

21AIE112 Elements of Computing Systems-II
Assignment 5

Date: 12/04/2022

Due Date: 26/4/2022

☐ **Course Outcomes**

- ❖ CO1: Elaborate the important components of a MIPS computer system and the basic organization
- ❖ CO2: Implement and execute low-level programming on the hardware platform
- ❖ CO3: Develop and test programs in object-based language 'Jack'
- ❖ CO4: Practice experiments related to basic concepts and functions of operating systems and compilers.

☐ **Answer all Questions**

1. Locate the following VM programs in the nand2teris folder

[CO2]

- **SimpleAdd**
 - **StackTest**
 - **BasicTest**
 - **PointerTest**
 - **StaticTest**
- a) Check the correctness of the programs using the VM emulator and supplied test script. Comprehend the lines of codes. (You may be asked to explain the lines of codes).
 - b) Write a VM-to-Hack translator in python or Java, conforming to the '*Standard VM-on-Hack Mapping*'
 - c) Use your VM translator to translate the above *.vm* programs to *.asm* programs
 - d) Execute the generated *.asm* programs on the CPU emulator using the supplied test script.

2. Explain in detail various memory segments and its VM and assembly pseudo codes.

[CO2]

3. Explain with the help of a stack diagram, argument how the following snippet of code works.

[CO2]

```
function main 0
  push constant 3
  call factorial 1
  return

function factorial 0
  push argument 0
  push constant 1
  eq
  if-goto BASECASE

  push argument 0
  push argument 0
  push constant 1
  sub
  call factorial 1
  call mult 2
  return

label BASECASE
  push constant 1
  return

function mult 2
  // Code omitted
```