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25226

3 Hours / 70 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.
(8) Use of Steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. Attempt any FIVE of the following : 10
- List any four renewable energy sources.
 - State any two objectives of energy management.
 - List any four solar thermal collectors and concentrators.
 - Define cut-in and cut-out wind speed.
 - List any two renewable energy schemes for agriculture sector in Maharashtra.
 - Define Battery rating.
 - State any two objectives of the National Action Plan on Climate Change (NAPCC).

P.T.O.

- 2. Attempt any THREE of the following : 12**
- a) Explain the role of renewable energy sources in meeting the energy demands of a growing economy.
 - b) Illustrate the use of Sankey diagram in representing energy flow in a system.
 - c) Explain any four design considerations of a solar water heating system.
 - d) Explain the role of battery, inverter and Maximum Power Point Tracking in a solar PV system.
- 3. Attempt any THREE of the following : 12**
- a) Explain the need and importance of the energy conservation act 2001.
 - b) Explain the concept of energy monitoring and targeting.
 - c) Compare natural circulation and forced circulation solar water heating systems on the basis of –
 - i) Principle of operation
 - ii) Suitability
 - iii) Efficiency
 - iv) Capacity
 - d) Explain with neat sketch working of a Geothermal power plant.
- 4. Attempt any THREE of the following : 12**
- a) Explain the production process of ethanol from sugarcane.
 - b) Explain with neat sketch working of a Tidal power plant.
 - c) Suggest suitable energy-efficient appliances for an office building using the concept of star rating.
 - d) Explain the principle of operation of a fuel cell.
 - e) Explain with a simple block diagram stand-alone solar PV system for home lighting.

5. Attempt any TWO of the following : 12

- a) Select suitable instruments required to conduct an energy audit for a machine shop with justification.
- b) Suggest any six energy conservation measures for an HVAC system used in a commercial building.
- c) Select a suitable solar dryer for drying of food products on large scale with suitable justification. Draw a neat sketch of it.

6. Attempt any TWO of the following : 12

- a) A farmer requires 25,000 L/day from a bore well. Total head = 30m. Pump efficiency = 40%, motor efficiency = 85%, system losses = 15%, sunshine = 6 h/day, PV module = 300 Watt. Design the PV system and calculate the number of modules. List main components and draw a block diagram.
 - b) Explain the construction and working of a Horizontal Axis Wind Turbine (HAWT) with a neat sketch.
 - c) Select a suitable power plant/energy source for following situations –
 - i) Hilly region having hot water springs.
 - ii) Pollution-free electric vehicles.
 - iii) Clean backup power in hospitals.
 - iv) Remote area with abundant waste.
 - v) Irrigation pumping in rural agricultural areas.
 - vi) Areas with strong and steady wind.
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