Problm- A vapour absorption refrigeration system works with generator, ambient & evaporator temps. as 360 K, 310 K & 260 K resp. Find the COP of system. If evaporator temp. falls to 250 K, what should be the generator temp in order to operate the system with same COP.

Soln-

$$COP = \left(\frac{360-310}{360}\right)\left(\frac{260}{310-260}\right)$$

$$= 0.138 \times 5.2$$

$$= 0.7176 \text{ Ans.}$$

$$COP' = \frac{360-310}{360}$$

$$COP = \left(\frac{T_G-310}{T_G}\right)\left(\frac{250}{310-250}\right)$$

$$0.72 = 4.16\left(\frac{T_G-310}{T_G}\right)$$

$$0.72T_G = 4.16T_G - 1289.6$$

$$T_G = 375 \text{ K Ans.}$$

Problm- A vapour absorption refrigeration system works with three thermal reservoirs. A REF of 100 W is required at 250 K, heat source is available at 400 K, heat rejection occurs at 300 K.

Find the minimum value of heat required in watt(W).

Soln- $RE = 100\ W$

$T_R = 250\ K$

$T_G = 400K$

$T_o = 300K$

$$COP = \frac{RE}{Q_G}$$

for min $Q_a$, COP should be max.

$$COP_{max} = \left(\frac{T_G - T_o}{T_G}\right)\left(\frac{T_R}{T_o - T_R}\right)$$

$$\frac{RE}{Q_G} = \left(\frac{T_G - T_o}{T_G}\right)\left(\frac{T_R}{T_o - T_R}\right)$$

$$\frac{100}{Q_G} = \left(\frac{400 - 300}{400}\right)\left(\frac{250}{300 - 250}\right)$$

$Q_G = 80W$ Ans.