

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 2715401

Date: 07-01-2015

Subject Name: ARM Processor Architecture and System Design

Time: 02:30 pm - 05:00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. All the questions are related to ARM CPU LPC2148.

- Q.1 (a)** Answer the following questions. **07**
- 1) How the barrel shifter can be used for multiplying two numbers?
 - 2) What is the significance of FIQ mode in ARM CPU?
 - 3) Explain any one instruction that helps to perform PUSH operation on stack.
 - 4) What is literal pool of memory?
 - 5) Mention an instruction to initialize a register R7 with an immediate 32 bit number 0x0068C234?
 - 6) How can you know whether an ARM CPU is in THUMB mode or in ARM mode?
 - 7) List out the three stages of pipeline in ARM CPU.
- (b)** Answer the following questions. **07**
- 1) List out the addressing modes related to memory access in ARM CPU with supporting examples of instructions.
 - 2) Describe the benefits of five stage pipeline with explaining the operation done by ARM CPU in each of the five stages.
- Q.2 (a)** Write an ARM assembly language program to perform multiply and accumulate operation on all the elements of a given array of size 10 with each 32 bit number. Use a subroutine to implement this task. **07**
- (b)** How leaf and non leaf subroutines can be handled by an ARM CPU for appropriate return action? Describe in detail. **07**
- OR**
- (b)** Explain different types of pipeline stalls with their appropriate solutions. **07**
- Q.3 (a)** Explain the operation of Phase Locked Loop in LPC2148. How can you set the required CPU clock frequency? **07**
- (b)** Explain the requirement of a Watchdog Timer in Embedded System Design. Describe the Watchdog Reset Mode in LPC2148. **07**
- OR**
- Q.3 (a)** How can you use a Timer to generate a PWM wave in LPC2148? **07**
- (b)** Describe the Vector Interrupt Controller for serving vectored and non-vectored interrupt requests in LPC2148? **07**
- Q.4 (a)** Describe the ARM bus structure with requirement of several buses. **07**
- (b)** Answer the following questions. **07**
- 1) Explain the use of Global ADC Data Register in LPC2148.
 - 2) Explain the special function registers to access Fast GPIO port pins.

OR

- Q.4 (a)** Describe the BURST mode of operation associated with ADC in LPC2148 with the help of an application. **07**
- Q.4 (b)** Answer the following questions. **07**
- 1) Explain the benefits of Memory Accelerator Module in LPC2148.
 - 2) Explain the use of APB Divider in LPC2148.
- Q.5 (a)** Explain how you can set the desired baud rate for the implementation of serial communication using UART along with the importance of DLAB bit in LPC2148. **07**
- (b)** Describe the use of PWM modulator to generate PWM signals on port pins. **07**

OR

- Q.5 (a)** Explain the 6Wired AND bus characteristics for CAN bus. Describe the requirements of such bus architecture. **07**
- (b)** Explain all the modes of operation associated with SPI bus in LPC 2148. **07**
