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15162

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

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

Marks

1. Solve any FIVE : **5 × 4 = 20**

(a) State any four conventional and four non-conventional energy sources.

(b) Draw the sketch representing the solar altitude angle, solar azimuth angle and zenith angle with respect to a horizontal plane and a normal to horizontal plane, taking East-West as one axis and North-South as other axis on plane.

(c) Explain in brief the solar-vapour compression refrigeration system with neat sketch.

(d) With the help of a neat diagram explain the layout of a typical small Hydro-Electric plant.

(e) Explain in brief with neat sketch the working of Kaplan turbine.

(f) Explain the process of photosynthesis. How much solar energy is stored through this process ?

(g) State the objectives and need of Energy Audit.

2. Solve any FOUR : **4 × 4 = 16**

(a) Explain how Green House gases and Global Warming is affecting the climate change.

(b) Describe the principle of solar photovoltaic energy conversion.

(c) State the types of geothermal resources and explain any one in brief.

(d) Explain the Packed Bed Exchanger Storage Method used in thermal energy storage of solar energy.

(e) Describe a passive solar space heating system.

(f) List the types of concentrating collectors and draw the labelled schematic diagram of any one.

3. Solve any FOUR : **4 × 4 = 16**

(a) Describe the solar evacuated flat plate collector. State two advantages of its over simple solar flat plate collector.

(b) Define :

(i) Solar irradiance

(ii) Solar constant

(iii) Extra terrestrial radiation

(iv) Terrestrial radiation

(c) With the help of a schematic diagram, explain the construction and working of Box-type Solar Cooker.

(d) Define Solar Cell, Solar Module, Solar Panel and Solar Array.

(e) Describe the layout and working of a stand alone Solar Photovoltaic Power Plant.

(f) With the help of a schematic of Solar Pump, explain its working.

4. Solve any FOUR : **4 × 4 = 16**

(a) State the classification of small hydro power stations.

(b) State the different components of small hydroelectric project.

(c) State the site selection criteria for a small hydro-electric plant.

(d) Sketch the diagram of a Horizontal Axis Wind turbine and explain the functions of its main components.

(e) Describe with a neat sketch of blocks the working of main components of wind energy conversion system.

(f) Explain in brief the anaerobic digestion. What are the factors which affect biodigestion ?

5. Solve any FOUR : **4 × 4 = 16**

(a) Explain the desirable features of Bio-ethanol that makes it suitable as automobile fuel.

(b) State the different biomass energy resources. What is the energy yield from each of them ?

(c) Explain the process of gasification of solid-bio-fuels. What is the general composition of the gas produced ?

(d) Explain in brief wet fermentation and dry fermentation.

(e) Explain the Preliminary and Detailed Energy Audit Methodology in brief.

(f) Describe the construction and principle of operation of a sunshine recorder.

6. Solve any FOUR : **4 × 4 = 16**

(a) Describe the working principle of infrared thermometer.

(b) State the principle of Angstrom type pyrheliometer along with a schematic diagram.

(c) How the efficiency of Boiler and Furnace is calculated ? Explain in brief.

(d) State concept of waste heat recovery system. Draw a labelled schematic of any waste heat recovery system.

(e) List the types of solar cell according to the type of active material used in it.

(f) Explain the depletion process of solar radiation as it passes through the atmosphere to reach the surface of the earth.