Reg.No.									

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

IV SEMESTER B.S. DEGREE EXAMINATION APRIL / MAY 2017

SUBJECT: RENEWABLE ENERGY UTILIZATION (ME 242)

(BRANCH: MECH, MET, IP)

Tuesday, 2 May 2017

Time: 3 Hours **Max. Marks: 100**

- ✓ **Answer ANY FIVE full Questions.**
- ✓ **Missing data, if any, may be suitably assumed.**

1A) Define the following with neat sketch with respect to Solar-Earth geometry.
(a) Latitude (b) Declination (c) Zenith angle.

1B) Write the two correction need to calculate Local Apparent Time and Determine the LAT corresponding to 1430hour (IST) at Mumbai (19^0 07'N, 72^0 51'E) on July 1. In India standard time is based on 82.50^0E. Equation of time correction on July 1 is (-3.5 minutes).

1C) Write short notes on the following:
(a) Solar dryer (b) Solar radiation measurement **(6+6+8)**

2A) Define the following with respect to Solar liquid flat plate collector
(i) Transmissivity absorptivity product
(ii) Collector Efficiency factor
(iii) Collector heat removal factor.

2B) State and explain the Hour angle and Day length with respect to solar earth system.

2C) Calculate the angle made by beam radiation with the normal to a flat plate collector, tilted by 30^0 from the horizontal, pointing due south, located at New Delhi, at 11:00 h (IST), on 1 June. The latitude and longitude of New Delhi are 28^0 35' N and 77^0 12' E respectively. The standard IST longitude is 81^0 44' E. **(6+6+8)**

3A) With neat sketch explain the working of solar absorption refrigeration system.

3B) Explain power generation through Hot Dry Rock Technology with neat sketch.

3C) Write short notes on the following:
(a) Spring tide and neap tide (b) Single basin and Double basin system in tidal power plant. **(6+6+8)**

4A) With neat sketch explain the working of Floating drum type biogas plant.

4B) With help of sketch explain the working of updraft type gasifier.

4C) Explain the factors which effects the generation of biogas? **(6+6+8)**

5A) Write a site selection criteria for wind turbine power plant.

5B) With neat sketch explain the working of vertical axis wind turbines (VAWT)

5C) Derive the expression for maximum power obtainable from a horizontal axis wind turbine. **(6+6+8)**

6A) Explain with neat sketches the bulb type and tube type turbines used in small scale hydroelectric power plants.

6B) With neat sketch explain the geothermal energy conversion in liquid dominated reservoir.

6C) A single basin type tidal power has a basin area of 3 km^2. · The tide has an average range of 10 m. Power us generated only during the flood cycle only. The turbine stops operating when the head on it falls below 3 m. Calculate the average power generated by the plant in a single filling process of the basin if the turbine-generator efficiency is 0.65. Estimate the average annual energy generation of the plant. **(6+6+8)**

7A) With neat sketch explain the process of ocean thermal energy conversion using Anderson cycle.

7B) With neat sketch explain the Single and double basin tidal energy conversion system.

7C) Explain with neat diagram 'Dolphin type' wave power machine. **(6+6+8)**

8A) With neat sketch explain the working of a suitable energy conversion device that makes use of hydrogen as fuel with byproduct as water.

8B) With neat sketch explain the working of a suitable system that makes use of magneto hydrodynamic principle with exhaust gas as working fluid.

8C) With neat sketch explain the working of thermionic power generation system and differentiate thermo ionic generator with thermoelectric generator. **(6+6+8)**