

GUJARAT TECHNOLOGICAL UNIVERSITY**ME - SEMESTER- I • EXAMINATION – WINTER 2014****Subject Code: 2712109****Date: 12/01/ 2015****Subject Name: Renewable Energy Engineering****Time: 02:30 p.m. to 05:00 p.m.****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain the terminologies related to wind energy conversion, hub height, swept area, cut-in speed, pitch control, rated power, wind rose, tip speed ratio. **07**
- (b) What are the factors affecting the generation of methane gas in anaerobic digestion process? **07**
- Q.2** (a) Define with sketch: air mass, extraterrestrial radiation, ground radiation, beam radiation, diffuse radiation, total radiation, reflected radiation. **07**
- (b) Determine the following for a location at $40^{\circ}7'N$ (i.e. $40.12^{\circ}N$) latitude at October 16th. (i) the zenith angle and solar azimuth at 11h LAT (ii) the sunrise angle and (iii) the day length. **07**
- OR**
- (b) Discuss the advantages and disadvantages of focusing collectors over flat plate collectors. **07**
- Q.3** (a) What is Betz limit? Discuss the site selection criteria for wind power generation. **07**
- (b) Discuss in detail the design considerations of horizontal axis wind machine. **07**
- OR**
- Q.3** (a) Explain the photovoltaic effect. Discuss the major advantages, disadvantages and applications of solar cell. **07**
- (b) What is fuel cell? Give the classification of fuel cell. Explain with neat sketch any one type of fuel cell. **07**
- Q.4** (a) Discuss with neat sketch KVIC design type biogas plant. **07**
- (b) Differentiate (atleast two points): fixed bed gasifier and fluidized bed type, continuous type and batch type biogas plant, floating gas holder and fixed dome type, wet fermentation and dry fermentation. **07**
- OR**
- Q.4** (a) What is gasifier? Explain the applications of gasifier. Discuss the problems in development of gasifier. **07**
- (b) Discuss with sketch any one system of geothermal power plant. **07**
- Q.5** (a) Summarize various applications of hydrogen. Explain the hydrogen as alternative fuel for vehicles. What are the disadvantages of using hydrogen as fuel? **07**
- (b) Discuss with sketch the Salter Duck arrangement for wave power generation. **07**
- OR**
- Q.5** (a) Discuss with schematic arrangement and t-S diagram, open cycle OTEC system. **07**
- (b) Define: Spring tide and Neap tide. Discuss the estimation of tidal range power. **07**