

Name : Shah Raza

Reg No: 18PWCSE1658

Section: 'B'

Subject: DSD

Sign: Raza

PROBLEM 1:

Solution:

```
module RAM(addr, CS, RW, idata, odata);
```

```
    input CS, RW;
```

```
    input [9:0] addr;
```

```
    input [63:0] idata;
```

```
    output [63:0] odata;
```

```
    RAM1 r1(addr, CS, RW, idata[31:0],  
            odata[31:0]);
```

```
    RAM2 r2(addr, CS, RW, idata[63:32],  
            odata[63:32]);
```

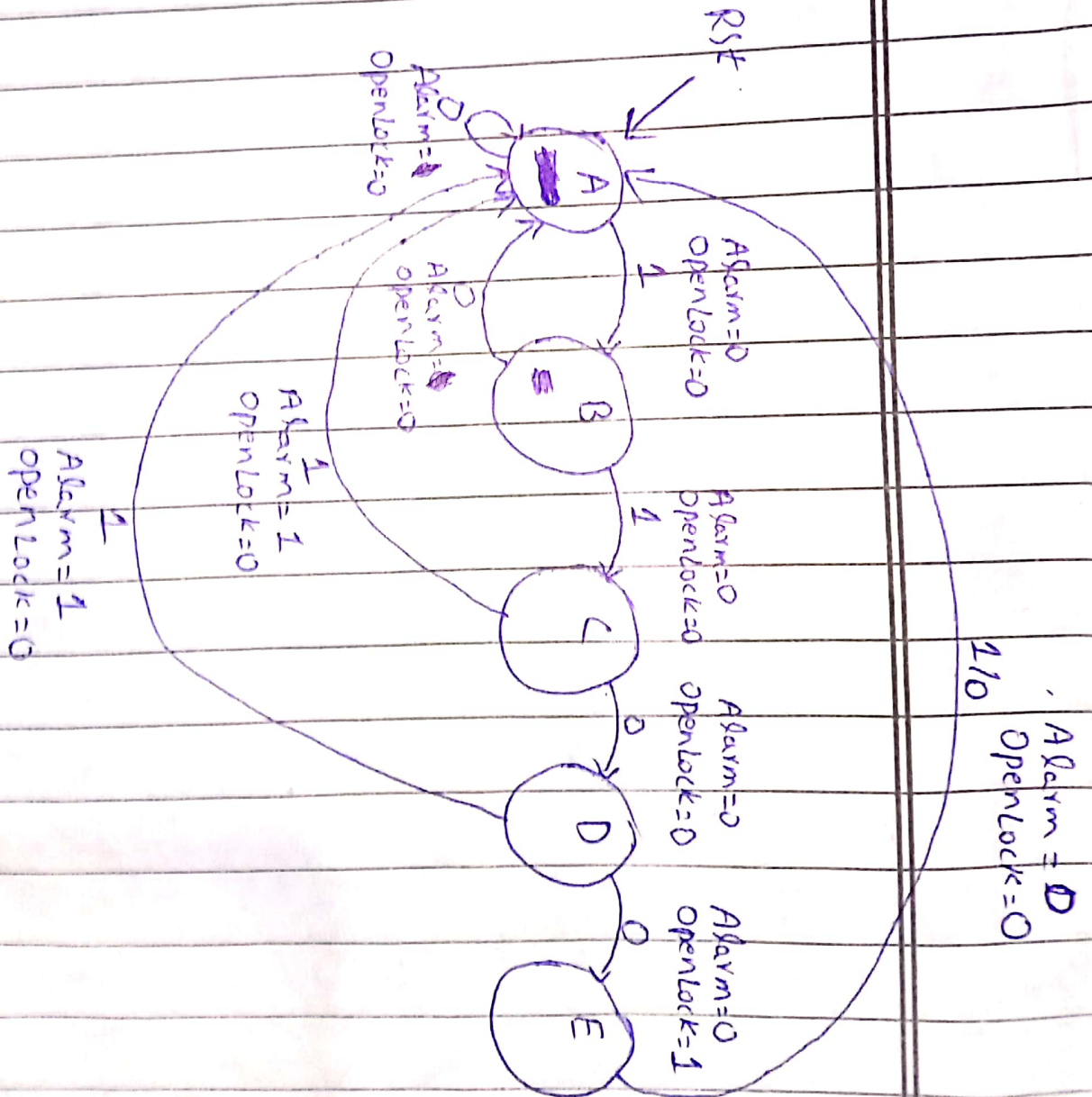
```
endmodule
```

2

Raza

PROBLEM 2:

- a) Design a Mealy/Moore FSM for lock sys.



b) Implement the FSM in Verilog.

