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 $*AR_3+$, A
       LD $*AR_1+$, T
       MPY $*AR_3+$, 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)

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