

(REVISED COURSE)

(3 Hours)

[Total Marks: 100]

- N.B. (1) Question No. 1 is **compulsory**.
 (2) Attempts any **four** questions from remaining **six** questions.
 (3) Draw **neat sketches** wherever necessary.
 (4) Figures to the right indicate full marks.
- 1 (a) What is the importance of 'Non-Conventional Energy Sources' in the context of Present Energy Scenario? 8
 (b) Explain energy status of India & Maharashtra and role of NCES. 8
 (c) Define the solar constant. What is its value? 4
- 2 (a) Define and explain the followings:- 8
 (a) Latitude (b) Hour angle (c) Declination (d) Day length
 (b) Estimate the monthly average daily global radiation on a horizontal surface at Ratnagiri ($16^{\circ} 59' N$, $72^{\circ} 05' E$) during the month of March if the average sunshine hours per day is 9.5. Assume the values of $a = 0.31$ and $b = 0.43$. 7
 (c) Find the days of the year on which the sun is directly overhead at 1200 h (LAT) at Pune ($18^{\circ} 32' N$). 5
- 3 (a) What is a Betz coefficient? Show that the maximum power coefficient is 59 % for a horizontal axis wind mill. 10
 (b) The following data are given for a family biogas digester suitable for the output of 10 cows: the retention time is 30 days, temperature $30^{\circ} C$, dry matter consumed per day is 2 kg, and biogas yield is $0.24 m^3$ per kg. The efficiency of burner is 60 %, methane proportion is 0.8. Heat of combustion of methane is $28 MJ / m^3$. Calculate the volume of digester and the power available from the digester. Assume density of dry material in the fluid is $50 kg / m^3$. 10
- 4 (a) A tidal power plant of the simple single basin type has a basin area of $30 \times 10^6 m^2$. The tide has a range of 12 m. The turbine however stops operating when the head on it fall below 3 m. Calculate the energy generated in one filling (or emptying) process, in kWh if the turbine generator efficiency is 75 %. 8
 (b) Explain with neat sketches, how energy from Geothermal sources can be obtained in different ways. 5
 (c) Propeller type wind turbine of 120 m diameter is running with 40 rpm at a velocity of 15 m/s with maximum efficiency. The atmospheric pressure is 1.01325 bar and the temperature is $15^{\circ} C$. Calculate: 7
 (i) The total power density in the wind stream
 (ii) The maximum obtainable power density
 (iii) The total power.

[TURN OVER

- 5 (a) Plot the variation of τ_r , τ_a and τ with the angle of incidence for the following cover system: 10
- | | |
|---|-----------------------|
| Material | : Glass |
| Number of cover | = 3 |
| Thickness of each cover | = 4 mm |
| Refractive index of glass relative to air | = 1.52 |
| Extinction coefficient of glass | = 15 m^{-1} |
- (b) Describe with a neat sketch the working of wind energy system showing the main components. 10
Discuss advantages and disadvantages of wind energy conversion systems.
- 6 (a) Draw a neat diagram and explain working of a KVIC design of a biogas digester? 10
- (b) How can wave energy be utilized? 10
- 7 Write short notes on any **four**:- 20
- Utilization of tidal energy
 - Site selection considerations for wind mill
 - Fuel cells
 - Micro-hydro power generation
 - Operational and environmental problems of geothermal energy.

RJ-Con. 11713-15.

Course: B.E. (SEM.VIII) (MECHANICAL ENGG.)([prog-758 To 772])

Q.P Code: 8270

Correction:

Q.2. A) a) latitude Angle
c) Declination Angle


Q2. B) Instead of During month of march consider it as date 16th March

Q.3. B) Dry matter consumed 2 Kg/day/cow

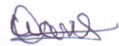
Q4. A) turbine generator efficiency =73%

Query Update time: 01/06/2015 01:10 PM

Block-8

Ansari Shahebaz 
6/1/15

75903562

Wazir. Subhan 

Ansari, SK



75903536

sham.

Block 9

Block 7

75903503



Nehar Anshu