(Set-K)

B.Tech -7(Chem Engg)
Energy Conservation and Renewable Energy sources

Full Marks : 70

Time : 3 hours

Answer any **six** questions including **Q.No.1** which is compulsory.

The figures in the right-hand margin indicate marks.

Symbols carry usual meaning.

1. Answer *all* questions : 2 × 10

(*a*) Define 'Renewable Energy'.

(*b*) List any four renewable energy resources.

(*c*) List any four biofuels derived from biomass or agriculture residue.

(*d*) Explain the law of conservation of energy.

(*e*) Draw the idealized power curve for wind mill.

(*f*) Define the working principal of open-cycle

(*Turn Over*)

ocean thermal electric power production system.

(*g*) Define the working principal of closed-cycle ocean thermal electric power production system.

(*h*) Define 'cut-in wind speed' and 'rated wind speed'.

(*i*) List any four solar based applications.

(*j*) List any four types of biomass.

2. (*a*) List any five benefits to use biomass as alternate source of energy. 5

(*b*) Define calorific value. Explain the 'net' and 'gross' calorific value and relation between them. 5

3. (*a*) Explain briefly the different types of PV modules available in the market. 5

(*b*) List different types of collectors with sketch for concentrating solar power system. 5

4. (*a*) Explain the various steps involved in bio-

ethanol production. List any two advantageous using bioethanol as fuel. 5

(*b*) What is hydro-power ? Explain different types of hydro-power plants. 5

5. (*a*) The a.c. load of remote home is 2200 Wh/day. A PV system with battery storage is considered for powering this home. If the inverter efficiency taken as 85%, Coulomb efficiency taken as 80%, PV de-rating is 90% (10% losses due to dirt and temperature) and system voltage is 24 V. Calculate the size of batteries for maximum 5 days of storage, if a 12 V battery with 100 Ah is considered. 5

(*b*) Using information from 5(*a*) determine the PV size if for the site on average there are 3 hours of full sun and a 12 V PV module is considered which has a rated current of 6.99 A. 5

6. (*a*) What is energy management ? What are the basic objectives of energy management ? 5

(*b*) What is energy audit ? List any four instruments with their application, commonly used in energy auditing. 5

7. (*a*) What is waste heat recovery unit ? What are the different units used to recover waste heat (Give any *four*) ? 5

(*b*) What is tidal energy ? How it can be converted to electricity ? What are the advantages of tidal energy ? 5

8. (*a*) Distinguish between impulsive turbine and reaction turbine (any 10 points). 5

(*b*) What is waste incineration ? What are the different methods used for waste incineration ? What are the advantages and disadvantages of incineration ? 5
