B.E. (Mechanical) (Sem-VII) (CBS) Date - 26/11/19

Paper / Subject Code: 42865 / Energy Audit and Management (ILOC - I)

3 hours **80 Marks**

N. B.:

1. **Question no. 1 is compulsory**
2. Attempt any **THREE Questions** from remaining **FIVE** questions.
3. Use illustrative diagrams wherever required.

Q1) Attempt any **FOUR** questions.

a) Give any **TWO** examples of energy conservation and energy efficiency each. **05**

b) Define 1) Energy management 2) Energy audit, as per energy conservation act. **05**

c) List any **FIVE** ENCON (ENergy CONservation) opportunities possible in lighting system. **05**

d) List any **FIVE** thermal systems that require energy management practices on regular basis. **05**

e) Why it is necessary to conduct **on site** performance evaluation in energy auditing. **05**

Q2) a) Distinguish between 'preliminary energy audit' and 'detailed energy audit'. **10**

b) What are advantages of NPV method over Simple Payback Period method? Calculate net present value (NPV) for an investment towards a LED Lamp having life of 2 years. The discount rate is 10% per year. The cost of lamp is □400/_. Due to investment, annual savings in first year and second year is □1000/_ each. **10**

Q3) a) What are the benefits of Power Factor (PF) improvement? During June-2019, the plant has recorded a maximum demand of 600 kVA and average PF is observed to be 0.82 lag, the minimum average PF to be maintained is 0.92 lag as per the independent utility supplier and every one % dip in PF attracts a penalty of Rs 10,000/in each month. Calculate **new kVA and the improvement in PF** for July-2019 by installing 100 kVAr capacitors. **10**

b) How an "energy efficient motor" is different from a "standard motor" in construction aspects? What are the advantages of energy efficient motor on standard motor? **10**

Q4) a) Why dry saturated steam is preferred for heating applications? Name any **FIVE** characteristics of steam which makes it most popular and useful to industries? **10**

b) List any **TEN** ENCON (ENergy CONservation) opportunities possible in HVAC system. **10**

Q5) a) XYZ company decided to replace 400 W lamp with 250 W lamp, 250 W lamp with 150 W lamp and 125 W lamp with 70 W lamps for same light output for 4500 hours of annual operation and consider Rs. 4.5 as per unit cost. Calculate **energy savings, cost savings and simple payback period** due to investment decision. **10**

b) The specifications of cooling water pump connected to boiler, are as follows: Discharge- Q = 12.5 lit/sec, head- H = 60m, Power consumption- P = 13.4 kW. As per the boiler manufacturer, required quality is 12.5 lit/sec at 3.0 kg/cm^2. What type of energy conservation measure can be proposed and estimate the **reduction in power consumption**? Assume operating efficiency of pump as 65% and motor efficiency as 90%. **10**

Q6) a) What do you mean by **ECBC**? Enlist any **FIVE** energy saving measures possible in any commercial building. **10**

b) What is LEED rating of a building? Discuss how any traditional building is converted into green building? **10**

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