USN | | | | | | | | | | |

10EC751

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
DSP Algorithms and Architecture

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Briefly explain the digital signal processing system. **(06 Marks)**

b. Briefly explain the FIR filter. **(08 Marks)**

c. Explain discrete time sequence in detail. **(06 Marks)**

2 a. Briefly explain the Parallel Multiplier. **(06 Marks)**

b. Briefly explain the Barrel shifter. **(06 Marks)**

c. Discuss the following indirect addressing modes:
(i) Post_increment (ii) Pre_Subtract_offset
(iii) Pre_decrement (iv) Post_add_offset **(08 Marks)**

3 a. Briefly explain the functional diagram of the central processing unit of TMS320C54XX processor. **(06 Marks)**

b. Briefly explain the block diagram of circular addressing modes of TMS320C54XX processor **(06 Marks)**

c. Assuming the current contents of AR_3 to be 200h, what will be its contents after each of the following TMS320C54XX addressing modes is used? Assume that the contents of AR_0 are 20h.
(i) $*AR_3+0$ (ii) $*AR_3+$ (iii) $*+AR_3(40h)$ (iv) $*+AR_3(-40h)$ **(08 Marks)**

4 a. Show the pipeline operation of the following sequence of instructions if the initial values of AR_1, AR_3, A are 84, 81, 1 and the values stored in memory location 81, 82, 83, 84 are 2, 3, 4, 6. Also provide the values of registers AR_3, AR_1, T and accumulator A after completion of each cycle.

```
ADD *AR3+, A
LD *AR1+, T
MPY *AR3+, B
ADD B, A
```

(08 Marks)

b. Write the program to compute multiply and accumulate using direct addressing mode
$y(n) = h(0)\,x(n) + h(1)\,x(n-1) + h(2)\,x(n-2)$ **(06 Marks)**

c. Briefly explain the Host Port Interface (HPI) with important signals. **(06 Marks)**

PART – B

5 a. What are the values are represented by the 16-bit fixed point number N = 4000h in Q_{15} and Q_7 Notation. **(02 Marks)**

b. Write a program for Digital interpolation using a FIR filter with interpolation factor = 5 for TMS320C54XX processor. **(10 Marks)**

c. Write an Assembly Language Program for second_order IIR filter using TMS320C54XX. **(08 Marks)**

6 a. Derive the optimum overflow and scaling in DIT-FFT algorithm. (06 Marks)
b. Write a program for signal spectrum in DIT-FFT Algorithm using TMS320C54XX. (06 Marks)
c. Write a program for Butterfly computation in DIT-FFT Algorithm using TMS320C54XX. (08 Marks)

7 a. Briefly explain Handling of interrupts in TMS320C54XX processor. (06 Marks)
b. Briefly explain the programmed I/O in TMS320C54XX processor. (08 Marks)
c. Briefly explain the Register subaddressing technique for configuration DMA operation. (06 Marks)

8 a. Briefly explain Synchronous Serial Interface (SSI). (06 Marks)
b. Briefly explain clipping autocorrelation pitch detector. (06 Marks)
c. Briefly explain JPEG Encoder and JPEG Decoder. (08 Marks)

* * * * *