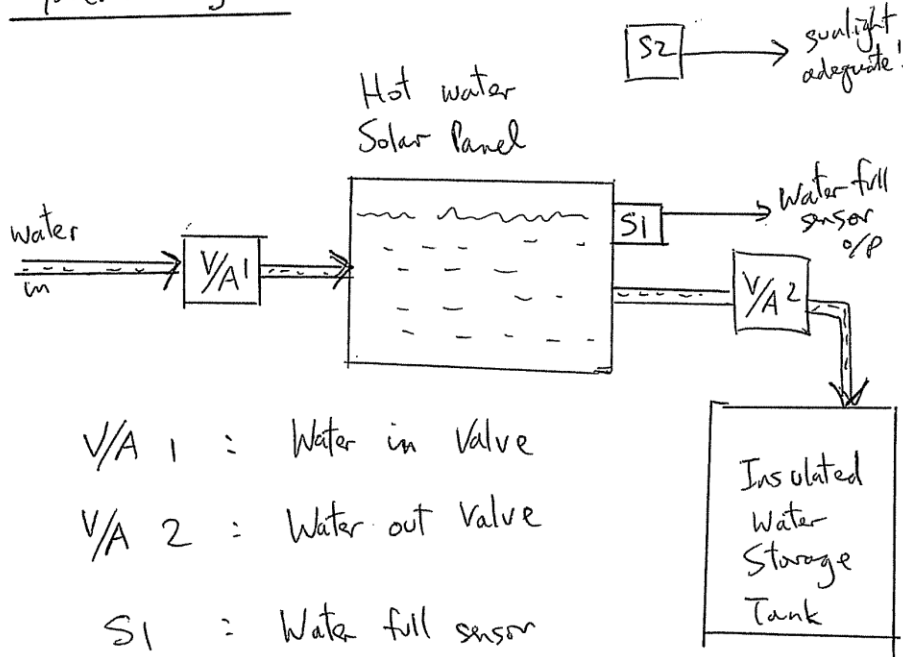


EE4281 Tutorial 4-06 Solution

Question 04

A2
(a)

System Diagram



V/A 1 : Water in Valve

V/A 2 : Water out Valve

S1 : Water full sensor

S2 : Sunlight sensor

Two extra sensors are needed. (S1, S2)

(b)

Sequence of Operation

Normal Mode (Fill water)

At 10:30 am, if there is enough sunlight, V/A 1 will switch on, until S1 indicates that the tank is full

Normal Mode (drain water)

At 3:30 pm, V/A 2 will be opened for 30 min and all the water will be drained to the water storage tank.

Weekend Mode No operation

(c)

Inputs/outputs	INPUT		OUTPUT	Modes of Operation			
	ON/OFF	DIGITAL	ANALOGUE	ON/OFF	Fill Water	Partial Water	Weekend
Sunlight Detector			X		X		
Water-Fill Detector	X				X		
V/A 1			X	X			X
V/A 2			X		X		X
Clock 1 (Time)		X		X	X		
Clock 2 (date)		X					X

(2)

