SINGAPORE POLYTECHNIC

2016/2017 Semester 1 Mid semester Test

FULL MODULE NAME: Embedded Computer Systems module no.: ET0104
Set by: Tracey Lee
Course: DEEE Year : 3/ FT/EO

Q No.	SOLUTION	Marks	Total
A	1 - a / 2 - b / 3 - c / 4 - b / 5 - c 6 - d / 7 - c / 8 - b / 9 - a / 10 - d	3 mks each	30
B1.	Increase in speed, addressing range, data size and architectural changes.	6 mks	
	Use LDO, SMPS and consider the battery types and alternative power sources.	6 mks	12
B2.			

Type of memory	Use	Reason	
ROM	program messages, tables	non volatile	4 mks
RAM	data, temporary store of recorded sounds	read/write	3 mks
Flash Memory	Storage of sound files	non volatile, erasable	3 mks
Serial EEPROM	customization settings	non volatile, erasable	3 mks

13

B3.

Day+ = 0xDB	Day– = 0xDD	Times/Day = 0xDE	Time+ = 0xBB
Time- = 0xBD	Abort = 0xBE	Record = 0x7B	Stop = 0x7D
Accept = 0x7E			

9 mks

Since keys can form a "L" shape, phantom key can occur. 3 mks 12

B4. Since we need 32K, each chip is 8K, # chips needed: 32K /8K = 4
A0 to A12 (2^{12} = 8192=1FFFh. From E4000H 2 mk

Chip 1 - E4000H to E5FFFH
Chip 2 - E6000H to E7FFFH
Chip 3 - E8000H to E9FFFH
Chip 4 - EA000H to EBFFFH 2 mks

```
A19 A18 A17 A16 A15 A14 A13 A12 A11- - - - - A0
1   1   1   0   0   1   0   x----------------x E4000-E5FFFH
1   1   1   0   0   1   1   x----------------x E6000-E7FFFH
1   1   1   0   1   0   0   x----------------x E8000-E9FFFH
1   1   1   0   1   0   1   x----------------x EA000-EBFFFH
```

4 mks

A16-19 enabled by 74688

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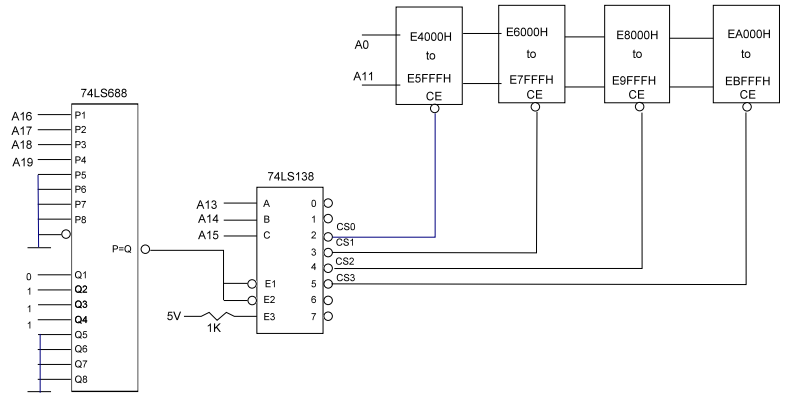
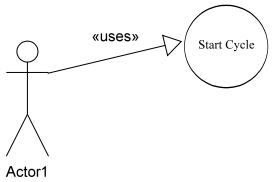
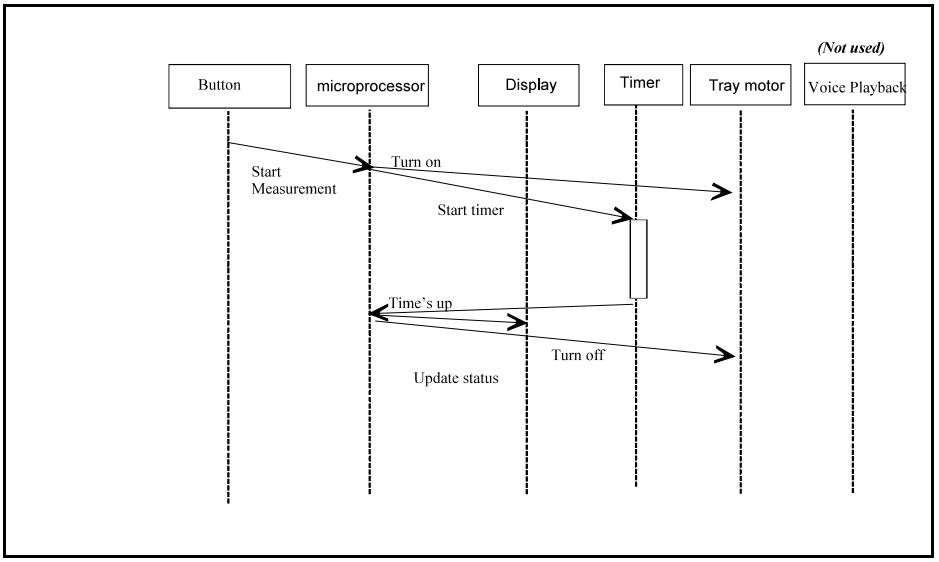
		5 mks	13
B5.			
i)	Goals: intelligent medicine reminder - activate by button press - position and hold relevant compartment to user - audible announcement - display message	3 mks	
	Constraints: easily operated, rugged (similar answers accepted)	2 mk	
	ii) Sub-systems for the design: sound player / keypad / display / timer / tray motor / µp	4 mks	
iii)		1 mk (user) 1 mk (balloon) 1 mk 'use arrows'	
iv)		3 mks (arrows) 3 mks (activities) (*other solutions possible-as long as reasonable*)	
v)	If compartment opens without intervention, contamination possible Other solutions possible.	2 mks	20