

17645

15162

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

**1. Attempt any FIVE :**

**20**

- (a) Define primary and secondary energy sources and give two examples for each.
- (b) List out the two advantages and disadvantages of renewable energy sources.
- (c) Distinguish between 'beam-radiation' and 'diffused radiation'. (Any four point)
- (d) Explain the term 'Solar constant' and state its value.
- (e) Draw and label the parts of Flat plate collector.
- (f) State the advantages and limitations of geothermal energy.
- (g) State the principle of hydrogen energy conversion and state its applications.

**2. Attempt any FOUR :****16**

- (a) State the need of alternate energy sources.
- (b) State the working of parabolic dish collector with labelled diagram.
- (c) State any four advantages of solar heating system.
- (d) State the factors to be considered for the selection of site for wind power plant.
- (e) Differentiate 'power in wind' and 'maximum power'. (Any four point)
- (f) Define – Hydrothermal, geopressured, petrothermal, magma volcano.

**3. Attempt any FOUR :****16**

- (a) Define along with diagram 'Incident angle', 'Zenith angle', 'Solar azimuth angle' and 'hour angle'.
- (b) How total radiation of solar is measured by pyranometer ?
- (c) Explain the meaning of
  - (i) power coefficient
  - (ii) thrust on turbines
- (d) With the help of block diagram label the basic components of wind electric system.
- (e) Define the following methods of energy generation from biomass :
  - \* Combustion
  - \* Anaerobic digestion
  - \* Pyrolysis
  - \* Gasification
- (f) State the difference between 'Fixed bed gasifier' and 'Fluidized bed gasifier'.  
(Any four point)

**4. Attempt any TWO :****16**

- (a) Draw block diagram of photovoltaic power generating system and explain its working.
- (b) State the principle and specification of
  - solar heating system
  - solar cooking system
- (c) Draw schematic diagram of ocean thermal electric power generation (closed cycle). Explain its operation.

**5. Attempt any FOUR :****16**

- (a) State the four advantages of Horizontal axis wind mill over vertical axis wind mill.
- (b) Draw block diagram of variable speed constant frequency system of WEGs.
- (c) Calculate the monthly average hourly Radiation falling with flat-plate collector facing south ( $r = 0^\circ$ ) with a slope of  $15^\circ$  has the following data :

Location – Chennai ( $13^\circ 00' N$ )

Month – October

Time – 11.00 to 12.00 (LAT)

$$I_g - 2408 \text{ kJ/m}^2\text{-h}$$

$$I_\phi - 1073 \text{ kJ/m}^2\text{-h}$$

Given that  $\rightarrow W = 7.5^\circ$

Ground reflectivity = 0.2

- (d) Draw a neat diagram to show spectral distribution of extra terrestrial solar radiation.
- (e) State the advantages and disadvantages of floating drum type biomass plant.
- (f) Draw schematic diagram of fixed bed gasifier and explain its working.

**6. Attempt any FOUR :****16**

- (a) State the principles of Tidal power generation. Also state its limitations.
  - (b) List out the factors to be considered for site selection of 'Ocean thermal electric power plant'.
  - (c) How the energy can be obtained from biomass using fermentation method ?
  - (d) State the thermal classification of biomass.
  - (e) State the different components of solar cell and explain the construction of solar PV module.
  - (f) With reference to 'Box type solar cooker' explain its components, material used, specifications.
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