BEYKENT UNIVERSITY *Faculty of Engineering and Architecture*

Name, Surname :
Student ID :
Course Code : 481000000001312
Title : COMPUTER ORGANIZATION
Assessment : □ Quiz □ Midterm □ Final
Date : 7.3.2018 16.00

Please ensure that your name appears on each booklet, together with the number of questions attempted.

Q1) Consider the following statements:

A = (B + C) * D
D = A * B
C = D + A

a) Write the instructions based on STACK architecture, remember that each statement need to be executed separately. You cannot perform any simplifications between the lines.

```
Push C
Push B
Add
Push D
Mul
Pop A
Push B
Push A
Mul
Pop D
Push A
Push D
Add
Pop C
```

10/14 x 3 + 4/14 x 2
38/14 CPI

b) Consider a new architecture MYSTACK, which includes 2 new instructions `myAdd` and `myMul` such that;

`myAdd` A is equivalent to the combination of `push A` and `add` instructions,
`myMul` A is equivalent to the combination of `push A` and `mul` instructions.

Write the instructions based on MYSTACK architecture.

```
Push C
myAdd B
myMul D
Pop A
Push B
myMul A
Pop D
Push A
myAdd D
Pop C
```

myAdd and myMul takes 2CC + 3CC = 5CC

6/10 x 3 + 4/10 x 5
38/10 CPI

c) Assuming 2 CC for each arithmetic operation and 3 CC for each memory access, compare the performance of STACK and MYSTACK architectures.

Possible answers are given above.
In fact the total number of clock cycles are 38 in both Stack and MyStack, and the performance is the same.

d) For the slowest architecture, suggest an improvement such that it would be faster than the other after the improvement, if possible.

Possible improvement would be to reduce 5CC for myAdd and myMul.