Q. P. Code : 50646

(3 Hours)

(Maximum marks: 80)

Note:

1. **Question No.1** is compulsory.
2. Attempt **any three** questions from remaining.
3. Assume **suitable data** if required.
4. Provide **neat diagrams** wherever necessary.

Q.1 Write short note on **(any Five)** **(20)**

a) Energy Audit.

b) Solar heating & cooling of buildings.

c) Prospects of geothermal energy in context to India.

d) Which wind data are taken into consideration in site selection of wind mills?

e) Factors affecting the biogas production.

f) Strategy for meeting the future energy requirements in India.

Q.2 a) What is Betz coefficient? Show that the ideal maximum theoretical efficiency is 59% for a horizontal axis wind mill. **(8)**

b) Describe construction and working thermosyphon solar water heating system. **(6)**

c) What are liquid dominated hydrothermal resources? How these can be utilized in a high temperature wet steam system? **(6)**

Q.3 a) Determine the average value of solar radiation on a horizontal surface for June 21, at the latitude of 10^0N, if constants a and b are given as equal to 0.30 and 0.51 respectively and ratio $\frac{n}{N} = 0.55$. **(8)**

b) Describe construction and working of floating dome type biogas plant with the help of neat sketch. **(6)**

c) Derive an equation for average tidal power generation per unit area of basin in terms of tidal range. **(6)**

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Q.4 a) Describe working of Darrieus type machines with the help of neat sketch and its characteristics. **(8)**

b) Explain wave energy conversion devices? **(6)**

c) Describe the photo voltaic - solar cells & its applications. **(6)**

Q.5 a) Wind at 1 bar and 20°C has a velocity of 12 m/s **Calculate:** **(10)**

(i) Total power density in wind stream (ii) maximum power density

(iii) A reasonable obtainable power density (iv) Total power produced if rotor diameter is 60 m and it runs at 50 rpm. (v) The torque and the axial thrust produced at maximum efficiency.

b) Describe working of Closed cycle OTEC system with the help of neat sketch. **(6)**

c) Explain energy consumption as a measure of Nation's development. **(4)**

Q.6 a) The following data are given for a family biogas digester suitable for the output of Eight cows. **(8)**

Given: Calorific value of methane : 28 MJ/m^3; Burner efficiency : 70% ; Retention period : 20 days; Temperature of fermentation: 30°C; Dry matter (cow dung) collected per cow per day : 2kg; Density of dry matter in fluid(slurry) in the digester : $50kg/m^3$; Biogas yield : 0.2 m^3 per kg of dry input ; Methane proportion in the biogas : 0.7

Calculate : i) The volume of biogas digester ii) The power available from the digester.

b) Explain the term 'slope' and surface azimuth angle of a surface facing the sun and bring out how sunset hour angle is affected by the slope. **(6)**

c) Explain vapour dominated system belongs to geothermal energy. **(6)**

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Correction in Program Code : T5328 - B.E.(MECHANICAL Engg)(SEM VIII) (CBSGS)(Rev-2012) / T1744 - 2)Renewable Energy Sources\tQ.P Code : 50646

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Question No. 3(b) Read working of floating drum Type instead of working of floating dome Type.