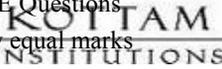Code No: R5310404

III B.Tech I Semester(R05) Supplementary Examinations, December 2009
DIGITAL IC APPLICATIONS
(Common to Electronics & Communication Engineering and Electronics & Instrumentation
Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Design a CMOS transistor circuit that realizes the following Boolean function.

$$f(x) = (a + b).(b + c)$$

   Also explain its functional operation.

   (b) What are the parameters that are necessary to define the electrical characteristics of CMOS circuits?
   Mention the typical values of a CMOS NAND gate. [8+8]

2. (a) Design a three input NAND gate using diode logic and a transistor inverter? Analyze the circuit with the
   help of transfer characteristics.

   (b) Explain sinking current and sourcing current of TTL output? Which of the parameters decide the fan-out
   and how? [8+8]

3. (a) Write a VHDL Entity and Architecture for the following function?

$$F(x) = a \quad b \quad c$$

   Also draw its relevant logic diagram.

   (b) Explain the use of Packages Give the syntax and structure of a package in VHDL. [8+8]

4. Design the logic circuit and write a data- ow style VHDL program for the following functions?

   (a) F (A) = p,q ,r ,s (1, 3, 4, 5, 6, 7, 9, 12, 13, 14)

   (b) F (X) = SA ,B, C ,D (3, 5, 6, 7, 13) + d (1, 2, 4, 12, 15) [8+8]

5. Design a two-digit BCD adder with logic gates. Using this logic write the VHDL program in structural style of
   mo deling. [8+8]

6. (a) Design a 16-bit comparator using 74X85 ICs.

   (b) Write a behavioral VHDL program to compare 16-bit signed and unsigned integers. [16]

7. (a) Design a 3-bit LFSR counter using 74X194 List out the sequence assuming that the initial state is 001.

   (b) Explain with timing waveforms, di erent operations during one clock cycle in a synchronous system struc-
   ture. [8+8]

8. (a) Determine the ROM size needed to realize the logic function performed by 74X153 and 74X139.

   (b) Design an 8×8 diode ROM using 74X138 for the following data starting from the first location. [8+8]

AB, 52, 74, 0F, CA, 9D, 2F, E6