Digital Circuit Design Quiz #2

1. Obtain the simplified Boolean expressions in terms of the input variables in the circuit of Fig. 1 for
   (a) (10%) Output ***F***
   (b) (10%) Output ***G***

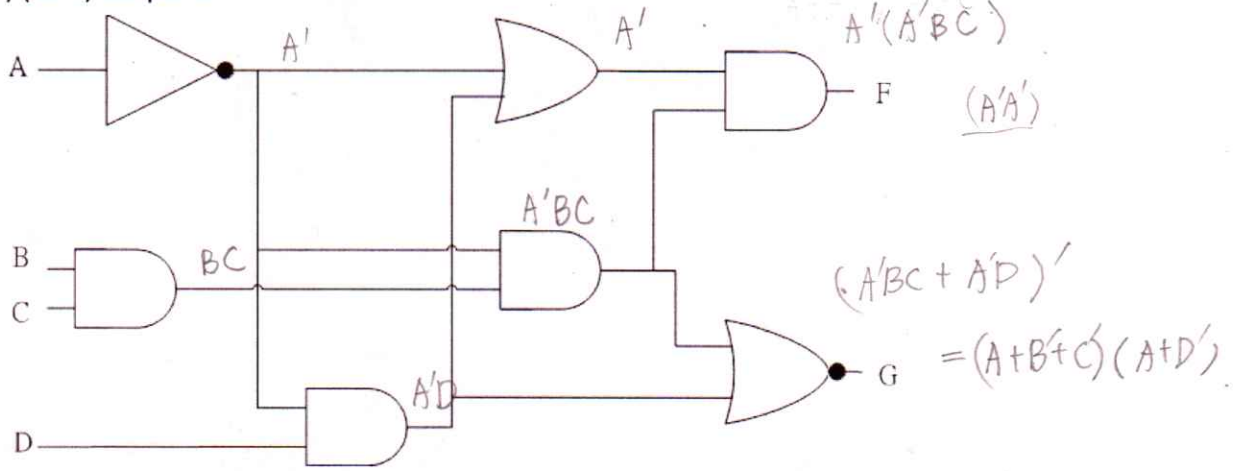

Fig.1

2. (20%) Implement a full subtractor with 4×1 multiplexers.

3. (20%) Construct a 5-to-32-line decoder with four 3-to-8-line decoders with enable and a 2-to-4-line decoder. Use block diagrams for the components.

4. (20%) Implement the following Boolean function with a 8x1 multiplexer:
   (a) $F(A.B.C.D) = \sum(0,2,5,7,11,14)$
   (b) $F(A.B.C.D) = \prod(3,8,12)$

5. (20%) Use an 8x1 MUX to implement a comparator that compares two 2-bit unsigned number A and B. The comparator has one output X, so that X=1 if A<B, and X=0 if A ≥ B.