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BIEL-003

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

June, 2017

00504

BIEL-003 : DIGITAL ELECTRONICS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any* ***seven*** *questions. All questions carry equal marks. Assume any missing data suitably. Use of scientific calculator is allowed.*

1. (a) Perform $(54)_{10} - (27)_{10}$ using 2's complement. 5

(b) Convert the following expressions into their canonical forms : 5

(i) $F = AB + ACD + \bar{A}BC$

(ii) $F = (A + B)(A + \bar{C})(B)$

2. (a) Design and implement a 3-bit magnitude comparator. 5

(b) Design a 4-bit parallel adder. 5

3. (a) What do you mean by Master-Slave flip-flop ? How does it avoid the race around condition ? 5

(b) What do you mean by characteristic equation of flip-flop ? Derive it for JK flip-flop. 5

4. (a) Differentiate between asynchronous and synchronous counter. 5

(b) Design a 3-bit bidirectional synchronous counter using T-flip-flop. 5

5. What do you mean by tri-state logic ? Draw and explain the working of a tri-state TTL NAND gate. *3+7=10*

6. (a) Design and implement 64k × 8 RAM using 8k × 8 RAM. 5

(b) Explain how a CMOS logic IC can be driven by a TTL logic IC. 5

7. (a) Draw and explain the working of a 4-bit SISO shift register with appropriate timing waveform. 5

(b) Explain the concept and design procedure of Algorithmic State Machines (ASM). 5

8. Simplify the given Boolean expression using K-map :

$$F = \sum m(0, 1, 3, 7, 11, 15) + d(2, 4, 6)$$

Also implement the simplified expression using NOR gate. *10*

9. (a) For a 2-bit number x, design and implement $y = 5x^2 + 6x + 1$ using PLA. *5*

(b) What do you mean by semiconductor memories ? How do you classify them ? *5*

10. (a) Obtain Excess-3 and Gray code for the following : *5*

(i) $(1453)_{10}$

(ii) $(56)_{10}$

(b) Design and implement a 4-bit binary adder and subtractor. *5*