17645

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3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory*.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any THREE of the following:** **12**

(i) State at least four applications of solar pond. Describe any one in brief.

(ii) Describe the meaning of terms:

1) Power coefficient

2) Thurst on turbines related to wind energy.

(iii) State the various bio-energy sources.

(iv) State four disadvantages of geothermal energy over other energy forms.

b) **Attempt any ONE of the following:** **6**

(i) Describe with neat diagram the working of fixed dome type biogas plant.

(ii) Describe with schematic diagram, the construction and operation of open cycle/closed cycle OTEC plant.

Marks

2. Attempt any FOUR of the following: **16**

a) Describe the environmental aspects of energy and sustainable development.

b) Define primary energy sources and secondary energy sources with two examples of each.

c) Describe different renewable sources of energy with special reference to the Indian context.

d) Describe the necessity of alternate energy sources.

e) Define the solar constant. State the standard value for solar constant in terms of watt per square meter and Kcal per square meter per hour.

f) Describe with schematic representation, the distribution of solar energy as direct, diffused and total radiation.

3. Attempt any FOUR of the following: **16**

a) What is the difference between pyrheliometer and a pyranometer? Describe the principle of any one type of pyranometer.

b) Describe the solar radiation on tilted surfaces with neat diagram.

c) State any four advantages and limitations of solar furnaces for industrial applications.

d) Draw the diagram of distribution of solar energy as direct, diffused and total radiation.

e) Write the principle and working of solar pond.

4. a) Attempt any THREE of the following: **12**

(i) Draw V-I characteristics of solar cell and state the formula for conversion efficiency of solar cell.

(ii) State the salient features and characteristics of synchronous generator and induction generators used in wind mills.

(iii) Describe the thermal gasification of biomass.

(iv) Describe with block diagram, the fuel cell based electrical power generation scheme.

Marks

b) **Attempt any ONE of the following:** **6**

(i) Describe with neat diagram, the operation of solar water pumping system. State advantages and limitations of solar water pumping system.

(ii) Describe with diagram the construction and working of vertical axis wind turbine and state its advantages.

5. Attempt any FOUR of the following: **16**

a) What is the MPPT? Describe the need of MPPT in solar PV system.

b) Describe with diagram, operation of solar operated absorption air conditioner system.

c) Describe with diagram, the working of variable speed variable frequency wind electric generating system.

d) State the main considerations in selecting the site for wind generators.

e) Differentiate between drum type and dome type biomass plant.

6. Attempt any TWO of the following: **16**

a) State the complete classification of solar thermal collectors. What are the main components of flat-plate solar collector? Explain the function of each.

b) State the three main designs of fixed bed gasifiers. Describe the construction and working of any one type of fixed bed gasifier.

c) Describe with neat diagram, the construction of tidal power plant. State its main components and their functions.

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