Solution:

```
module lockSys (code, clk, rst, Alarm,
                openLock);
    input code, clk, rst;
    output reg Alarm, openLock;
    parameter A = 3'b000, B = 3'b001,
               C = 3'b010, D = 3'b011, E = 3'b100;
    reg [2:0] PS, NS;
```

```
    always @(posedge clk or rst)
        if (rst)
            PS <= A;
        else
            PS <= NS;
```

```
    always @(PS or code)
        case (PS)
            A:
                begin
                    Alarm = code ? 0 : 1;
                    openLock = code ? 0 : 0;
                    NS = code ? B : A;
                end
```

B:

begin

Alarm = Code? 0: 1;

openLock = Code? 0: 0;

NS = Code? C: A;

end

C:

begin

Alarm = Code? 1: 0;

openLock = Code? 0: 0;

NS = Code? A: D;

end

D:

begin

Alarm = Code? 1: 0;

openLock = Code? 0: 1;

NS = Code? A: E;

end

E:

begin

Alarm = Code? 0: 0;

openLock = Code? 0: 0;

NS = Code? A: A;

end

endcase

endmodule

PROBLEM 3:

- a) What is the number of all possible faults?

Solution:

We know that

$$\text{Fault sites} = \text{No of PI} + \text{Fanout branches} \\ + \text{No of Gate}$$

$$\text{Fault sites} = 6 + 4 + 6 = 16$$

$$\text{No of possible faults} = 2 \times K \\ = 2 \times 16$$

$$\text{possible faults} = 32 \\ (\text{Ans})$$

- b) How many checkpoint faults are in the circuit?

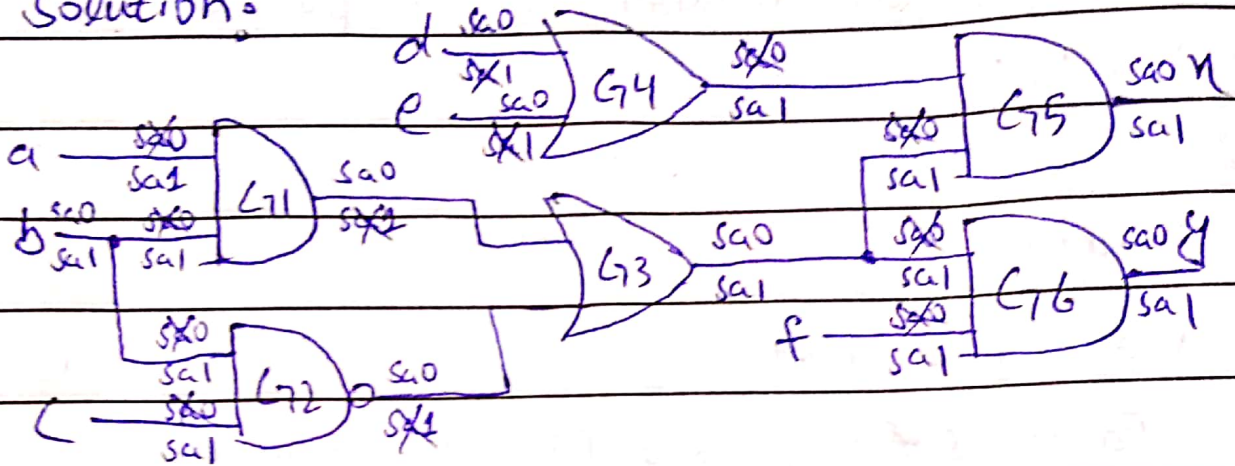
Solution:

$$\text{Check Points} = \text{Primary Inputs} + \text{Fanout branches} \\ = 6 + 4 = 10$$

$$\text{Check Point faults} = 2 \times K \\ = 2 \times 10 \\ = 20 \\ (\text{Ans})$$

c)

Solution:



Reduced Faults = 20

Collapse Ratio = $20/32 = 0.625$

(Ans)