

Total No. of Questions :6]

SEAT No. :

**P221**

[Total No. of Pages :2

**Oct./ BE/ Insem. - 537**

**B.E. (Electrical)**

**RENEWABLE ENERGY SYSTEMS**

**(2015 Course) (Semester - I) (403143) (Elective-I)**

*Time : 1 Hour]*

*[Max. Marks :30*

*Instructions to the candidates:*

- 1) *Answers Q1 or Q2, Q3 or Q4, Q5 or Q6.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Given: Incident angle

$$\begin{aligned}\cos\theta &= \sin\phi (\sin\delta \cos\beta + \cos\delta \cos\gamma \cos\omega \sin\beta) \\ &+ \cos\phi (\cos\delta \cos\omega \cos\beta - \sin\delta \sin\gamma \sin\beta) \\ &+ \cos\delta \sin\gamma \sin\omega \sin\beta\end{aligned}$$

**Q1) a)** Explain any one instrument used for measuring solar radiation. [4]

b) For the latitude of 30° N & the tilt angle 30° towards the equator, determine ratio  $R_b$  for 10:30 am on July 25. [6]

OR

**Q2) a)** Explain any one type of CSP. [5]

b) Calculate the Sun's zenith and azimuth angle at 9 am solar time on 1st September at latitude of 23° N. [5]

**Q3) a)** List various silicon technologies available for solar PV cell. Explain any one in brief. [5]

b) What is STC? Give the parameters under STC. [5]

What is NOCT ? Specify the conditions for NOCT.

OR

**P.T.O.**

- Q4) a)** What are the factors required for electrical design of solar array? [5]
- b) Calculate F.F. maximum power & cell efficiency with following parameters  
 $V_{oc}=0.24V$ ,  $I_{sc}=-10mA$ ,  $V_m=0.14V$ ,  $I_m=-6.5mA$ , Intensity =  $100 \text{ w/m}^2$ ,  
Area =  $4 \text{ cm}^2$  [5]

- Q5) a)** State different types of speed control strategies for wind turbine. [5]
- b) Wind at one standard atmospheric pressure &  $15^\circ \text{ C}$  has a speed of  $10 \text{ m/s}$ . A wind turbine of  $10 \text{ m}$  diameter is operating at  $5 \text{ rpm}$  with max efficiency of  $40\%$  calculate [5]
- i) Total power density in wind streams.
  - ii) Maximum power density
  - iii) Actual power density
  - iv) Power O/P of the turbine
  - v) Axial thrust an turbine structure.

OR

- Q6) a)** Define: [5]
- i) Wind turbine efficiency
  - ii) Cut-in-speed
  - iii) Cut-out-speed
  - iv) Yaw control
  - v) Pitch control
- b) Compare Horizontal & vertical axis wind turbine. [5]

