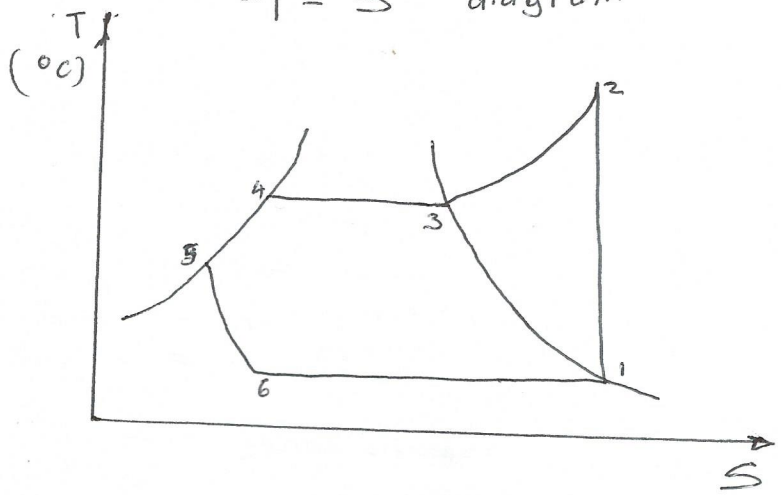
(ii) $h_1 = 178.7$ KJ/kg $\quad h_3 = 191.7$ KJ/kg $\quad h_2 = 194.9$ KJ/kg

$T_4 = 10°C = 283$ K

$T_5 = 7°C = 280$ K

Liquid cooled by 7°C before expansion by throttling

T - S diagram



$C_{pL} = 0.94$ KJ/kg K

$h_5 = h_4 - C_{pL}(T_4 - T_5) = 45.4 - 0.94(283 - 280)$

$h_5 = 45.4 - 2.82 = 42.58$ KJ/kg $= h_6$

$$C.O.P = \frac{h_1 - h_6}{h_2 - h_1} = \frac{\text{refrigerative effect}}{\text{energy out put}} = \frac{178.7 - 42.58}{194.9 - 178.7}$$

$C.O.P = \underline{\underline{8.4}}$