

[06 - 4203]

IV/IV B.E. DEGREE EXAMINATION.

Second Semester

Electrical and Electronics Engineering

Elective II (A) – NON – CONVENTIONAL ENERGY
SOURCES

(W.e.f. admitted batch of 1999–2000)

Time : Three hours

Maximum : 70 marks

Answer questions NO.1 and any FOUR from the rest.

All questions carry equal marks.

1. (a) What is meant by renewable energy sources? Explain in brief these energy with special reference to Indian context.
- (b) Define the terms:(i) Zenith angle and(ii) Hour angle. Why is orientation needed in concentrating type collectors?
- (c) Explain the basic principle of wind energy.
- (d) Name the factors which affect the size of the biogas plants. What is meant by energy plantation?
- (e) What are the possible sources of geo thermal pollution? What are the limitations of a flashed steam system?

- (f) What are the advantages and limitations of wave energy conversion? What type of turbine is best suited for micro hydel plant?
- (g) Name the types of electrodes used for a fuel cell. State few applications of fuel cell.
2. (a) How are solar air collectors classified? What are the applications of a drier?
- (b) Estimate the daily global radiation on a horizontal surface at Baroda ($22^{\circ} 13' N, 73^{\circ} 13'E$) during the month of March. If constants 'a' and 'b' are given equal to 0.28 and 0.48 respectively and average sunshine hours for day are 9.5.
3. (a) Prove that in the case of horizontal axis wind turbine, maximum power can be obtained when : Exit velocity = $\frac{1}{3}$ wind velocity and $P_{max} = \frac{8}{27} PAV^3$.
- (b) How are wind energy conversion systems (WECS) classified? Discuss briefly.
4. (a) What is the difference between biomass and biogas? Explain the constructional details of and working of KVIC digester.
- (b) How are Gasifiers classified? What is pyrolysis? Name the potential applications of the gasifier.

5. (a) Describe a binary cycle system for liquid dominated system.
- (b) What are the sub classification hydrothermal convective systems? Describe the principle of total flow concept.
6. (a) Explain with neat sketches, the various methods of tidal power generation. What are the limitations of each method?
- (b) What are the advantages and limitations of small scale hydro-electric power generation?
7. (a) What is the principle of fuel cell? Discuss the problems associated with the operation of fuel cell.
- (b) Derive an expression for e.m.f. of a fuel cell.
8. Write short notes on the following :
- (a) Solar radiation on tilted surfaces
- (b) Vapour dominated geothermal power plant
- (c) Basic components of a wind energy conversion system (WECS).
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