

Question 2: Define the following terms:

8 points

SWAT: is a purpose of tear down a product which involve identifying Strengths, Weaknesses, Opportunities, and Threats

BOM: Bill of Materials is a list of the raw materials, sub-assemblies, intermediate assemblies, sub-components, components, parts and the quantities of each needed to manufacture an end product.

SOP: Subtract and Operate procedure which is a used to identify sub-functions as main functions using Bottom-up approach where its Principle is to remove a part and see what happens, this process is repeated n times where n is the number of components in the product.

NetList: information defining inter-component connections for a PCB

Question 3: What are the basic category of Rapid Prototyping:

4 points

1. Material removal RP - machining, using a dedicated CNC machine that is available to the design department on short notice
2. Material addition RP - adds layers of material one at a time to build the solid part from bottom to top

Question 5: Explain the principle of Binder Jetting 3D printing. **6 points**

- (1) powder layer is deposited.
- (2) ink-jet printing of areas that will become the part.
- (3) piston is lowered for next layer.

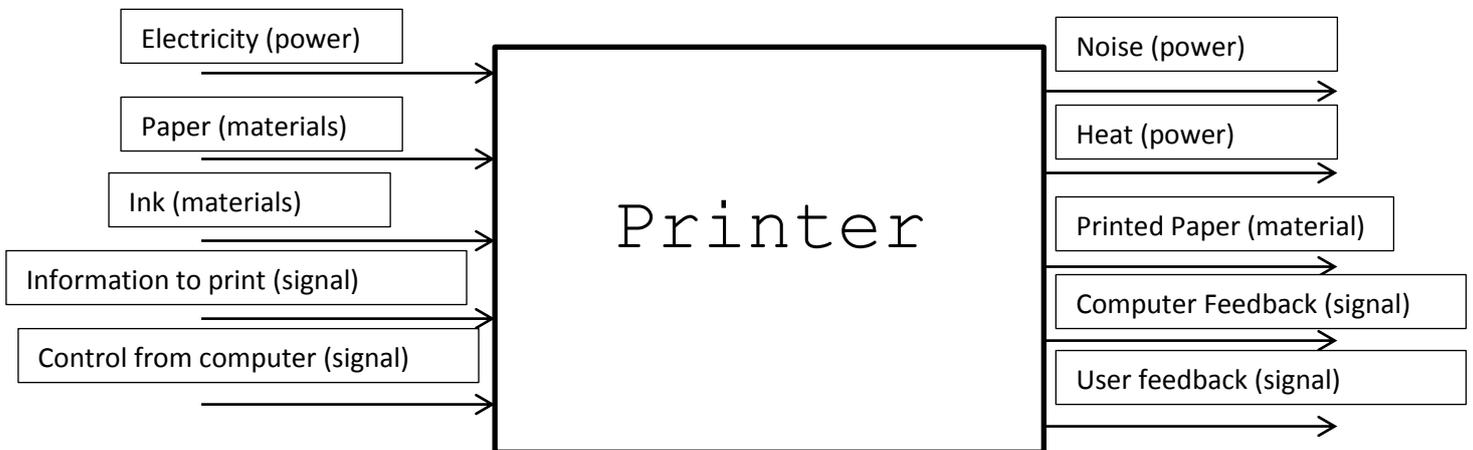
Question 6: Compare between contact probs and laser probs in term of advantages and disadvantages:

10 points

	Advantages	Disadvantages
Contact Probs	Very fast scanning Very precise Possibility of manual scanning	Not appropriate for soft material Scanning of unknown surfaces is difficult
Laser Probs	Precise and fast in z-direction Possible to scan soft materials	High price equipment Does not work on reflective materials Sensitive to dust

Question 7: For the computer printer below draw a black Box model that represent the inputs and outputs.

