Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

FOURTH SEMESTER B.TECH (E & C) DEGREE END SEMESTER EXAMINATION
MAY/ JUNE 2016
SUBJECT: DIGITAL SYSTEM DESIGN USING VERILOG (ECE - 2204)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates
- Answer **ALL** questions.
- Missing data may be suitably assumed.

1A. Implement 3 bit binary- to-gray code converter using ACT1 series

1B. Explain the following terms: [i] channeled and channelless gate array [ii] Logic Synthesis [iii] antifuse switch

1C. Compare ASIC and FPGA.

(5+3+2)

2A. Find the test vector for SA0 fault shown in **FIG. 2A** using ITG

2B. Implement following function using Xilinx XC 3000. How many CLBs and LUTs are required? $F(a,b,c,d,e) = a.b.c + a.\bar{b}.c + \bar{e} + d.e$

2C. Find the test vector for SA1 fault at node α shown in **FIG. 2C** using D-Algorithm

(5+3+2)

3A. Find combinational controllability and observability measures of all the nodes for the circuit in **FIG. 3A.**

3B. Obtain the minimal test vector set for the fault set {a0, b0, c0, d1, e0, f1} in the circuit of **FIG. 3B** using fault table method.

3C. How will you enhance the observability of node α in the circuit of **FIG.3C.**

(5+3+2)

4A. Write a sequential Verilog code for 4-bit Carry Look Ahead (CLA) adder.

4B. Find the test vector to detect the fault SA1 at node α for the circuit in **FIG. 4B** by path sensitization method.

4C. Give a data-flow Verilog model for 3-to-8 decoder with enable input and active high output.

(5+3+2)

5A. Write a structural Verilog code for 4 bit carry ripple adder (CRA) using 1-bit full adder module.

5B. Write the switch level Verilog HDL code for two-input CMOS NAND gate.

5C. Implement the following expression using Altera MAX FPGA having 3 wide AND OR array plane. $F = AB\bar{C} + \bar{A}\,\bar{B} + \bar{B}C + \bar{A}\,\bar{D} + AB\bar{D}$

(5+3+2)

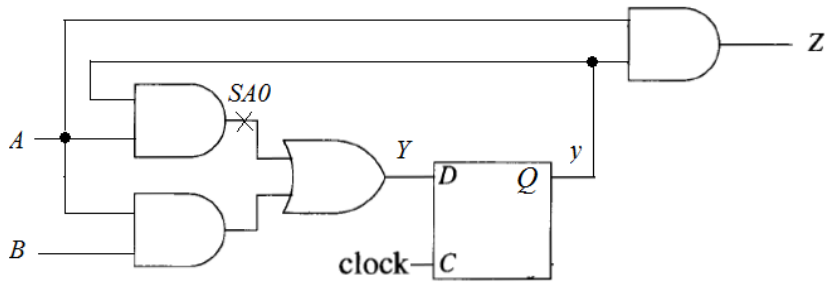

FIG. 2A

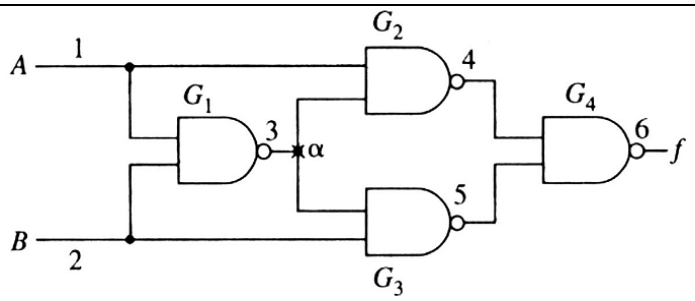

FIG. 2C

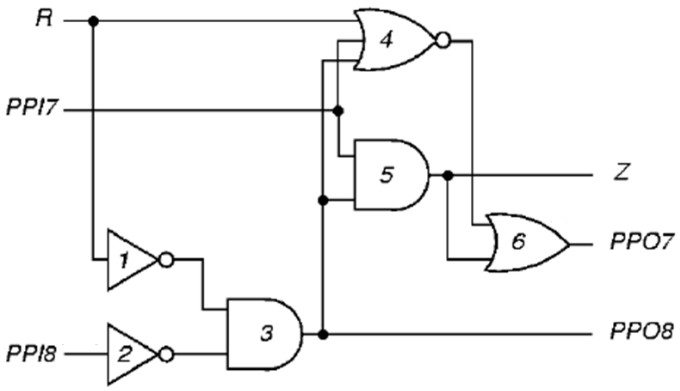

FIG. 3A

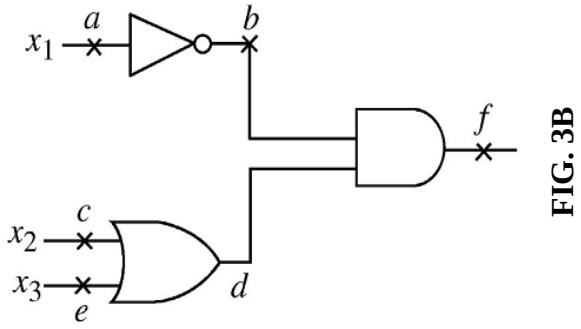

FIG. 3B

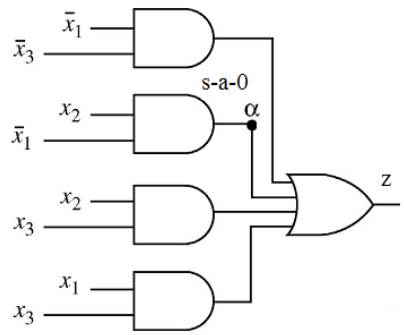

FIG. 3C

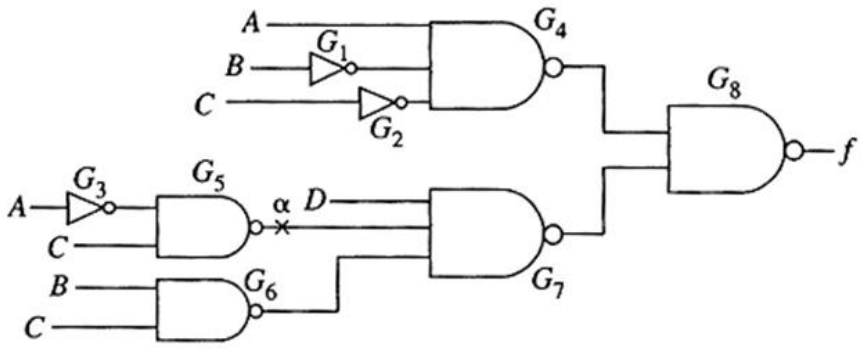

FIG. 4B