

ELECTRICAL POWER UTILIZATION

I INTERNAL TEST

Answer any Five Full Questions : Each Question carries 10 Marks

1. Advantages of Electrical heating

Economical, Cleanliness, Absence of flue gases, Ease of control, Automatic Protection, Upper limit of Temperature, Special heating requirements, High Efficiency of Utilization, Better working conditions, Safety, Explanation (10) Marks.

2. (a) Direct Resistance heating with diagram – 5 marks

(b) Indirect Resistance heating with diagram – 5 marks

3 Principle of Dielectric heating – 3 marks

Diagrams – 4 marks

Derivation – 3 marks

4 (a) Faraday's First law – explanation – 2.5 marks, second law – 2.5 marks

(b) Basic principle of electrolysis – diagram – 2 marks, explanation – 3 marks

5(a) Electrochemical equivalent – definition – 3 marks, (b) Current efficiency –

Definition – 4 marks (c) Electrode potential – definition – 3 marks

6 Heat required to raise the temperature of water = $ms(t_2 - t_1) = 283.5 \text{ kWh}$ - 2 marks

Water to be heated daily = 5400 kg - 1 mark

Energy supplied = 324.324 kWh - 2 marks

Loading = 13.5 kW – 2 marks

Efficiency of tank = 87.41 % - 3 marks

7 (a) Heat required = $m [s(t_2 - t_1) + L] = 0.299 \text{ kWh} - 2 \text{ marks}$

Energy input = $5 \times 10/60 = 0.8333 \text{ kWh} - 1 \text{ mark}$

Efficiency of furnace = $35.88 \% - 2 \text{ marks}$

(b) Depth of penetration formula is used

Substituting the frequency = $56.289 \text{ kHz} - 5 \text{ marks}$