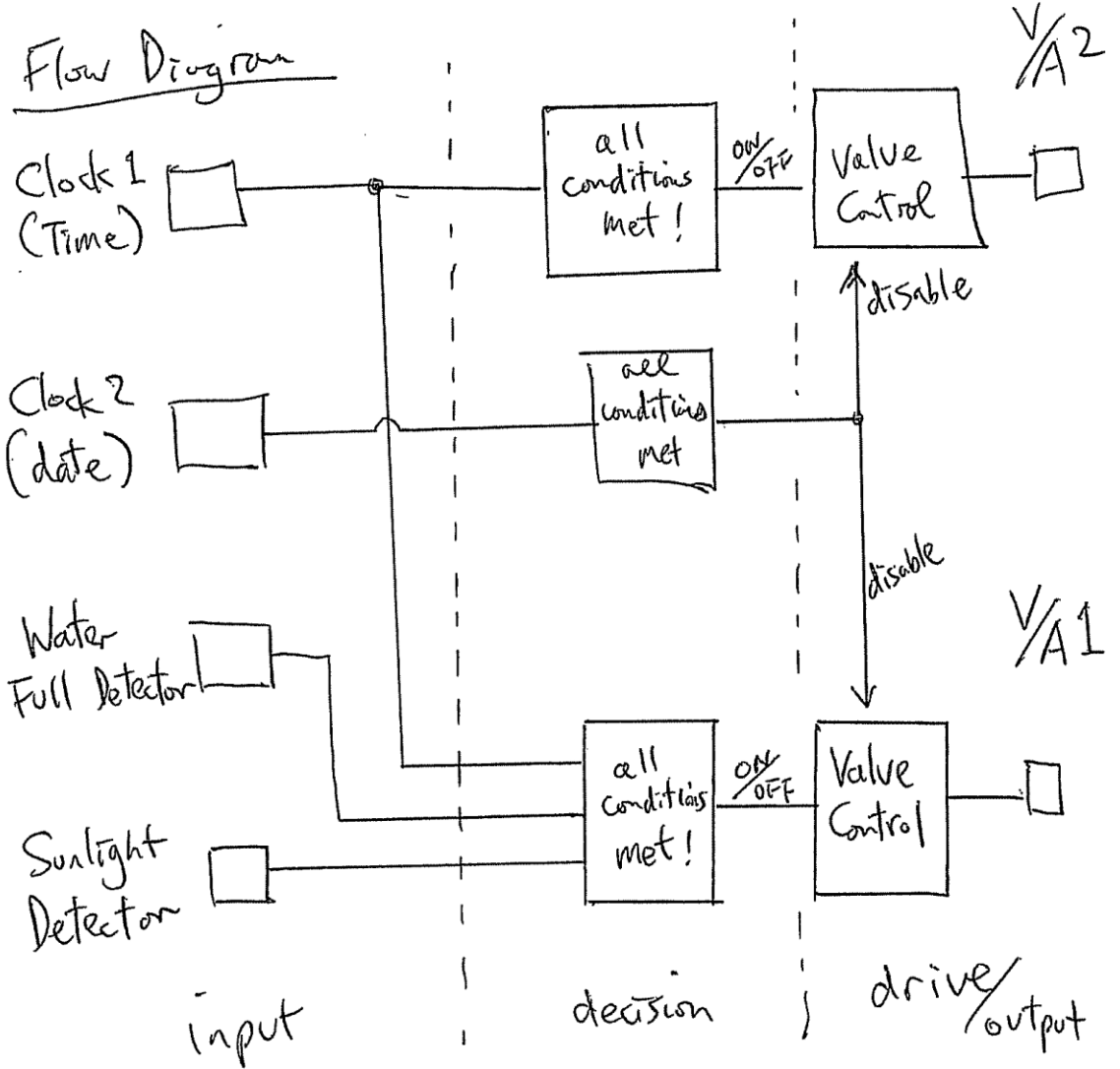
Mode Summary

Input Condition

	Clock 1	Clock 2	Sunlight Detector	Water Level	Output Action
Fill Water	10:30 am ↓ 11:00 am	X	Adequate Sunlight	Not full	Switch on V/A 1
Drain Water	3:30 pm ↓ 4:00 pm	X	X	X	Switch on V/A 2
Weekend (No operation)	X	During Weekend	X	X	Disable V/A 1 and V/A 2

(e)

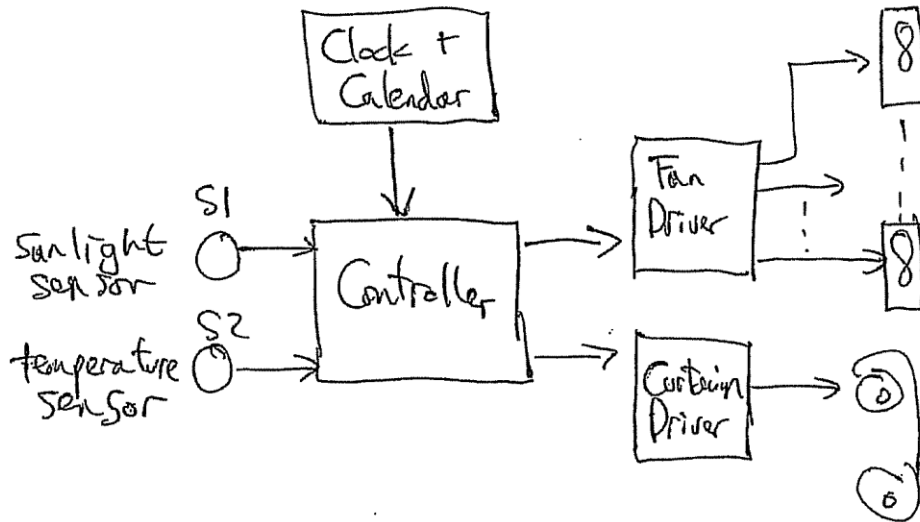
Flow Diagram



Question 06

No. 8

(a)



(b)

Sequence of Operation

Weekend mode - Fans off ; Curtains closed

Weekday mode - (i) Fans off ; Curtains closed
(12:00 - 1:00 pm) lunch time
(ii) Fans on above 30°C

Working Hour mode - (i) Below 15°C : Open Curtains
(9:00 am - 12:00 pm) and
(2:00 pm - 5:00 pm)
(ii) 15° - 28°C and sunny
Half close curtains

(iii) over 28°C and sunny
Fully close curtains

(iv) Above 30°C → Fans on

2

No. (C)

<u>I/O Summary</u>	<u>INPUT</u>			<u>OUTPUT</u>			<u>MODES</u>		
	<u>analogue</u>	<u>digital</u>	<u>on/off</u>	<u>analogue</u>	<u>digital</u>	<u>on/off</u>	<u>Working Hour</u>	<u>Lunch Time</u>	<u>Weekend</u>
<u>Input/Outputs</u>									
Fan						X	X	X	
Curtain					X		X		
Light Sensor S1	X						X		
Temperature Sensor S2	X						X	X	
Clock/Calendar		X					X	X	X

Mode Summary

<u>Mode Summary</u>	<u>Input</u>	<u>Output</u>
Working Hour	S1	
	S2	
	X	<15°
	Sunny	15°-28°
Lunch Time	Sunny	>28°
	X	>30°
	X	>30°
Weekend	X	X
	X	X
	X	X

Open Curtains

Half Close Curtains

Fully Close Curtains

Switch on Fans

Fans on

Curtains Closed

Fans - off

Curtains Closed

No. 2e

Flow Diagram

