1. (a) How the *power factor improvement* is related with the energy conservation programme?

(b) A 12 kW rated motor has a full load efficiency of 85%. Actual measurement shows 415V, 18A and PF 0.74. Find out the motor loading in percent during the measurement.

(c) A municipal corporation has 30,000 numbers of 250 Watts HPMV lamps. The annual operation hours of these lamps are 3600 hours. Calculate the annual energy cost, if the electricity tariff is Rs 4.75/kWh. Estimate the demand cost, if the present demand cost is Rs 150/KVA; assume Power factor as 0.7 for the lighting load. Discuss at least one energy saving opportunity in this lighting system, with investment and simple payback period.

***3+6+6=15***

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**TU/CODL**

**TEZPUR UNIVERSITY**

**SEMESTER END EXAMINATION (AUTUMN), 2017**

**DRE 201: ENERGY MANAGEMENT AND AUDITING**

*Full Marks: 70 Time: 3 hours*

*The figures in the right-hand margin indicate marks*

*for the individual questions*

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1. Choose the correct option **1×10=10**
2. Energy management involves

(a) Combination of technical and managerial skills

(b) Managerial skills only  
(c) technical skills only

(d) Energy audit skills only

(ii) Which of the following is least important of a good energy information system?

(a) data accuracy (b) data relevance

(c) data volume (d) data validation

1. The ratio of energy consumption to corresponding production is called
2. specific energy consumption (b) energy intensity

(c) Production energy ratio (d) specific production ratio

1. For an investment which has fluctuating annual savings over its project life, which of the following financial techniques is the best?
2. Simple payback period (b) ROI

(c) NPV (d) IRR

**P. T. O.**

(v) The central nodal agency for coordinating and implementing the energy conservation activities in India under the EC Act, 2001 is

(a) Bureau of Indian Standard

(b) Bureau of Energy Efficiency

(c) Bureau of Energy and Environment

(d) Bureau of Energy Conservation

1. The major loss in a fuel fired boiler is
2. Radiation loss (b) Flue gas loss

(c) Un-burnt carbon loss (d) Blow down loss

1. A three-phase induction motor is drawing 12 amps at 440 volts. If the operating power factor of the motor is 0.85, then the power

drawn by the motor is

1. 7.8 kW (b) 4.5 kW

(c) 5.3 kW (d) 23.4 kW

1. Luminous efficacy of which of the following is the highest
2. CFL (b) HPMV

(c) HPSV (d) LPSV

1. Amount of oxygen (stoichiometric) needed for complete combustion of 1 kg of Methane is
2. 17.39 kg (b) 4 kg

(c) 6 kg (d) None of the above

1. An energy audit requires

(a) Quantification of energy use

(b) Qualification of energy use

(c)Converting all energy use to one single unit

(d) Reduction in power consumption

**P. T. O.**

1. (a) Explain: Energy management, energy conservation and energy auditing.

(b) Discuss the difference between energy conservation and energy efficiency.

(c) What are the different types of *energy auditing*?

(d) A plant is using 4 tons/day of coal to generate steam. The calorific value of the coal is 4000 kCal/kg. The cost of coal is Rs. 2000/ton. The plant substitute coal with rice husks, as a boiler fuel, which has a calorific value of 3000 kCal/kg and cost Rs. 700/ton. Calculate the annual cost savings at 300 days of operation, assuming the boiler efficiency decreases from 78% on coal to 72% on rice husks.

***3+3+3+6=15***

1. (a) Why the *economic analysis* is so important in energy management programme?
2. Explain the meanings of *fuel substitution* and *energy substitution* with examples.
3. A cement industry has installed 6 MW DG set and is operated by furnace oil. The cost of furnace oil is Rs 35/liter. The average loading on the DG set is 5 MW and the hourly furnace oil consumption is 1230 liters. Estimate the cost of energy generation in Rs/kWh. The plant management is planning to convert the existing DG set to gas operated engine. The estimated cost of gas is Rs 20/Sm3. If the energy generation is 3.7 kWh/Sm3, calculate the generation cost per kWh with gas as fuel.

***3+5+7=15***

1. (a) Explain the use of *sankey* diagram.
2. In a pumping system, the motor and pump efficiencies are 90% and 80% respectively. The losses in throttle valve and pipe fittings are 20% and 28% respectively. If the motor is drawing 34 kW, find out the power transmitted to water in kW at the end use.
3. Mention any three responsibilities and duties of an energy manager.

***3+7+5=15***

***P. T. O.***