Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

FIRST SEMESTER M.Tech. (INDUSTRIAL AUTOMATION AND ROBOTICS) DEGREE END SEMESTER EXAMINATION
November /December 2015
SUBJECT: ANALOG AND DIGITAL ELECTRONICS (MTE-505)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates
- Answer **ANY FIVE** full questions.
- Missing data may be suitably assumed.

1A. Convert $(5,137)_{10}$ to: (a) BCD (b) Excess-3 code (c) 2421 code (3)

1B. Design a combinational logic circuit to convert BCD to Excess-3code. (5)

1C. Draw the symbol of an Op amp and list the packages available in the market as Op amps. (2)

2A. Reduce the combinational circuit of Figure Q2A using Boolean algebra and arrive at an equivalent reduced circuit. (5)

2B. Four interrupts P1, P2, P3 and P4 arrive at the input interface of a microprocessor at t = 5 seconds. Design a combinational circuit that would be able to process these interrupts in the priority:

P1 > P2 > P3 > P4. (5)

3A. For the state diagram shown in Fig Q 3A, design a sequential circuit using D flip flops. (5)

3B. Design a 3 bit up-down counter that counts up from 0 to 7, then counts down from 7 to 0 and repeats itself. (5)

4A. Explain the principle of difference mode and common mode gains in an Op-amp with suitable equations. (5)

4B. A voice signal has to be analysed to detect the peak value of its amplitude over a time period of 500 seconds. Design an op-amp circuit for the same. (5)

5A. What is the significance of giving a feedback to an Op-amp? Explain the operation of the same with and without feedback using suitable circuits and derivation. (5)

5B. What would be the output of the following code snippet? Give reasons for your answer.

```
        MOV A,#55H
        MOV R3,#10
NEXT:   MOV R2,#70
AGAIN:  CPL A
        DJNZ R2,AGAIN
        DJNZ R3,NEXT
```
(5)

6A. For an 8051 system of 11.0592 MHz, find how long it takes to execute the following instructions assuming the number of machine cycles as given in the brackets beside each instruction:

(a) MOV R3, #55H [1 machine cycle]

(b) DJNZ R2 target [2 machine cycles]

(c) MUL AB [3 machine cycles] (5)

6B. With a suitable flowchart explain the steps to create a *.hex file from a *.asm file. (5)

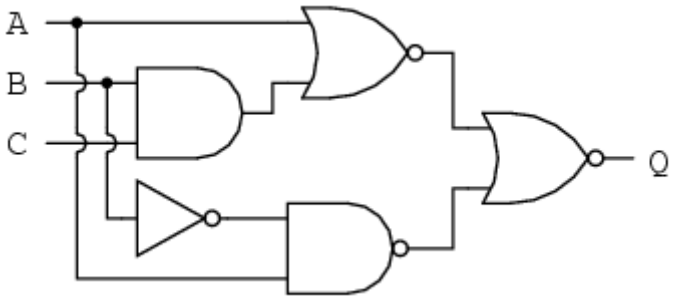

Figure Q 2A

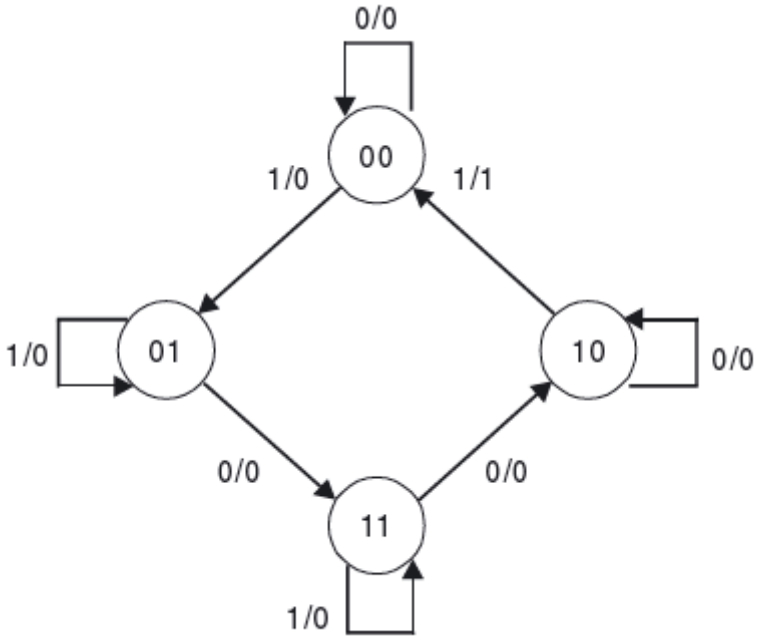

Figure Q 3A