Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

SEVENTH SEMESTER B.TECH. (E & C) DEGREE END SEMESTER EXAMINATION DECEMBER 2018/ JANUARY 2019 SUBJECT: RTL VERIFICATION USING VERILOG (ECE - 4021)

TIME: 3 HOURS

MAX. MARKS: 50

Instructions to candidates

- Answer **ALL** questions.
- Missing data may be suitably assumed.
- 1A. Using ESPRESSO algorithm, determine the essential prime implicants for the set of prime implicants F={P,Q,R} where P=B'C', Q=BC, R=AC'D
- 1B. Draw control and data flow graph (CDFG) for executing the following sequential statements x=a*b, y=c+d, if x<y then z=y-x else z=x-y.
- 1C. Define latency, mobility and resource constraints.

(4+3+3)

- 2A. Using tabular method, obtain prime implicants and the minimal expression for the given function $F(w,x,y,z) = \sum m(0,1,5,7,8,10,14,15)$
- 2B. Construct ROBDD for decade counter. Also perform ITE for the decade counter.
- 2C. Write a Verilog-AMS code for the voltage follower circuit. The values can be suitably assumed.

(4+3+3)

- 3A. Apply ASAP and ALAP algorithm for the given data flow graph shown in **Figure 5A**. Determine the latency using ASAP and mobility using ALAP. Draw the scheduled graph. Assume all the operations have unit execution delay.
- 3B. Write a Verilog-AMS code to calculate I=C.dv/dt. The parameter values can be suitably assumed.
- 3C. Explain Gajski' Y chart.

(4+3+3)

- 4A. Write the structural VHDL code for 4 bit parallel adder.
- 4B. Write the sequential VHDL code for the circuit shown in Figure 4B.
- 4C. What are all the different types of identifiers used in VHDL. Explain with an example for each.

(4+3+3)

5A. Apply Hu algorithm for the given data flow graph shown in **Figure 5A**. Assume $\gamma=4$, P(0)=1,P(1)=3,P(2)=4,P(3)=2,P(4)=2. Determine the resource constraints. Draw the scheduled graph with resource constraints.

- 5B. Explain the flow of digital design and verification.
- 5C. Determine the prime implicants for the following function using iterated consensus method $F=\sum m(0.2.3.4.5.6)$

(4+3+3)





Figure 4B