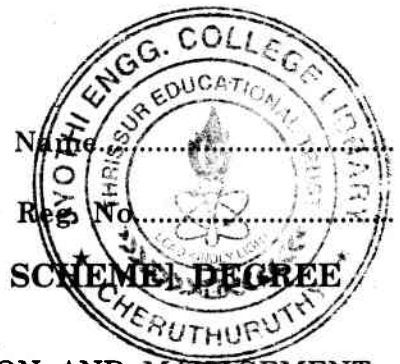C 1060

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EIGHTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, APRIL 2016

EE / PTEE 09 803 L09—ENERGY AUDITING, CONSERVATION AND MANAGEMENT

Time : Three Hours

Maximum : 70 Marks

Part A

Answer all questions.
2 marks each.

1. Define renewable energy and non-renewable energy sources.

2. What are the disadvantages of bio-energy.

3. Explain benefits of power factor improvements.

4. What are the demerits of simple payback period.

5. What are objectives of energy management.

(5 × 2 = 10 marks)

Part B

Answer any four questions.
5 marks each.

6. Explain components of a fuel cell and its operation

7. Discuss maximum demand control.

8. Explain energy efficient motors

9. Explain energy conservation opportunities in fans and blowers

10. Discuss the advantages of net present value (NPV) method.

11. Explain specific energy consumption.

(4 × 5 = 20 marks)

Answer all questions.
10 marks each (40 marks)

12. (a) Explain power curve of a wind turbine specifying the boundary speed conditions. (5 marks)

  (b) Determine the efficiency and fill factor of a solar cell, if Isc is 10 mA, Voc is 0.6 V and insolation is 0.9 mW/sq.cm. If I_{max} is 50 % of Isc and V_{max} is 0.045 V.

(5 marks)

Or

  (c) Explain a bio-gas plant mentioning the principle of operation and operational problems.

(10 marks)

Turn over

13. (a) The utility bill of an industry shows the power factor as 0.70 lag for an industry with 627 kW load. Calculate the kVAr required to improve PF to 0.95 lag ? Draw the phasor diagrams showing power factor angles before and after improvement.

(10 marks)

Or

(b) Calculate the annual energy cost savings on replacing an existing standard motor having efficiency of 85 % with an energy efficient motor having efficiency of 93 %. Assume that the output power is 15 kW and 8000 Hrs. hours of working in a year. Energy price = Rs 4/ kwh.

(10 marks)

14. (a) Calculate the NPV of the investment, if discount rate is 12 % and capital investment is 25 lakh Rupees and comment on the feasibility of the project. The return from the project is as follows.

Year	1	2	3	4	5	6
CASH	1 lakh	3 lakh	3 lakh	4.5 lakh	4.5 lakh	5 lakh

Or

(b) A small wind mill for water pumping costs Rs. 10,000 to purchase and install. If Rs. 800 is the annual savings after replacing diesel engine, calculate the internal rate of return of the investment, if life of wind mill is assumed as 15 years.

15. (a) Explain demand side management (DSM) methods.

Or

(b) Explain the steps of detailed energy audit in an industry.