Centre for Energy Studies

MAJOR TEST (CES) (Part B)

ESL- 360 Direct Energy conversion M.M. 15

1(a) What is heat mirror? Evaluate figure of merit for transparent and absorbing type surfaces. (2½)

(b) What is plasma wave length? Explain on the bases of transmission and reflection spectras. (1½)

(c)(i) What is Ohmic contact? Explain in brief the roll in PV system. (1)

(ii) Find the Thomson heat transferred to the surroundings from a wire whose end points are maintained at 373 and 273°K. A current of 10 mA is flowing in the wire and its absolute thermoelectric power increases linearly with Temperature at a rate $\frac{dS}{dT} = 5.4 \times 10^{-9} V/°K^2$ (4) (2)

2.(a) Discuss properties of an ideal ion-exchange membrane electrolyte. Find the maximum efficiency for CH_4 fuel cell, the ideal cell voltage is 1.15 volts. what flow rate in kg/hr of methan and oxygen would be required to produce a power output of 100KW. what heat transfer rates would be involved under following circumtances? (F = 96,500 Coulombs/gm-mol)

Given: $\Delta G^{\circ}_{27°C} = -195,500$ cal/gm.mol

$\Delta H^{\circ}_{27°C} = -212,800$ cal/gm.mol

1 Joule/sec = 0.86 K.cal/hr (4)

(b) what is Hall Effect? Calculate Hall constant and mobility for following data:
length of sample 2 cm., width 0.4 cm., mag. field 5×10^3 Gauss, V_x (voltage) 1.5 volts and current 7.5 mA, $V_H = +6$ mV. (2)

(c) calculate the maxi. possible resistivity for Ge at room Temp.
If $p_0 = 3.45 \times 10^{13}/cm^3$ $n_0 = 1.67 \times 10^{13}/cm^3$, $e = 1.6 \times 10^{-19}$ Coulomb (4)