

315337

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 answer 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 of the following: 10
- a) List application of solar concentrating collectors.
 - b) Define Pyrheliometer and state the use of Pyrheliometer.
 - c) State any two disadvantages and any two applications of flat plate collector.
 - d) State preventive measures for hydrogen handling.
 - e) State concept of variable speed constant frequency scheme.
 - f) List factors affecting wind power generation.
 - g) Write any two advantages of Chinese digester.

P.T.O.

2. Attempt any THREE of the following: 12

- a) Explain I-V characteristics of solar cell with graph.
- b) Distinguish between Parabolic Trough collectors and Heliostat field collector on the basis of:
 - i) Efficiency
 - ii) Scalability
 - iii) Storage Capability
 - iv) Applications.
- c) Explain lift and drag forces acting on wind turbine blades with neat sketch.
- d) Describe the need of gearbox in wind turbine with block diagram.

3. Attempt any THREE of the following: 12

- a) Explain series connection of solar cells with advantages.
- b) Describe any two methods of Hydrogen Storage.
- c) Explain Binary cycle geothermal plant with diagram.
- d) Distinguish between tidal energy and wave energy on any four points.

4. Attempt any THREE of the following: 12

- a) Explain how temperature difference in OTEC affects power generation and efficiency.
- b) Analyze the role of topography and river characteristics in selecting a small hydro-electric power plant.
- c) Discuss any four advantages of hydrogen fuel over conventional fuels.
- d) Discuss how the following factors affecting biogas generation:
 - i) Temperature
 - ii) pH value
 - iii) Retention time
 - iv) Feedstock quality.
- e) Explain with neat sketch of the Chinese biogas digester.

5. Attempt any TWO of the following:**12**

- a)
 - i) Compare constant speed and variable speed wind turbines.
 - ii) Justify why modern wind turbines prefer variable speed operation.
- b) Compare hydrogen IFC vehicle and Battery Operated Electric vehicle on the basis of:
 - i) Refueling time
 - ii) Range
 - iii) Infrastructure
 - iv) Environmental impact.
- c) A Rural area has surplus agricultural waste:
 - i) Suggest a suitable biomass conversion process.
 - ii) Explain its working principle and justify your selection.

6. Attempt any TWO of the following:**12**

- a) Explain the working of a solar air heater and analyze its advantages in drying applications.
 - b) A solar plant is proposed in a cloudy region:
 - i) Identify which type of radiation will dominate.
 - ii) Explain its effect on solar power output and how to minimize losses.
 - c)
 - i) Suggest a suitable site for wind farm in Maharashtra and Justify your choice based on wind resource.
 - ii) A site has average wind speed of 8 m/s. Justify whether it is suitable for wind power generation using power coefficient concept
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