SUBJECT CODE NO:- P-487
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EEP/EE/EEE) Examination MAY/JUNE-2016
Energy Conservation & Audit
(Revised)

[Time: Three Hours]   [Max Marks:80]

"Please check whether you have got the right question paper."

N.B   i) Q.No.1 and Q.No.6 are compulsory.
               ii) Attempt any two questions from the remaining questions in each section.
               iii) Assume suitable data, if necessary.

Section A

Q.1   Attempt (any five)   10
   a)   Define energy audit
   b)   What is meant by evaporation ratio in case of steam boiler?
   c)   What is the refrigeration local in "TR" when 10 m^3/hr of water is cooled from 20^0 C to 8^0 C?
   d)   Define global warming potential
   e)   What are the types of topping cycle?
   f)   What is use of lux meters & leak detectors?
   g)   Define ton of refrigeration
   h)   The efficiency of boiler was improved from 70% to 80%. What % of fuel is saved?

Q.2 a) What are the duties and responsibilities of energy manager as per energy conservation Act 2001?   07
     b) Write down the 'steps' involved in 'Energy audit' with example   08

Q.3 a) A steam power station of 100 MW capacity uses coal of calorific value 6400 Kcal/ Kg. The thermal efficiency is 30%   07
         and electrical efficiency is 90%. Find the coal requirement per hour when the plant is working at full load
     b) Explain in detail the steps to calculate boiler efficiency   08

Q.4 a) What is cogeneration as applied to cement industry? Explain with diagram the co-generation system using back-   07
         pressure turbine.

     b) Explain which law is applicable to pumping system and list the energy conservation opportunities in pumping   08
         system in an industry.

Q.5   Write short notes on (any three)   15
         1.   ISO 50001
         2.   Role of BEE in energy conservation
         3.   Energy performance assessment of HVAC & refrigeration system
         4.   CDM and its objectives.

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Section B

Q.6   Attempt <u>any five</u>   10
   a) What is PI?
   b) The cost of heat exchanger is Rs 1 lakh. Calculate simple payback period considering annual operating cost of RS. 15000 and annual saving potential of Rs 60000
   c) What is harmonics?
   d) A 4 pole squirrel cage IM. Operates with 5% slip at full load. What is the full load RPM you may expect? If the frequency is changed to 45c/s by a v/f control
   e) Define NPV giving the standard formula to calculate net present value
   f) What is DSM? How it helps in energy management?
   g) Draw the vector diagram showing the relation between KW, KVA and KVAr & angle θ between KW and KVA.
   h) What is IRR?

Q.7 a) What are the different methods of automatic power factor controller explain in brief?   08
   b) Give comparison between NPV and IRR method   07

Q.8 a) Explain simple payback period method & its advantages and disadvantages   08
   b) An industrial plant is consuming 400 KW power with a maximum demand of 520 KVA. The demand charge is   07
       Rs. 300/KVA per month. Determine the saving possible by improving the p.f. to 0.95 and payback period. If investment on capacitor bank is Rs. 3,00,000/-

Q.9   Explain in detail the procedure to conduct energy audit of a typical cement plant. Suggest measures to be taken to 15 improve the overall performance of plant

Q.10   Write short notes on <u>(any three)</u>   15
         1. Soft starter
         2. E.A 2003 and energy sector reforms
         3. Power factor improvements and its benefits
         4. Energy performance assessment of a typical steel plant.