

17645

11920

3 Hours / 100 Marks

Seat No.

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- 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. Attempt any FIVE :

20

- (a) Explain the necessity of Alternate energy sources.
- (b) Define the terms related to Solar Radiation Geometry
 - (i) Declination
 - (ii) Hour angle
 - (iii) Zenith angle
 - (iv) Solar Azimuth angle
- (c) State disadvantages of Solar PV system for power generation.
- (d) Draw the block diagram showing basic components of wind electric system and state the function of each block.
- (e) Describe the various Biomass Resources.
- (f) Describe the major applications of geothermal energy.
- (g) State the limitations of tidal energy.

2. Attempt any FOUR :**16**

- (a) Explain environment aspects of energy and sustainable development.
- (b) Explain Energy scenario in India in the context of overall production and consumption,.
- (c) Define 'Solar constant', 'Solar extra-terrestrial radiation'. Explain standard value of Solar constant.
- (d) Define the term 'Direct radiation', 'Diffused radiation' and 'Total radiation'. Draw the schematic representation of distribution of solar energy as Direct, Diffused and Total radiation.
- (e) Explain the construction of solar PV module & solar panel and series – parallel connection of modules in a panel.
- (f) State & explain the importance of MPPT in solar PV system. State various strategies used for operation of MPPT.

3. Attempt any FOUR :**16**

- (a) Explain with block diagram; the general stand-alone solar PV system for power generation.
- (b) Explain with neat diagram; the operation of solar powered water pumping system.
- (c) Explain with suitable diagram; the principle; operation and working of solar pond.
- (d) Explain with diagram; the construction; working of pyrliometer for the measurement of beam radiation.
- (e) Define 'Tilt factor' for beam radiations, Diffused radiation and Deflected radiations'. State empirical formula for total radiation on a surface of arbitrary orientation.
- (f) Describe with neat sketch; the construction and working of pyranometer for measurement of Total radiation or Global radiation.

4. Attempt any FOUR :**16**

- (a) Describe the term related to wind energy :
 - (i) Power in the wind
 - (ii) Power co-efficient
- (b) State the area of applications of wind energy.
- (c) Describe with block diagram; the working of variable speed variable frequency wind electric generating system.
- (d) Describe Thermal Gasification of Biomass.
- (e) Describe Fluidized Bed Gasifier and state its advantages.
- (f) Describe in brief the following methods of obtaining energy from Biomass :
 - (i) Anaerobic digestion
 - (ii) Combustion

5. Attempt any TWO :**16**

- (a) State the different types of focusing/concentrating type collectors. Explain any one type of concentrating type collector with suitable diagram. State the advantages and disadvantages of concentrating collectors.
- (b) Explain site selection considerations for wind energy conversion system.
- (c) Compare fixed Dome type and movable Drum type Biogas plant (minimum 8 pts.)

6. Attempt any TWO :**16**

- (a) Explain with neat sketch; the construction and operation of open cycle Ocean Thermal Energy Conversion (OTEC) plant.
 - (b) Explain with neat sketch; the construction and working of fuel cell. Draw the block diagram of fuel cell based electrical power generation system.
 - (c) (i) Explain with neat sketch, Double basic arrangement for Tidal energy conversion system.
(ii) Explain with neat sketch; the construction; working and uses of Solar furnace.
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