6 points

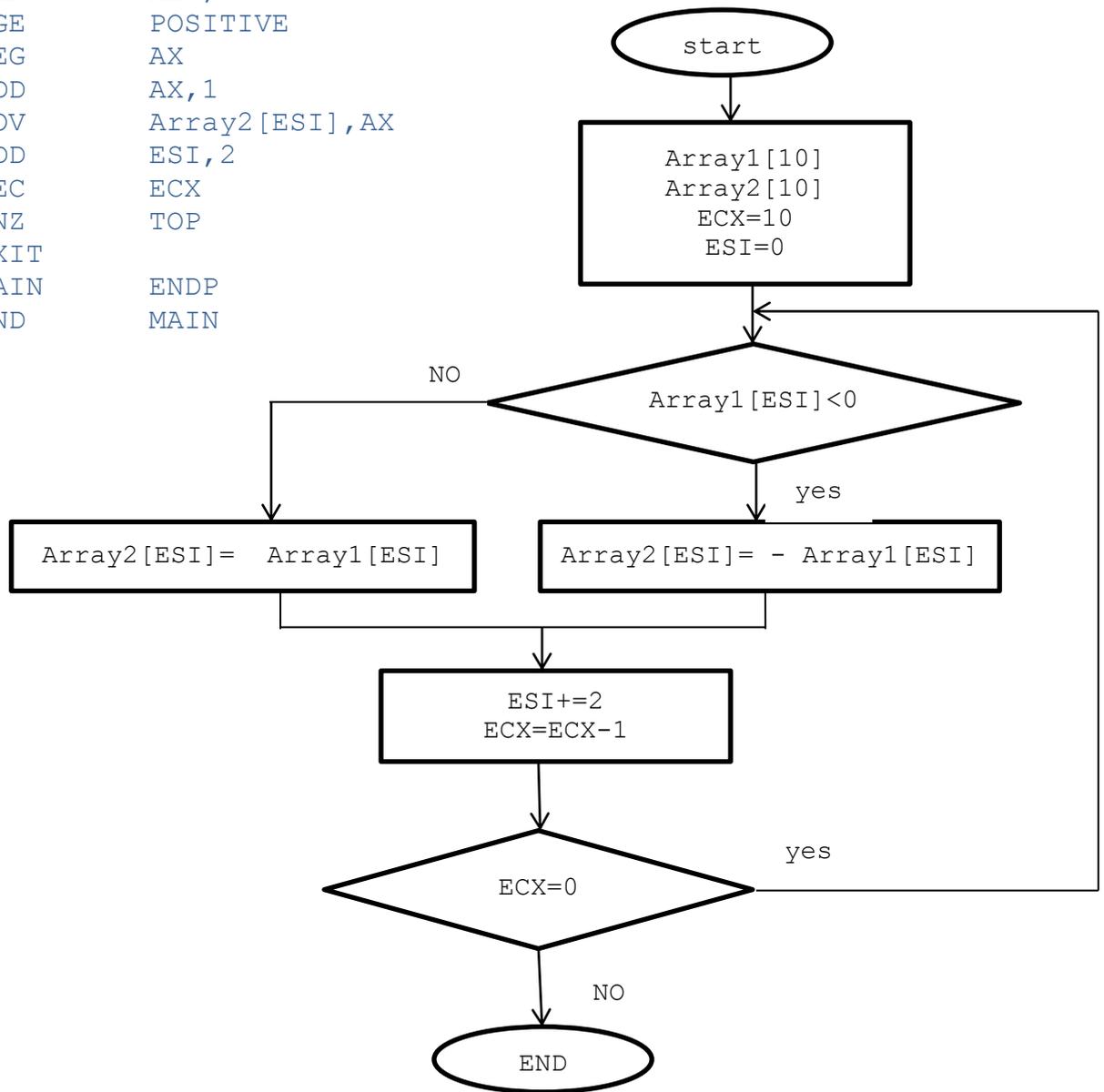


Question 8: Given the following assembly code; analyze the program then draw the block diagram of the operation. **12 points**

