17559

15116

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions : *(1)* ***All*** *questions are* ***compulsory****.*
(2) Illustrate your answers with neat sketches ***wherever*** *necessary.*
(3) Figures to the ***right*** *indicate* ***full*** *marks.*
(4) Assume suitable data, if ***necessary****.*
(5) Use of Non-programmable Electronic Pocket Calculator is ***permissible****.*
(6) Mobile Phone, Pager and any other Electronic Communication devices are ***not permissible*** *in Examination Hall.*

Marks

1. A) Attempt **any three** of the following : **12**

a) Classify energy sources with suitable examples.
b) State the steps involved in the field testing for determination of pump efficiency.
c) Define energy monitoring and targeting. State essential elements of monitoring and targeting system.
d) Explain the concept of fuel cell.

B) Attempt **any one** of the following. **6**

a) State the modes of heat transfer with suitable example.
b) Explain the significance of power factor. A three phase induction 75 KW motor operates at 55 KW. The measured voltage is 415 V, current is 80 ampers. Calculate the power factor of the motor.

2. Attempt **any four** of the following. **16**

a) Explain the types of energy Audit.
b) State the salient features of EC Act 2001.
c) State the important properties considered for the selection of fuel.
d) Explain the concept of thermal power plant with the help of block diagram.
e) What do you understand by word "Energy Security" ?

3. Attempt **any four** of the following **:** **16**

a) List components of windmill with their uses.
b) State advantages and disadvantages of direct method for boiler efficiency calculation.
c) State significance of Benchmarking energy performance in the industry. Write two benchmarking parameters related to utility.
d) Describe the principle of Biomass Gasifier and state the applications of gas produced.
e) State salient features of PAT Scheme.

P.T.O.

Marks

4. A) Attempt **any three** of the following. **12**

a) Describe energy conservation opportunities in boiler.

b) Explain the working of solar water heating system.

c) Explain three T's of combustion.

d) Differentiate between conventional and non conventional energy sources.

B) Attempt **any one** of the following. **6**

a) Define specific heat and latent heat. Steam at 100°C is condensed and cooled upto 50°C. Calculate heat given out in kJ. (latent heat of condensation of steam = 540 kcal/kg, Specific heat = 1 kcal/kg.k.

b) List the parameters required for energy audit with their measuring instruments.

5. Attempt **any two** of the following **:** **16**

a) Explain efficiency calculation of boiler by direct method to evaluate its performance.

b) What is simple payback period ? State its importance in energy conservation projects. An investment of Rs. 20,000/- gives energy saving of Rs. 35,000/- per year. Yearly maintenance cost is Rs. 8,000/- Calculate its payback period.

c) Explain effect of speed variation on pump performance using affinity laws. Estimate the reduction in power consumption of condensate transfer pump by reducing speed of the pump by 20% to the rated speed. Q = 38 m^3/h, H = 65 m, P = 12.5 kW.

6. Attempt **any two** of the following **:** **16**

a) Explain the role of range and approach in cooling tower performance evaluation. How much maximum cooling is possible in cooling tower ? State energy saving opportunities in cooling tower.

b) Explain construction and working of biogas plant.

c) Explain the term LMTD. List the steps to check performance assessment of heat exchanger.
