Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VI SEMESTER B.TECH (MECHATRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: DIGITAL SIGNAL PROCESSING & APPLICATIONS [ELE 356]

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions
- Missing data may be suitably assumed.

1A. How is a DSP processor different from conventional microprocessor? **(2)**

1B. Let the contents of ARP, AR4, TREG0, TREG1, TREG2, PREG, ACC, Data memory location 324h be as shown in **fig Q1(B)**. After execution of the LTA $*,5$; (TRM $= 0$) instruction, what are the contents of the above registers and memory locations? **(2)**

		Before Instruction
ARP		4
AR4		324h
Data Memory 324h		62h
TREG0		3h
TREG1		4h
TREG2		5h
PREG		0Fh
ACC	X	5h
	C	

fig Q1(B)

1C. Obtain an IIR type analog Chebyshev filter transfer function that satisfies the constraints $\frac{1}{\sqrt{2}} \leq |H(j\Omega)| \leq 1;\ 0 \leq \Omega \leq 2 \qquad |H(j\Omega)| \leq 0.1;\ \Omega \geq 4$ **(6)**

2A. What is the difference between IIR & FIR filters **(2)**

2B. Explain the application of DSP in Digital Crossover Audio System. **(3)**

2C. Design a third order Butterworth digital filter using Impulse Invariant technique. Assume sampling period T=1sec. **(5)**

3A. Explain how convolution performed using a single MAC unit **(3)**

3B. Design an ideal HPF using Hamming window method with frequency response

$$H_d(e^{jw}) = 1 \text{ for } \frac{\pi}{4} \leq |w| \leq \pi$$
$$= 0 \text{ for } |w| \leq \frac{\pi}{4}$$

(7)

Find the values of h(n) for N=11. Find H(z). Realize the filter using Canonic form and plot the frequency response

4A. Determine the Transposed directform II for the given system: $y(n) = 0.5y(n-1) - 0.25y(n-2) + x(n) + x(n-1)$ **(3)**

4B. Write a program to calculate the value of the function $Y = A * X_1 + B * X_2 + C * X_3$ using TMS320C5X instruction set. **(3)**

4C. Explain how a higher throughput is obtained using the VLIW architecture. Give an example of DSP that has VLIW architecture. **(4)**

5A. Draw the internal architecture diagram of TMS320C5X and indicate the various blocks **(5)**

5B. Explain the addressing modes supported by TMS320C5X with examples **(5)**

6A. Give the list of mnemonics of the shift expressions of TMS320C5X and explain them in brief. **(3)**

6B. Explain the application of DSP in CD-Recording System. **(3)**

6C. Realize the system given by difference equation $y(n) = -0.1y(n-1) + 0.72y(n-2) + 0.7x(n) - 0.252x(n-2)$ in parallelform **(4)**