

21415

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.

- |  | <b>Marks</b> |
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| <b>1. [A] Attempt any THREE of the following :</b>   | <b>12</b>    |
| (a) List the types of energy sources with one example of each.   |              |
| (b) State the types of renewable energy sources.   |              |
| (c) Define solar constant and write its expression.  |              |
| (d) Give the classification of solar collectors.   |              |
| <b>[B] Attempt any ONE of the following :</b>  | <b>6</b>     |
| (a) Describe the distribution of solar energy as direct, diffused and total radiation with the help of neat diagram.   |              |
| (b) Draw neat labelled diagram of box type and dish type solar cooker. List the components and material used for both. |              |
| <b>2. Attempt any FOUR :</b>   | <b>16</b>    |
| (a) Describe the necessity of alternative energy sources.  |              |
| (b) Define following terms :   |              |
| (i) Hour angle   |              |
| (ii) Solar azimuth angle   |              |
| (iii) Zenith angle   |              |
| (iv) Incident angle  |              |
| (c) Describe the construction and operation of solar dryer.  |              |
| (d) List the applications of solar space heating and cooling.  |              |
| (e) List the factors considered for site selection of wind mill.   |              |
| (f) State the types of wind turbines.  |              |

- 3. Attempt any FOUR :** **16**
- (a) Describe the environmental aspects of energy.
  - (b) Describe the working of Pyranometer for measurement of total radiation.
  - (c) List the sources of biomass energy.
  - (d) Classify the biomass plants.
  - (e) Describe the operation of geothermal power plant with labelled diagram.
- 4. [A] Attempt any THREE of the following :** **12**
- (a) State the components of solar cell and draw VI characteristic of solar cell.
  - (b) Compare horizontal axis wind mills to vertical axis wind mills. (any four points)
  - (c) List the methods of obtaining energy from biomass.
  - (d) Describe the operation of single basin arrangement for tidal power generation with neat diagram.
- [B] Attempt any ONE of the following :** **6**
- (a) Draw block diagram of constant speed constant frequency system for wind generation. Also describe working of it.
  - (b) Draw schematic diagram of fluidized bed gasifier and describe its working.
- 5. Attempt any FOUR of the following :** **16**
- (a) State the limitations of pyrheliometer for measurement of beam radiation.
  - (b) State and explain the principle and working of solar pond.
  - (c) Draw neat diagrams of continuous and batch type biomass plant.
  - (d) Describe operation of fuel cell technology.
  - (e) List the advantages and limitations of hydrogen energy.
- 6. Attempt any TWO of the following :** **16**
- (a) Draw functional block diagram of photovoltaic power generating system. State its advantages and disadvantages.
  - (b) Draw block diagram showing basic components of wind system and state function of each block.
  - (c) Draw schematic diagram of open cycle and closed cycle ocean thermal power plant. Describe the operation of each plant.
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