RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. General Degree in Information and Communication Technology
Third Year Semester II Examination - April/May 2016

ICT 3304 – Embedded Systems

Time allowed: Three Hours

Instructions for candidate

- This is a closed book examination.
- There are **FOUR(4)** pages in the question paper.
- Time allowed will be **THREE(3)** hours.
- Question paper consists of **SIX (6)** questions.
- Answer any **FIVE (5)** questions
- All questions carry equal marks.

100

Q1.

1. Write down 4 characteristics of an embedded System? (4 marks)
2. How can we measure the performance design matric of an embedded System? Explain using a suitable example. (4 marks)
3. What is an Application Specific Instruction set Processor? (3 marks)
4. Write down 4 benefits of using an ASIP. (4 marks)
5. What are the sub operations in an Instruction cycle? (5 marks)

Total Marks: 20

Q2.

1. Create a truth table for a half adder and a full adder. (4 marks)
2. Obtain the relevant SOP expression and draw the circuit diagrams for the full adder in part 1.(5 marks)
3. Draw the circuit diagrams of JK Flip Flop and T Flip Flop and briefly explain the difference. (5 marks)
4. Briefly explain the following peripherals. (2x3 marks)
    a. LCD controller
    b. USART
    c. Counter

Total Marks: 20

Q3.

1. What is a Deadlock? Briefly explain using a suitable example. (5 marks)
2. Write down the steps in the ES design process. (4 marks)
3. When selecting a processor for an ES, what are the considerations a programmer must be concerned of? (5 marks)
4. Briefly explain the following IPC functions. (2x3 marks)
    a. Queue
    b. Mutex
    c. Pipe

Total Marks: 20

Q4.

1. What is RISC architecture? Write down three characteristics of RISC processor. (4 marks)
2. Why do the PIC microcontrollers are designed using RISC architecture? Explain. (4 marks)
3. What is the importance of having a WDT in a microcontroller? (4 marks)
4. What are the addressing modes available in a Mid Range PIC microcontroller? (3 marks)
5. Draw and explain the ALUin a PIC Mid Range microcontroller in relation to the above mentioned addressing modes. (5 marks)

Total Marks: 20

Q5.

1. What is the importance of having the W register in the PIC microcontroller? (3 marks)
2. Explain the usage of the following PIC instructions briefly. (3 marks)
   a. BTFSS
   b. CLRW
   c. DECFSZ
3. What are the four sources of interrupts that a PIC microcontroller can handle? (4 marks)
4. Given below is the INTCON register. briefly explain five of the bits. (5 marks)

INTCON REGISTER (ADDRESS 0Bh, 8Bh)

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-x
GIE	EEIE	T0IE	INTE	RBIE	T0IF	INTF	RBIF
bit 7							bit 0

5. Write an assembly language program for PIC16F84A microcontroller to turn on an LED when a switch is on and turn off the LED when the switch is off (5 marks)

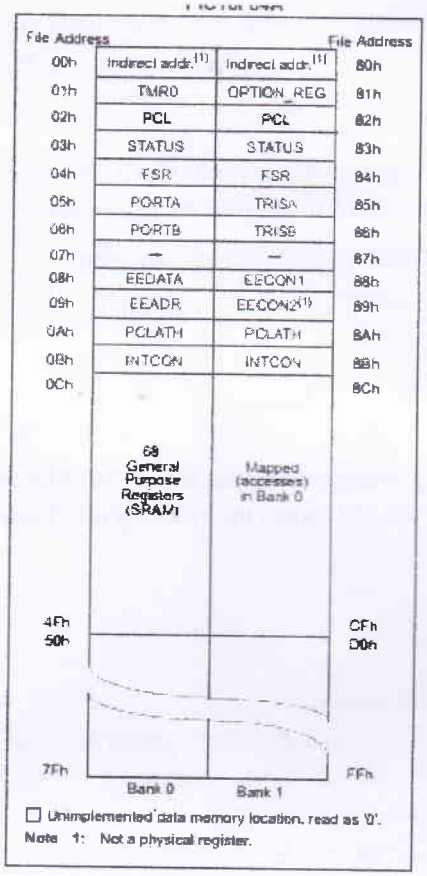
Total Marks: 20

Q6.

1. What is a RTOS? (3 marks)
2. What are the three ways that a system respond to hardware source calls from interrupts? (3 marks)
3. Explain one of them using a suitable diagram. (5 marks)
4. Write five RTOS services. (5 marks)
5. Compare and contrast Round Robin Time Slicing scheduling method and Preemptive scheduling method? (4 marks)

Total Marks: 20

Register Map of PIC16F84A Microcontroller



End of the paper