... ... (Elective) Elective : Renewable Energy Sources 30/5/2..

Q.P. Code : 734801

(3 Hours) [Total Marks : 80

N.B.: (1) Question **No.1** is **compulsory**.
(2) Answer **any Three** from the remaining **Five** questions.
(3) Assume suitable **data** if **required**.
(4) **Figures** to the **right** indicate **full marks**.

1. Write short notes on **any Four** of the following : 20
   (a) Present status of power generation of India
   (b) Horizontal axis wind turbine
   (c) Energy audit
   (d) Energy plantation
   (e) Solar photovoltaic system

2. (a) Calculate solar altitude angle, incident angle and collector efficiency if : 10
   Location Pune : (18°32'N, 73°51'E)
   Day and Time : May 15, 11 am
   Annual average intensity of solar radiation: 400 W/m²
   Collector tilt = latitude angle
   No. of glass covers = 2
   Heat removal factor = 0.85
   Transmittance of glass = 0.88
   Absorptance of glass = 0.90
   Top loss coefficient = 7 W/m² °C
   Collector fluid temperature = 73°C
   Ambient temperature = 28°C
   Diffusive reflectance for two covers : 0.24.
   (b) Show that maximum power coefficient is 59% for horizontal axis wind turbine. 10

3. (a) Discuss the factors which affect the production of biogas. 10
   (b) Estimate the average daily global radiation on a horizontal surface in Baroda (22°N) if average sunshine hours are 9.5, a = 0.35, b = 0.4 and March, 16 is typical day for that month. 10

TURN OVER

4. (a) What is wave energy? Explain any one wave energy conversion system. 6
   (b) Describe pyranometer and sunshine recorder. 6
   (c) Calculate the number of animals and volume of biodigester required to produce power for a household which has power requirement of 0.8 KW for lighting and cooking purpose. 8
   Take C.V. of methane 28 MJ/m^3,
   Burner efficiency 70%,
   Retention period 30 days,
   Dry matter per animal per day is 1.8 kg,
   Density of dry matter in slurry in digester is 50kg/m^3,
   Biogas yield is 0.3m^3 per kg of dry input,
   Methane proportion in biogas is 0.6.

5. (a) Explain with a schematic the working of flash steam geothermal plant. What are its limitations. 6
   (b) Derive an expression for tidal power for single basin area. 6
   (c) Explain with schematic the working of KVIC plant in detail. 8

6. Write short notes on **any Four** : 20
   (a) Need for alternate energy sources
   (b) Comparison between liquid and air flat plate collectors
   (c) Total energy conversion
   (d) Local solar time
   (e) Open cycle OTEC system
