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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Third Semester, B.E. – Electronics and Communication Engineering

Semester End Examination; Dec - 2016/Jan - 2017

Digital Electronic Circuits

Time: 3 hrs

Max. Marks: 100

Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.

UNIT - I

- 1 a. Explain with a neat circuit diagram, the working of two input basic (NAND) TTL gate. 8
- b. With the help of circuit diagram, explain the working of two input NMOS NAND gate and two input PMOS NOR gate. 7
- c. Define the following terms: 5
- i) Power dissipation ii) Propagation delay.
- 2 a. Explain with the circuit diagram, the operation of ECL NOR gate. 10
- b. Explain the operation of n-channel depletion type MOSFET with neat diagram and V-I characteristics. 10

UNIT - II

- 3 a. Obtain the complement of the following function : 5
- $$f(w, x, y, z) = \bar{w}x\bar{z} + w(x + \bar{y}z).$$
- b. Obtain the minimized Boolean Expression for the following, 10
- i) $f(w, x, y, z) = \sum m(0,1,2,3,4,9,13) + \sum \phi(5,10,11,14)$
- ii) $f(w, x, y, z) = \pi m(0,3,4,11,13) + \pi \phi(2,6,8,9,10).$
- c. Design a three input and one output combinational logic circuit that has logic '1' output when the majority of inputs are at logic '1'. 5
- 4 a. Simplify using QM minimization technique, 12
- $$f(v, w, x, y, z) = \sum m(4,5,9,11,12,14,15,27,30) + \phi(1,17,25,26,31).$$
- b. Simplify the following function using MEV technique, 8
- $$f(a, b, c, d) = \sum M(2,3,4,5,13,15) + \sum \phi(8,9,10,11).$$
- Use 2 variable VEM and 3 variable VEM.

UNIT - III

- 5 a. Realize the following Boolean expression using 3 to 8 line decoder and OR gates, 6
- $$f_1(x, y, z) = \sum m(1,2,4,5)$$
- $$f_2(x, y, z) = \sum m(1,5,7)$$

- b. Design a 4 to 2 line priority encoder. 8
- c. Realize: $f(w, x, y, z) = \sum m(0,1,5,6,7,9,12,15)$ using multiplexer. 6
- 6 a. Design and implement the following functions using PLA, 10
 $f_1 = \sum m(0,1,3,4); \quad f_2 = \sum m(1,2,3,4,5).$
- b. Design a 2-bit magnitude comparator. 10

UNIT - IV

- 7 a. Explain Gated SR Latch with diagram. 8
- b. Explain the function and working of Gated D latch. 8
- c. Explain how SR latch can be used as switch? 4
- 8 a. Explain the working of master-slave JK flip-flop. 10
- b. Explain the working of master-slave SR flip-flop. 10

UNIT - V

- 9 a. Explain the working of a universal shift register with a neat circuit diagram. 10
- b. Design a synchronous Mod-6 up counter using clocked JK flip-flop for the count sequence $\Rightarrow 0 \rightarrow 2 \rightarrow 3 \rightarrow 6 \rightarrow 5 \rightarrow 1$ and repeat. 10
- 10 a. Explain with a neat diagram the architecture of 86 processor. 10
- b. Explain the structure of PSW register of 86. 6
- c. What do you mean by memory segmentation? 4

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