

Total No. of Questions : 10]

SEAT No. :

P5577

[Total No. of Pages : 3

[5561]-547

B.E. (Mechanical) (Semester - II)
SOLAR AND WIND ENERGY
(2015 Pattern) (Elective - IV)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Draw suitable neat diagrams, wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if required.*

Q1) a) Explain present energy scenario and role of governing bodies for solar and wind energy. [6]

b) Explain Solar tower with figure. [4]

OR

Q2) a) Explain any one solar measurement instrument with figure. [6]

b) Explain solar distillation with figure. [4]

Q3) a) Classify solar thermal collectors and describe flat plate collector with the help of suitable diagram. [6]

b) Explain solar PV Cell with figure. [4]

OR

Q4) a) Classify solar concentrating collectors and explain point contact concentrator with figure. [6]

b) Describe classification of solar cells based on type of active material. [4]

P.T.O.

- Q5)** Design a solar PV System wherein load consists of a CFL, TV, Fan, Refrigerator and Computer. The system should allow the use of loads in non sunshine hours. The operating hours and the power rating of these loads are given in following table. [18]

Load	Watts	Hr/day	Numbers
CFL	18	6	10
Fan	70	4	8
TV(21")	250	2	2
Refrigerator	150	8	8
Computer	250	1	3

OR

- Q6)** An evacuated tube solar water heating system is designed for daily hot water supply of 300 lit. The daily average solar global radiation is 780 W/m^2 . The inlet and outlet temperature of water is 25°C and 50°C . The effective sunshine hours are 7 hours. Calculate number of evacuated tube required if dimension of one tube is $1800\text{mm} \times \phi 57\text{mm} \times 47\text{mm}$. Calculate efficiency of the system. [18]

- Q7)** a) Sketch the diagram of HAWT and explain function of its main components. [8]
b) Describe main considerations in selecting a site for wind generators. [8]

OR

- Q8)** a) Explain analysis of aerodynamic forces acting on wind mill blades with figures. [8]
b) Explain various design considerations for horizontal and vertical axis wind turbines. [8]

Q9) A propeller type turbine has a following data :

[16]

Speed of free wind at a height of 10m = 15 m/sec

$\alpha = 0.14$

air density = 1.226 kg/m³

height of tower = 100m

diameter of rotor = 90m

wind velocity at turbine reduces by 25%

generator efficiency = 90%

Find total power available to wind, power extracted by wind turbine, electrical power generated, axial thrust on turbine, maximum axial thrust on turbine.

OR

Q10) a) Explain in detail step by step design process for miniature wind mill. **[8]**

b) Explain status of wind energy potential and installation in India. **[8]**