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.data
Array1 WORD 4,5,-3,8,9,-1,10,60,50,-5
Array2 WORD 10 DUP(?)
.code
PROC MAIN
MOV ESI, 0
MOV ECX, 10
TOP: MOV AX, Array1[ESI]
CMP AX, 0
JGE POSITIVE
NEG AX
POSITIVE: ADD AX, 1
MOV Array2[ESI], AX
ADD ESI, 2
DEC ECX
JNZ TOP
EXIT
MAIN ENDP
END MAIN

```



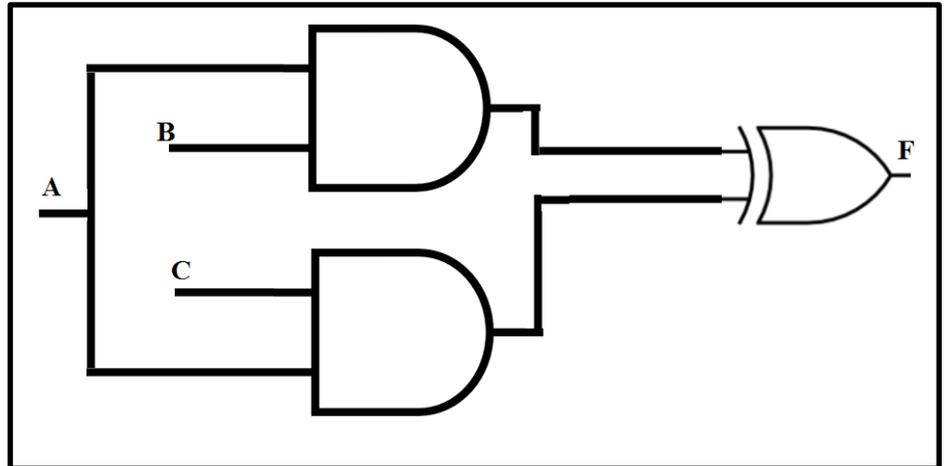
Question 9: Given the following VHDL code: draw the combinational circuits which represent.

10 points

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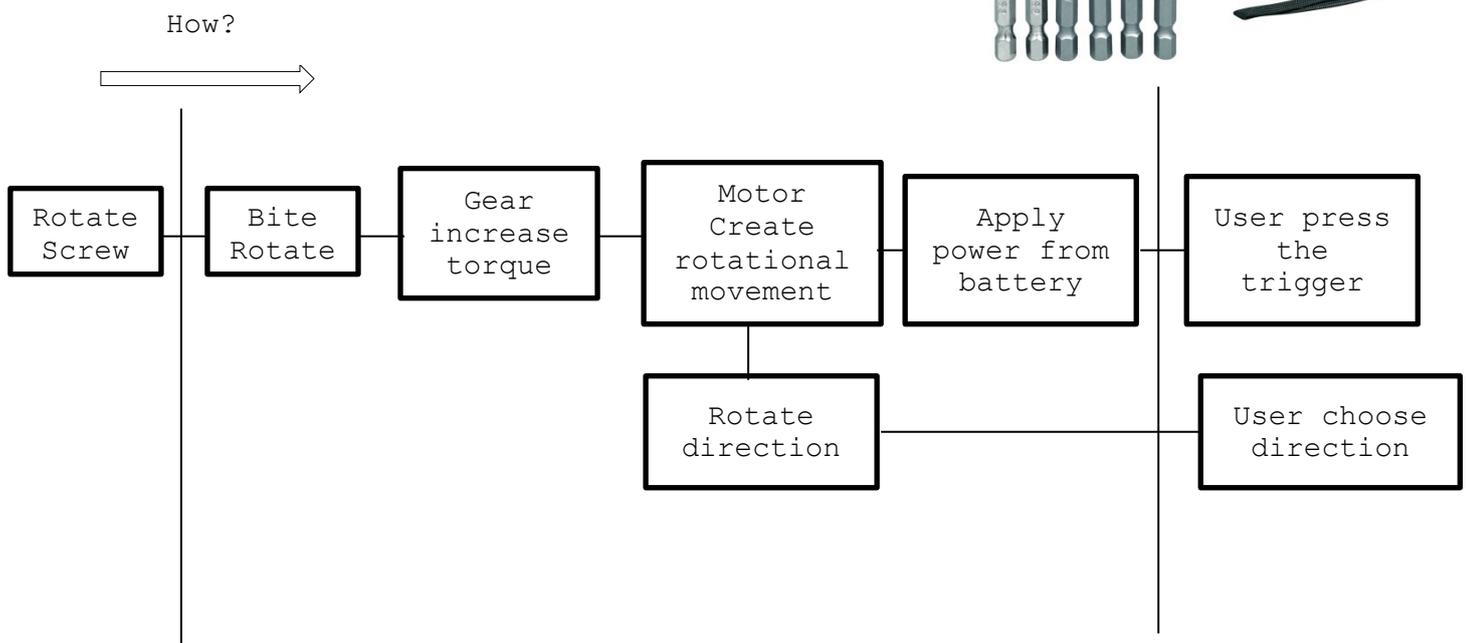
ENTITY CC IS
    PORT(A , B , C :IN BIT;
          F :OUT BIT);
END CC
ARCHITECTURE Logic_CC OF CC IS
    SIGNAL C1 , C2 :BIT
BEGIN
    C1<= A AND B;
    C2<= A AND C;
    F<=C1 XOR C2;
END Logic_CC;

```



Question 10: For the following power screwdriver suggest a FAST model.

12 points



Question 11: Given the following Exploded view of a pen generate a BOM with SOP description

12 points



#	Qnt	name	Material	Description	SOP
1	1	Pen front body	Plastic	Body of the pen secure the cartridge and easy to hold and use the pen	Assembly will fail, hard to hold the pen and to write
2	1	Pen back body	Plastic	Body of the pen secure the cartridge and easy to hold and use the pen	Assembly will fail, hard to hold the pen and to write
3	1	Washer	Metal	Provide Gap and make it easy to ties front and back body	Hard to tie front and back body
4	1	Pen holder	Metal	Used to hold the pen in pocket	Not possible to hold the pen in pocket
5	1	spring	Metal	Hold the cartridge in its place Return the cartridge back to its place	The cartridge will be loose, Not possible to hold the cartridge it its place and will not return to its proper place
6	1	cartridge	Metal and Plastic	Contain the writing ink and the writing head, used to perform the writing operation	Writing is not possible
7	1	Hold mechanism	plastic	secure the cartridge in proper place for writing or for nor writing position	The cartridge cannot be secure in proper place, writing is not possible
8	1	Press button	plastic	Move the cartridge to and from writing position	It is not possible to put cartridge to proper writing positin.