Multiplexers (Dataselectors) and Demultiplexers

Exercises:

1. Download the ICs datasheets needed for measurements (74157 quad 2-to-1, DJ409 double 4-to-1 multiplexer, 7442 (7445) BCD-DEC decoder, 74138 3-to-8 decoder, 74139 double 1-to-4 demultiplexer datasheets; puma.unideb.hu/~misak, http://alldatasheet.com).

2. Read and learn:

- dataselector circuits ([1], P.331-342).

3. Design and implement:

- 2 line to 4 line decoder with Enable input! Design this problem exclusively by the use of NOR and NAND gates!

- $Y = \sum^{4}(1,2,5,6,7,8,10,12,13,15)$ logic function by 8-to-1 multiplexer and one inverter!

Write solutions to the measurement protocol! Propose IC types for problems realization! Examine the designed circuits by Tina circuit simulator! Describe circuits operation and write your experiences in measurement protocol!

4. Browse the 4th laboratory work from laboratory handbook [2]!

5. Build 2-to-1 multiplexer with 2-input NAND gates! Examine its operation!

6. Build 1-to-2 multiplexer with 2-input NAND gates! Examine its operation!

7. Examine the circuit from laboratory handbook [2], P.18 (21)! How does this circuit operate?

8. Build the circuit! Examine its operation! Compare its practical operations with expected (planned) operation! Describe and write your experiences in measurement protocol!

9. Transform the circuit (8. exercise) to 4-to-1 multiplexer! Examine its operation! Compare its practical operations with expected (planned) operation! Describe and write your experiences in measurement protocol!

10. Get acquainted in practice with DJ409 and 74157 ICs operation!

11. Realize by the use of DJ409, 74157 ICs your own 4-variable logic function designed by Shannon function decomposition (last semester problem)! Examine its operation! Compare its practical operations with expected (planned) operation! Describe and write your experiences in measurement protocol!

BIBLIOGRAPHY

[1] Floyd T. L. Digital fundamentals. New Jersey: Pearson Prentice Hall, 2006.
[2] Szász Cs. Digital electronics basics (Laboratory handbook), Debrecen: DE MFK, 2003 (in Hungarian).
[3] Magyari B. Digital ICs (74xx series). Budapest: Műszaki Könyvkiadó, 1982 (in Hungarian).