**EE2016 Mid Semester Exam**

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**Question 1**

**Given** that the input array has 100 elements and Load/Store instructions cost 5 cycles

Cost = 1639 cycles

Registers R4-R11 are pushed to stack before the instructions of Smin subroutine start and are popped back from stack to R4-R11 at the end of the subroutine.

Algorithm:

Based on fact that we can use only one load in loop, I used 6 registers in cycle- fashion such that A[i] of previous iteration is used to load A[i+5] of next iteration and Si is calculated.I actually used 6 LDRs in a loop which calculates 6 values of Si. Code is well documented and more details are available there.

**Question 2**

Given that the input array has 100 elements and Load/Store instructions cost 1 cycle

Cost = 972 cycles

Registers R4-R11 are pushed to stack before the instructions of Smin subroutine start and are popped back from stack to R4-R11 at the end of the subroutine.

Algorithm:

As two loads can be used in a loop here, I evaluated using the hint that

Si = A[i+5] - A[i-1] - Si-1

**As load instructions become more time taking (more cycles), considering 2 loads per loop takes more no of cycles compared to 1 load per loop. Please refer the table**

|  |  |  |
| --- | --- | --- |
| **LDR/STR cost** | **1 Load per loop(Q1)** | **2 Load per loop (Q2)** |
| 1 cycle | 1175 | 972 |
| 5 cycles | 1639 | 1812 |
| 10 cycles | 2219 | 2862 |
| 20 cycles | 3379 | 4962 |