

**CERTIFICATE IN ENERGY TECHNOLOGY
AND MANAGEMENT (CETM)**

00851 **Term-End Examination**

June, 2015

**OEY-003 : ENERGY MANAGEMENT :
AUDIT AND CONSERVATION**

Time : 3 hours

Maximum Marks : 70

Note : *Attempt five questions in all. Question No. 1 is compulsory. All questions carry equal marks. Use of scientific calculator is permitted.*

1. Choose the correct answer from the given four alternatives. 7×2=14

(a) Renewable energy is obtained from sources that are

- (i) exhaustible
- (ii) essentially inexhaustible
- (iii) available for free
- (iv) None of the above

(b) Which one is normally *not* an energy conservation measure ?

- (i) To reduce excess air of combustion
- (ii) To replace 60 watt incandescent light bulb by a 12 watt CFL
- (iii) To convert an oil fired boiler to wood fired
- (iv) To increase air-conditioned room temperature by 2°C.

(c) If the population of India is 1.05 billion people and annual electricity consumption is 660 Million MWh, how much is the annual per capita consumption in kWh ?

- (i) 63
- (ii) 500
- (iii) 629
- (iv) 6280

(d) At the constant temperature, electrical resistance is given by

- (i) $\frac{\text{Current}}{\text{Voltage}}$
- (ii) $\frac{\text{Voltage}}{\text{Current}}$
- (iii) Voltage \times Current
- (iv) None of the above

- (e) To assess the existing situation of a plant, good energy saving strategy plan starts with
- (i) energy audit
 - (ii) training
 - (iii) seminar
 - (iv) None of the above
- (f) If $NPV = 1000$ and $i = 5\%$, then the future value after 10 years is
- (i) 1551
 - (ii) 614
 - (iii) 1629
 - (iv) 645
- (g) A firm pays ₹ 160 for 10,500 kcal of fuel oil. How much does the firm pay for 1 kWh of fuel oil ?
- (i) ₹ 7.60
 - (ii) ₹ 11.80
 - (iii) ₹ 13.10
 - (iv) Question does not make sense.

2. (a) Explain the causes of global warming and its impact.

- (b) In a steam heat exchanger, furnace oil at 40 kg/hr, enters at 30°C and leaves at 90°C. Specific heat of furnace oil is 0.22 kcal/kg °C. If the latent heat of steam is 540 kcal/kg, find out the amount of steam (in kg/hr) required to heat the oil. 7+7
3. (a) What is an energy audit and how is it classified ?
- (b) Explain briefly the features and use of a Sankey diagram. 7+7
4. (a) Discuss the basic principles of developing energy balance.
- (b) Write down in detail the energy conservation measures in Boilers. 7+7
5. (a) Explain the various housekeeping measures in order to conserve energy.
- (b) A thermal power plant uses 0.77 kg of coal to generate one kWh of electricity. If the coal contains 52% carbon by weight, calculate the amount of CO₂ emissions/kWh under complete combustion conditions. 7+7

6. (a) What is Life Cycle Cost analysis ? What is the significance of inflation on it ?
- (b) What do you mean by power factor improvement ? How can the plant power factor be improved ? 7+7
7. (a) Discuss the advantages and limitations of adopting renewable energy systems.
- (b) A house is fitted with 10 lamps rated 100 W each, four fans each consuming 0.5 A, an electric kettle of resistance 100 Ω and an electric iron of resistance 121 Ω . If the energy is supplied at 200 V and costs ₹ 4 per kWh, calculate the bill for running the appliance for four hours in a day for the month of February, 2015. 7+7
8. (a) Explain the use of energy audit instruments for conducting energy audit.
- (b) Write short notes on any *two* of the following : 7+7
- (i) Energy Efficient Lighting Devices
 - (ii) Combustion Analyzer
 - (iii) Rural Energy Planning