Registration No: | | | | | | | | | | |

Total Number of Pages: 02 **M.TECH**

P2PRCC12

2nd Semester Regular Examination 2016-17

GREEN ENERGY RESOURCES & TECHNOLOGY

BRANCH: ELECTRICAL ENGG

Branch: POWER CONTROL AND DRIVES (PT), POWER AND ENERGY ENGG, POWER ELECTRONIC, POWER ELECTRONIC & DRIVES, POWER ELECTRONIC AND ELECTRICAL DRIVES, POWER ELECTRONIC AND POWER SYSTEMS, POWER ENGG AND ENERGY SYSTEMS, POWER SYSTEM ENGG, POWER SYSTEMS

Time: 3 Hours

Max Marks: 100

Q.CODE:Z967

Answer Question No.1 which is compulsory and any FOUR from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions**: ***Short answer type*** **(2 x 10)**

- **a)** Differentiate between a solar cell , solar array and a solar panel.
- **b)** What is the role of a charge controller in a solar PV system?
- **c)** Why reactive power compensation is required in a wind energy system?
- **d)** Draw the power versus wind speed characteristics of a wind turbine.
- **e)** Write the biogas production reaction for a biogas plant.
- **f)** Name different types of hybrid power systems.
- **g)** What do you mean by retention time?
- **h)** What do you mean by energy audit? What is the need of energy audit?
- **i)** Write is the cost of electricity when produced from different renewable sources.
- **j)** Define simple payback period.

Q2 **a)** Draw the equivalent circuit diagram of a solar PV cell. Discuss about the different components of the equivalent circuit of the solar cell with neat diagram. **(10)**

b) Briefly discuss about the different types of losses that occur in a solar PV cell. **(10)**

Q3 **a)** What do you mean by BOS of a PV module? Describe the need of battery, charge controller, dc-to-dc controller in a standalone solar PV system. **(10)**

b) Briefly discuss about the different control systems in a wind energy system. **(10)**

Q4 **a)** Differentiate between wind-diesel hybrid system and wind –PV hybrid system. **(10)**

b) Discuss about the impacts of renewable energy on environment. What are the principles and strategies of energy conservation? **(10)**

Q5 **a)** Discuss about different types of biogas plants. What are the factors affecting biogas production. **(10)**

b) Differentiate between Wave energy conversion system and Tidal energy conversion system. **(10)**

Q6 **a)** Differentiate between Single output and Double output systems. **(10)**

b) What are solar cell parameters? Define the Isc, Voc, FF and efficiency of solar cells. **(10)**

Q7 **a)** A boy's hostel in a school needs 10000 liters hot water. Solar radiation available on the location is 8 kWh/m2-day. Temperature of feed water is 27oc and it is to be heated up to 60oC. Find out collector area required and cost of the system. Use the assumptions given below: **(10)**

- The typical price of a collector is about Rs 5000 per square meter.
- Tank and other installation cost is about 50% of the collector's cost.
- 50 litres of hot water per day requires 1 square meter of collector area.
- The life of a water heating system is between 15 and 20 years.
- Consider the cost of an electrical energy unit (kWh) to be Rs 4.

Assume 300 sunny days a year.

b) An industry wants to install a wind turbine to generate annual energy of 50000 kWh. The wind speed at the location is 9 meter per second at a height of 10 meter from the ground. Which turbine would you suggest to the industry? Make necessary assumptions. **(10)**