B. Tech.

THIRD SEMESTER EXAMINATION 2012-13

Digital Logic Design

Time: 3 Hours

Total Marks: 100

Note: Attempt ALL questions. All questions carry equal marks.

1. Attempt any Four parts of the following. (5×4=20)
   (a) Convert $(243)_5$ into equivalent base 8 number and base 7 number.
   (b) Explain floating point representation with a suitable example.
   (c) Simplify the following Boolean function:
   $F(w,x,y,z) = \Sigma(0,1,2,4,5,6,8,9,12,13,14)$
   (d) Draw the circuits to implement AND, OR and NOT gates using NAND gate only.
   (e) For the expression $Y = A + BC' + ABD' + ABCD$, convert to standard SOP.
   (f) What are different error correcting codes? Explain.

2. Attempt any Two parts of the following.
   (a) Design a combinational circuit that accepts a three-bit number and generates an output binary number equal to the square of the input number. (10×2=20)
   (b) What is a magnitude comparator? Design and draw a 4-bit magnitude comparator.
   (c) What is a multiplexer? Implement 64 × 1 multiplexer with four 16 × 1 and one 4 × 1 multiplexer. Use only block diagram.

3. Attempt any Two parts of the following.
   (a) Draw the diagram of a 4-bit binary ripple counter using flip-flops that trigger on the positive edge. (10×2=20)
   (b) Explain the working of JK Flip-Flop with a suitable neat diagram. What do you mean by triggering of Flip-Flops.
   (c) The content of a 4-bit shift register is initially 1101. The register is shifted six times to the right, with the serial input being 101101. What is the content of the register after each shift?

4. Attempt any Two parts of the following.
   (a) A microprocessor uses RAM chips of 1024×1 capacity. $(10 \times 2 = 20)$
      (i)   How many chips are needed and how should their address lines be connected to provide a memory capacity of 1024 bytes?
      (ii)   How many chips are needed to provide a memory capacity of 16K bytes?
   (b) Explain Programmable Logic Array (PLA) with a suitable example.
   (c) Implement a full-adder circuit with multiplexers.

5. Attempt any Two parts of the following.
   (a) What are the basic symbols for register-transfer logic? Explain Bus transfer and Memory transfer. $(10 \times 2 = 20)$
   (b) List the characteristics of asynchronous sequential circuits. Explain asynchronous sequential circuit by drawing a suitable diagram.
   (c) Explain race free state assignment with a suitable example.

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