Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

(A Constituent Institute of Manipal University)
Manipal – 576 104

III SEMESTER B.Tech (BME) DEGREE END-SEM EXAMINATIONS, NOV / DEC 2015
SUBJECT: DIGITAL ELECTRONICS (BME 2103)
(REVISED CREDIT SYSTEM)
Thursday, December 03, 2015: 9.00a.m. - 12.00Noon

TIME: 3 HOURS **MAX. MARKS: 100**

Instruction to Candidates:
Answer ALL the questions.

1. A. Design a decoder circuit to display octal numbers using the common-cathode type seven-segment display used in Biomedical equipment's. (08)

   B. (a) Define a digital Multiplexer. (08)

   (b) Realize the Boolean function $f = \sum(0, 3, 5, 7, 8, 10, 14)$ using:

   (i) 8:1 Multiplexer, (ii) 4:1 Multiplexer, and additional gates.

   (c) Mention one application of a digital Multiplexer in Biomedical equipment's.

   C. Construct the state diagram for a Moore sequential circuit that will detect a non-overlapping sequence "1100" from an input sequence. (04)

2. A. Simplify the following Boolean function using "Quine-McCluskey" method: (08)

   $f(A, B, C, D) = \sum m\ (1, 4, 9, 10, 15) + \sum d\ (6, 7, 8, 11)$ $d \rightarrow$ don't cares

   B. (a) Design a Mod-13 Ripple counter using JK Flip-flops. (08)

   (b) A 4-bit Ripple counter uses Flip-flops with propagation delay of 20ns each. What will be the maximum possible time required for change of state?

   (c) The output frequency of a Mod-12 counter is 6kHz. What is its input frequency?

   C. Convert a JK Flip-flop to a SR Flip-flop. (04)

3. A. What is a Shift Register? Design a 3-bit Parallel-in Parallel-out (PIPO) / Parallel-in Serial-out (PISO) Shift Register using D Flip-flops. (08)

B. Simplify the following 5-variable Boolean function using "Karnaugh-Map". (08)

F (A, B, C, D, E) = $\sum$ m (0, 1, 4, 5, 13, 15, 20, 21, 22, 23, 24, 26, 28, 30, 31)

C. What is a digital comparator? Design a 1-bit digital comparator. (04)

4. A. Illustrate the design of a Mealy sequential circuit, by designing a sequence detector which will detect an overlapping sequence 1010 from an input sequence. (08)

B. Design a circuit to subtract 1001 from 1101, using the following methods: (08)

(i) 1's complement (ii) 2's complement.

C. (a) Fill in the blanks: (04)

(i) $(35)_8 = (\_)_{10}$ (ii) $(AC5)_{16} = (\_)_2$

(b) Express the following decimal numbers in "8421" and "2421" codes:

(i) 807 (ii) 429.5

5. A. Design a synchronous counter with the following binary sequence: 0, 1, 3, 4, 5, 6 and repeat. Use JK Flip-flops. (08)

B. What is a parity bit? Mention its significance. Design a 3-bit Even-parity Generator / Checker. (08)

C. (a) Perform the following decimal additions in the 8421 code. (04)

(i) 88.7+265.8 (ii) 204.6+185.56

(b) Convert the following numbers to Gray code.

(i) $(45)_{16}$ (ii) $(234)_8$