# **Hardware Answers -**

1. **Architect-**State transition diagram of Mealy FSM for pattern detection block is as follows.

Note Assumptions:  
(i) Assumed that active high reset is used.  
(ii) Assumed that overlapping patterns are allowed.

RST = 1

State Definitions:

A = Seen 0’s only  
B = Seen first ‘1’  
C = Seen ‘10’ so far  
D = Seen ‘101’ so far

DIN = 1  
DETECT = 1

DIN = 0  
DETECT = 0

DIN = 0  
DETECT = 0

DIN = 0  
DETECT = 0

DIN = 1  
DETECT = 0

DIN = 1  
DETECT = 0

DIN = 1  
DETECT = 0

DIN = 0  
DETECT = 0

**D**

**C**

**A**

**B**

1. **Design-**See PatternDetection.v
2. **Verification-**See PatternDetection.v
3. **Validation-**   
   To be upfront, I am not sure how to approach this section.