Reg. No.					



## MANIPAL INSTITUTE OF TECHNOLOGY Manipal University SECOND SEMESTER M.TECH DEGREE END SEMESTER EXAMINATION - APRIL / MAY 2017 SUBJECT: VLSI TESTING AND TESTABILITY (ECE - 5259)

## TIME: 3 HOURS

MAX. MARKS: 50

## Instructions to candidates

- Answer **ALL** questions.
- Missing data may be suitably assumed.
- 1A. Explain the reason for occurrence of errors or faults occur in VLSI chips. Also describe the different types of ATEs available with block diagram.
- 1B. Find the observability of 2:4 binary decoder using only NAND gates.
- 1C. Find the Test Vector for critical path output zero for the circuit shown in FIGURE Q1C.

(5+3+2)

- 2A. Find the Test vector for SA1 for circuit shown in **FIGURE Q2A**, using D algorithm and PODEM.
- 2B. Explain how Iddq test can be used for finding the faults in the MOS circuits.
- 2C. Find the fault collapse ratio for the circuit shown in **FIGURE Q2C**.

(5+3+2)

- 3A. Distinguish between Homing and Distinguishing sequence. Find distinguishing sequence for the state machine shown in **Table Q3.1**. And also write the response of the sequential circuit for the distinguishing sequence.
- 3B. Find the test vector for the circuit shown in **FIGURE Q3B**, using Iterative Test Generator (ITG) method.
- 3C. If in a Hamming code scheme, "1010110" code word is received then find any error has occurred, if so correct it.

(5+3+2)

- 4A. Use all possible output compression techniques for the circuit shown in **FIGURE Q4A**, and compare the signature of faulty and fault free circuit. For signature analysis technique, use  $1+x^3$  LFSR with initial values are all 0s.
- 4B. Find the test vectors for the fault shown in circuit **FIGURE Q4B**, through l-p-f and p-n-f paths using Boolean difference method.
- 4C. Discuss recursive learning.

(5+3+2)

5A. How Reed Muller Expansion technique can be used to improve the testability of a combinational circuit? Explain.

- 5B. Find the Signal flow graph, reverse SFG, expression for output and input for circuit shown in **FIGURE Q5B**.
- 5C. Describe online self-test.

(5+3+2)





FIGURE Q1C

FIGURE Q2C





PS	NS, Output				
	X=0	X=1			
А	C,1	D,0			
В	D,0	B,1			
С	B,0	C,1			
D	С,0	A,0			
Table Q3.1					





FIGURE Q3B



Ri

VinG)





FIGURE Q5B

Vout (+)

Rf

-1 1-

1