CE-210 Digital Systems I
Assignment #4 – Chapter 4

1- Use K-maps to obtain a minimal SOP and a minimal POS for the following function. Which realization, SOP or POS, is more cost-effective?

$Y = \prod_{A, B, C}(0, 1, 4, 5, 7)$

2- For each of the following functions obtain

all on-set prime implicants and all off-set prime implicants,

all distinguished 1-cells and all distinguished 0-cells,

all essential on-set prime implicants and all essential off-set prime implicants,

a minimal SOP and a minimal POS.

Also determine which realization, SOP or POS, needs less hardware.

Note: For each function, draw a K-map to show all the on-set prime implicants and another K-map to show the minimal SOP. If these two K-maps are identical, then one K-map is sufficient. Similarly, draw a K-map to show all the off-set prime implicants and another K-map to show the minimal POS. Again, if these two K-maps are identical, then one K-map is sufficient.

$Y = \Sigma_{A, B, C, D}(0,1, 4, 11, 12, 13, 15)$

On-set prime implicants (write p-terms) =

Distinguished 1-cells (write cell numbers) =

Essential on-set prime implicants (write p-terms) =

Minimal SOP =

Off-set prime implicants (write s-terms) =

Distinguished 0-cells (write cell numbers) =

Essential off-set prime implicants (write s-terms) =

Minimal POS =

Which realization (SOP or POS) needs less hardware?

$Y = \Sigma_{A, B, C, D} (0, 1, 2, 3, 4, 5, 6, 7, 14, 15)$

Off-set prime implicants (write s-terms) =

Distinguished 0-cells (write cell numbers) =

Essential off-set prime implicants (write s-terms) =

Minimal POS =

On-set prime implicants (write p-terms) =

Distinguished 1-cells (write cell numbers) =

Essential on-set prime implicants (write p-terms) =

Minimal SOP =

Which realization (SOP or POS) needs less hardware?

$Y = \prod_{A, B, C, D} (0, 2, 9, 10, 11, 12, 13, 14, 15)$

Off-set prime implicants =

Distinguished 0-cells (write cell numbers) =

Essential off-set prime implicants (write s-terms) =

Minimal POS =

On-set prime implicants (write p-terms) =

Distinguished 1-cells (write cell numbers) =

Essential on-set prime implicants (write p-terms) =

Minimal SOP =

Which realization (SOP or POS) needs less hardware?

3- Use K-maps to obtain a minimal SOP and a minimal POS for each of the following incompletely specified functions. Which realization, SOP or POS, is more cost-effective?

$Y = \prod_{A, B, C, D} (0, 3, 10, 11, 14) \cdot D(2, 4, 5, 8, 15)$

$Y = \Sigma_{A, B, C, D} (2, 6, 10) + D(1, 5, 9, 11, 13, 14)$