[Total No. of Questions - 9] [Total No. of Printed Pages - 2]
(2126)

16298(D)

B. Tech 8th Semester Examination

Non-Conventional Energy Resources (NS)

ME-421(d)

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

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question from each of the section A, B, C and D and all the subparts of the question in Section E. Marks for each question are given in bracket and assume missing data if any suitably.

SECTION - A

1. (a) Explain Indian energy scenario and discuss the challenges being faced in meeting energy demand at national level. (10)

   (b) Explain the concept of non conventional energy and state their advantages and disadvantages. (10)

2. (a) Explain the principle and operation of a solar pond based thermal power plant.. (10)

   (b) Explain main components of solar furnace and state the maximum temperature that can be achieved in such a furnace. (10)

SECTION - B

3. (a) Derive an expression for energy that can be extracted from wind. Explain the factors on which it depends. (10)

   (b) Wind speed at 15°C is 10 m/s at one atmospheric pressure. A 10m diameter wind turbine is operating at 5 rpm with maximum efficiency of 40%. Calculate (i) the total power density in the wind stream (ii) the maximum power density (iii) the actual power density (iv) the power output of the turbine and (v) the axial thrust on the turbine structure. (10)

4. (a) Explain the various parameters to be controlled to achieve the bio-gas production efficiently. (8)

   (b) Explain the construction and working of a biogas plant with the help of a diagram. (12)

SECTION - C

5. (a) Explain the various ways of geothermal power generation. (10)

   (b) What is geothermal energy? Explain plate tectonic theory and how is it related to geothermal energy. (10)

6. (a) Explain a tide and state its main features. (8)

   (b) Explain the principle of operation of a single effect single basin tidal power plant with a graph of sequential operating modes. (12)

SECTION - D

7. (a) Explain the process of an ocean thermal energy conversion based on steam cycle with the help of a schematic diagram. (12)

   (b) State the status of OTEC in India. (8)

8. (a) Explain the working principle of a closed cycle MHD generator and state its operational problems. (10)

   (b) Explain the working of a pico hydro power plant with a diagram. (10)

SECTION - E

9. (a) State the concept of cogeneration.

   (b) State the anaerobic digestion process.

   (c) State hybrid OTEC system.

   (d) State the classification of main biomass sources.

   (e) Discuss the concept of standalone type of PV systems. (4×5=20)