

**An-Najah National University**  
**Faculty of Engineering and Information Technology**  
**Computer Engineering Department**

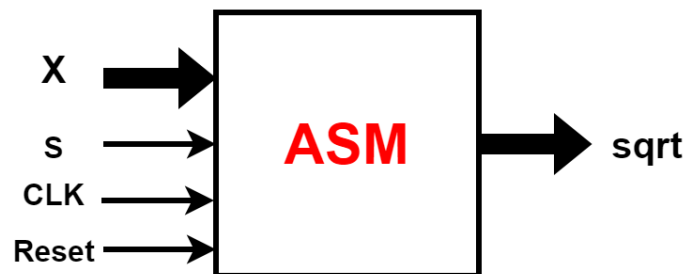
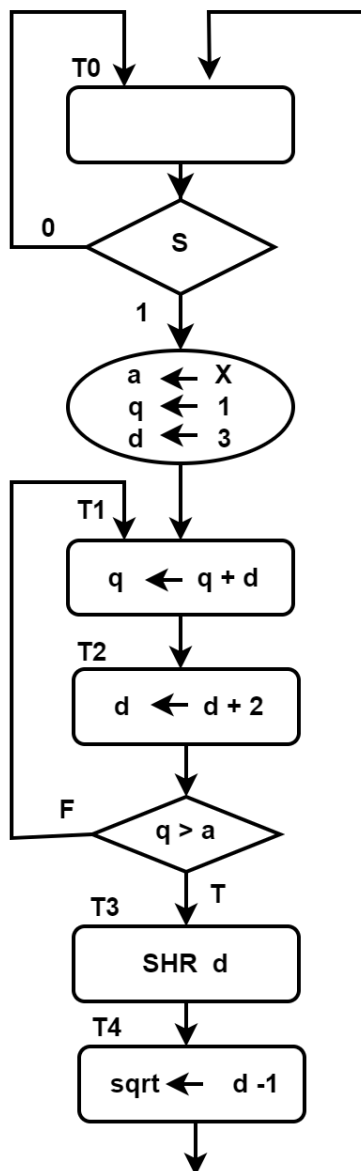
**Digital Circuit Design II (10636321)**

**Assignment # 1**

**Due to: 29/04/2023**

(CLO's: VI)	Points:10
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Given the following ASM chart which implements an algorithm to find the integer square root for a positive integer number (X)



Write a complete **VHDL** code to implement the ASM chart using 3 processes.  
(Use a positive edge **CLK** and a low-level asynchronous **Reset**)

```
library IEEE;
use IEEE.std_logic_1164.all;
use IEEE.std_logic_unsigned.all;

entity Int_SQRT_Calculator is
  port(   CLK, RESET, S : in  std_logic;
         X       : in  std_logic_vector(7 downto 0);
         Sqrt    : out std_logic_vector(7 downto 0));
end Int_SQRT_Calculator;
```

Notes:

- *The size of the input (X) is 8 bits.*
- *The size of the result sqrt(X) is 8 bits.*
- *SHR: Shift right by one bit.*
- *You can use signals to store the values of **a**, **q**, and **d**.*

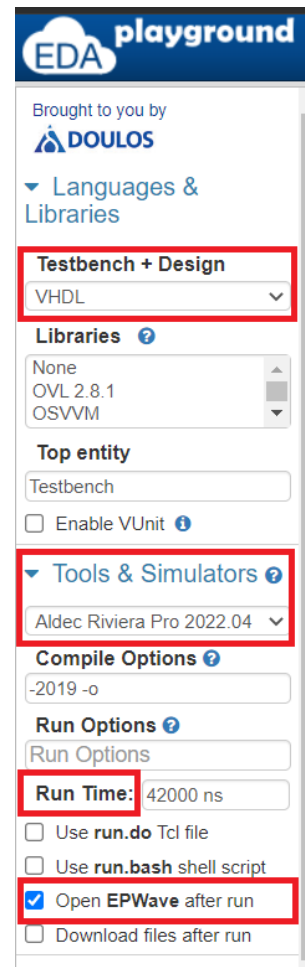
**You have to submit two files:**

- 1. A VHDL code to implement your ASM.**
- 2. A testbench file to simulate and test your design.**

Notes:

1. Select the clock period to be 4 ns
2. You should cover all the values of the input X ( from 1 to 200 ) :-
  - For each case, you have to activate the S signal for 2 clock cycles
  - You have to wait the sufficient time to get the result (e.g. 20 Clock cycles)

Note: When you select the simulation tool to be “**Aldec Riviera Pro 2022.04**”, do not forget to set the **Run Time** to be sufficient to cover the previous test cases.



The screenshot shows the EDA playground configuration interface. The header includes the EDA logo and the text "playground". Below the header, it says "Brought to you by DOULOS". The main configuration area is divided into several sections:

- Testbench + Design**: A dropdown menu is set to "VHDL".
- Libraries**: A list of libraries including "None", "OVL 2.8.1", and "OSVVM".
- Top entity**: A text input field containing "Testbench".
- Tools & Simulators**: A dropdown menu is set to "Aldec Riviera Pro 2022.04".
- Compile Options**: A text input field containing "-2019 -o".
- Run Options**: A text input field containing "Run Options".
- Run Time**: A text input field is set to "42000 ns".
- Checkboxes**: There are three checkboxes: "Enable VUnit" (unchecked), "Use run.do Tcl file" (unchecked), "Use run.bash shell script" (unchecked), and "Open EPWave after run" (checked).

Red boxes highlight the following elements:

- The "Testbench + Design" section and its dropdown menu.
- The "Tools & Simulators" section and its dropdown menu.
- The "Run Time" text input field.
- The "Open EPWave after run" checkbox.