

Code :RR310403

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III B.Tech I Semester(RR) Supplementary Examinations, May 2011
DIGITAL IC APPLICATIONS
 (Electronics & Communication Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

1. (a) Design a CMOS transistor circuit that has the functional behavior

$$f(X) = \overline{(A + C)} \cdot (B + C)$$
 (b) Design a 4-input CMOS OR-AND-INVERT gate. Explain the circuit with the help of logic diagram and function table.
2. (a) Explain the difference in program structure of VHDL and any other procedural language? Give an example?
 (b) A single pull-up resistor to +5V is used to provide a constant-1 logic source to 15 different 74LS00 inputs. What is the maximum value of this resistor? How much high state DC noise margin can be provided in this case?
3. Design the logic circuit and write a data-flow style VHDL program for the following functions.
 (a) $F(Q) = \Sigma_{A,B,C,D} (0,2,5,7,8,10,13,15) + d(11)$
 (b) $F(R) = \Pi_{A,B,C,D} (1,4,5,7,9,13,15)$
4. Design a priority encoder that can handle 32 requests? Use 74x148 and required discrete gates. Provide the truth table and explain the operation.
5. (a) Design a 4x4 combinational multiplexer and write the corresponding VHDL program.
 (b) Design a full subtractor using two-half subtractors? Write VHDL program for the above logic. Using this entity write VHDL program for 4-bit ripple subtractor.
6. (a) Differentiate between ripple counter and synchronous counter. Design a 4-bit counter in both modes and estimate the propagation delay.
 (b) Design a modulo-88 counter using 74x163 ICs.
7. (a) Design an 8-bit serial-in and parallel-out shift register with flip-flops. Explain the operation with the help of timing waveforms.
 (b) Write VHDL data-flow program for the above shift-register.
8. (a) Explain the necessity of two-dimensional decoding mechanism in memories. Draw MOS transistor memory cell in ROM and explain the operation.
 (b) Determine the ROM size needed to realize the logic function performed by 74x153 and 74x139.
