Student Exam No:-_____

GANPAT UNIVERSITY

B.TECH SEM-V ELECTRICAL ENGINEERING

REGULAR EXAMINATION NOV-DEC-2014

2EE506:- NON CONVENTIONAL ENERGY SOURCES

Time: 3 Hours **Total Marks:-70**

Instructions: - 1. Attempt all questions.
2. Answers of each section must be written in separate answer book.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.

SECTION-I

Que-1 **(A)** How is per capita energy consumption related with standard of living? **[4]**

(B) What do you mean by renewable and non-renewable energy sources? **[4]**

(C) What do you understand by energy chain? **[4]**

OR

Que-1 **(A)** Calculate the solar radiation on the top of the atmosphere on 21st September of this year. **[3]**

(B) Justify "why solar energy is called the mother of all the forms of energy?" **[3]**

(C) List and describe various types of non conventional energy sources. Give their availability and relative merits. **[6]**

Que-2 **(A)** Define: **[5]**

a) Angle of Latitude
b) Hour angle
c) slope (Tilt Angle)
d) Surface azimuth angle

(B) What is solar concentrating collector? Describe its classification in details giving neat sketches wherever required. **[6]**

OR

Que-2 **(A)** Distinguish between terrestrial and extraterrestrial radiation with suitable figures. Which radiation is important in solar energy calculations? Why? **[5]**

(B) Explain pyrheliometer and pyranometer with neat sketch. **[6]**

Que-3 **Attempt any two:** **[12]**

(A) Describe the components of wind energy conversion system with the help of block diagram.

(B) Compare the horizontal axis and vertical axis wind turbines.

(C) From the sample wind data given below, calculate the annual energy if cut-in speed is 5 km/h, design speed is 15 km/h & cut-out speed is 22 km/h:

Speed(km/h)	0-0	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16
Annual %	3.2	2.1	2.3	2.5	3.2	4.3	4.8	5.8	7.2
Speed(km/h)	16-18	18-20	20-22	22-24	24-26	26-28	28-30		
Annual %	7.3	8.1	6.5	6.4	6.4	4.8	4.5		

SECTION-II

Que-4 **(A)** Explain the three important ways of obtaining energy from biomass. [6]

(B) Compare the fixed dome and floating drum types of biogas plant. [6]

OR

Que-4 **(A)** What is anaerobic digestion? Explain the stages of anaerobic digestion. [6]

(B) Explain the concept of Tidal phenomenon, describing the Tide & Ebb cycle and Spring & Neap tides. [6]

Que-5 **(A)** Give an overview of Ocean Thermal Energy Conversion System (OTEC) with a typical temperature profile of ocean layers. [5]

(B) How MHD systems are classified? Describe an MHD open cycle system in brief. [6]

OR

Que-5 **(A)** What are the conditions to be satisfied for on shore OTEC power plant? [5]

(B) Calculate the open circuit voltage and maximum power output for an MHD generator having following data: [6]

Plate area= $0.25m^2$

Distance between the electrodes= 0.50 m

Flux density= 2 wb/m^2

Average gas velocity= 1000 m/s

Gaseous conductivity= 10 mho/m

Que-6 **Attempt any Three:** [12]

(A) What are the major advantages and limitations of an MHD generating system?

(B) Describe the different parts of Fuel cell vehicles (FCV) with the help of schematic diagram.

(C) Comment on possibilities of hydrogen as a potential energy carrier in future.

(D) Explain the principle of operation of Hydrogen Fuel cell.

END OF PAPER