per day is 9.5. (Take values a=0.28 and b=0.48).   |     |
| Q3) | a) | What is Betz coefficient? Show that the ideal maximum theoretical efficiency   | 10  |
|     |    | is 59% for a horizontal axis wind mill.  |     |
|     | b) | Explain the construction details and working of KVIC biogas digester.  | 10  |
| Q4) | a) | Following observation were recorded from a test on Biogas system:  | 10  |
|     |    | Calorific value of methane: 28.5MJ/m <sup>3</sup> , Burner efficiency: 60%, Number of  |     |
|     |    | Cows: 8, Retention period: 20 days, Temperature of fermentation: 30°C, Dry   |     |
|     |    | matter collected per cow per day: 2kg, Density of dry matter in the fluid in the   |     |
|     |    | digester: 50kg/m <sup>3</sup> , Biogas yield: 0.2m <sup>3</sup> per kg of dry input, Methane proportion  |     |
|     |    | in the biogas: 0.7, Determine volume of digester and power available from  |     |
|     | 1. | biogas digester.   | 1.0 |
|     | b) | How is Geothermal energy tapped? Enumerate problems in tapping.  | 10  |
| Q5) | a) | Explain single and double basin tidal power plants with neat sketches.   | 10  |
|     | b) | What are the effects of various parameters on performance of Flat Plate Collector?   | 10  |
| Q6) | a) | Explain with neat sketch Wind Energy conversion system. Classify Windmills.  | 10  |
|     | b) | Classify the different types of Concentrating solar collectors. Explain any one with schematic diagram   | 10  |