

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VIII (NEW) EXAMINATION – WINTER 2020

Subject Code:2181910**Date:25/01/2021****Subject Name:Renewable Energy Engineering****Time:02:00 PM TO 04:00 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain reserves, production and utilization of primary energy sources in India. **03**
- (b) List the advantages and drawbacks of Renewable Energy **04**
- (c) Determine the Zenith angle, solar altitude angle and solar azimuth angle on 21st Jan at 11 am solar time at a location 48 N **07**
- Q.2** (a) Explain direct, sky and total radiation. **03**
- (b) Explain the following terms with neat sketches: solar declination, Hour angle, solar altitude, zenith angle. **04**
- (c) List instruments used for measurement of solar radiation intensity. Explain Pyranometer with neat sketch. **07**
- Q.3** (a) List different types of concentrating collectors. Explain any one line focusing collector with neat sketch. **03**
- (b) What are solar ponds? Discuss constructional working principle of solar pond with help of neat sketch **04**
- (c) Prove that in case of horizontal axis wind turbine maximum power can develop when exit velocity = 1/3 of wind velocity and $P_{\max} = 8 \rho A V_i^3 / 27$ **07**
- Q.4** (a) Explain with neat diagram variation of power coefficient with tip-speed ratio **03**
- (b) Explain working of solar cooker. **04**
- (c) Derive the one dimensional momentum theory and Betz's limit for the wind mill. Also state the assumption in theory and draw the variation of pressure and velocity in wind mill. **07**
- Q.5** (a) Explain downward draft gasifier with a neat diagram. **03**
- (b) Explain the factors affecting production of biogas **04**
- (c) Write short note on effect of various parameters on performance of flat plate collectors. **07**
- Q.6** (a) Explain the basic principle of ocean thermal energy conversion? **03**
- (b) Explain in brief with neat sketch: single basin, two-way tidal power plant. **04**

- (c) Explain Construction & working of Floating drum type biogas plant with neat sketch **07**
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- Q.7** (a) Write short note on Magnus effect. **03**
- (b) What are the advantages, dis-advantages and applications of geothermal energy? **04**
- (c) Explain with neat sketch the basic and working principle of MHD generator. Also compare with conventional power plant. **07**
- Q.8** (a) Define (1) time value of money (2) Net present value (3) Future value. **03**
- (b) Explain return of investment (ROI)? Write down its limitation. **04**
- (c) With usual notations derive an expression for cumulative savings **07**

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