

January 2023

M.Tech.- I SEMESTER

Non-Conventional Sources of Energy (MTEVE-101A)

Time: 3 Hours

Max. Marks:75

- Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.
 4. Any other specific instructions

PART -A

- Q1 (a) What is Pitch angle ? (1.5)
- (b) What do you mean by Air Foil ? (1.5)
- (c) What is Swept Area? (1.5)
- (d) What is Diffusion Radiation? (1.5)
- (e) Define Solar Constant. (1.5)
- (f) What is geothermal energy ? (1.5)
- (g) What do you mean by biogas ? (1.5)
- (h) What is ocean energy ? (1.5)
- (i) Write the expression for total power in wind stream. (1.5)
- (j) Write the names of biomass resources? (1.5)

PART -B

- Q2 (a) Discuss the different technologies to produce biogas. (10)
- (b) What are the factors affecting the production of biogas ? (5)
- Q3 (a) Find the angle subtended by beam radiation with the normal to a flat-plate collector at 9:00 a.m. for the day on November 3,2022.The collector is in Delhi(28° 35' N, 77° 12' E), inclined at an angle of 36° with the horizontal and is facing due south. ($\gamma = 0^\circ$, $n=307$ and $\omega = 45^\circ$) (10)
- (b) What are the advantages of geothermal energy ? (5)
- Q4 Explain the working principle of OTEC and describe the closed loop OTEC system. (15)
- Q5 (a) What are the various types of geothermal resources available ? (7.5)
- (b) Describe the various ways of geothermal power generation. (7.5)
- Q6 (a) A WEG generates 1500 watts at rated speed of 24 kmph at the atmospheric pressure and temperature of 20 °C. Calculate the change in output if the wind generator is operated at an altitude of 1800 m, temperature 10°C, wind speed 30 kmph, and air pressure 0.88 atmospheric. (10)

P T O

(b) Write short notes on advantages and disadvantages of wind energy system. (5)

Q7 Discuss the following:- (i) Solar Radiation Measurement Instruments (ii) (15)
Extraterrestrial & Terrestrial solar radiation
