Reg. No.



IV SEMESTER B.TECH. (COMPUTER SCIENCE AND ENGINEERING) GRADE IMPROVEMENT/MAKEUP EXAMINATIONS, AUGUST 2021

SUBJECT: EMBEDDED SYSTEMS [CSE 2253]

REVISED CREDIT SYSTEM (11/08/2021)

Time: 2 Hours

MAX. MARKS: 40

Instructions to Candidates:

- ✤ Answer FOUR full questions.
- ✤ Missing data may be suitably assumed.
- Explain the different types of registers in ARM architecture. Also Illustrate the operation of all types of load and store instructions.

1B. Explain the following assembler directives:

- i) AREA
- ii) ENTRY
- iii) ADR
- iv) ALIGN
- v) RN
- 2A. Write and explain a code snippet for each of the following instructions to illustrate the difference between them.
 - i) MULL and UMULL
 - ii) ADDS and ADC
- 2B. Write an ARM assembly language program to check whether a number is prime or not. 5M Store AA in the memory location PRIME if it is a prime number, else store FF.
- 3A. Write an ARM assembly language program to evaluate the expression K=A² + B² 2*A*B. Assume that A and B are 16 bit variables in code memory. Also, assume that the result of all the arithmetic operations do not exceed 32 bits.
 5M
- 3B. State the difference between the SUBCC and SUBCS instructions with an example. Using MOV instruction, show the rotate left operation of 0x33 bya) 4 timesb) 8 times
 - c) 12 times.

Also, write the resultant rotated value in each case.

5M

5M

4A. List the four stack structures. Draw the stack diagram for the following code snippet. Write the values in the registers R0-R3 and R13 after the execution of each of the instructions STM and LDM.

LDR R13, =0x40001000 LDR R0, =0x523 MOV R1, #0x12 LDR R2, =0x468 MOV R3, #0x10 BL FUNCTION HERE B HERE FUNCTION STM R13!, {R0-R3} LDM R13!, {R0-R3} BX LR

5M

5M

5M

- 4B. Write an assembly code snippet to convert the packed BCD number 0X41 into unpacked BCD representations and store the results into memory addresses 0X20000001 and 0X20000002. Further, set the D4 and D5 bits of the location 0X20000001 to HIGH using their bit alias addresses.
 5M
- 5A. What is the purpose of PINSEL registers? Explain all the PINSEL registers with their functionality in LPC1768.5M
- **5B.** Discuss all the GPIO registers in detail with respect to LPC1768

6A. Write an Embedded C Program to turn on alternatively the even-positioned LEDs and the odd-positioned LEDs continuously in the LED block of LPC1768. Assume that the eight LEDs are connected to P0.15 to P0.22. Expected Output: LD7 LD6 LD5 LD4 LD3 LD2 LD1 LD0 Iteration 1:

1
1
1
1
1
1

6B. Write an Embedded C Program to display the decimal numbers from 0-9 in the seven segment display (SSD) unit continuously. The even numbers should be displayed in unit 2 of the SSD unit and odd numbers should be displayed in unit 3 of the SSD unit. Assume that the eight segments of all the SSD units are connected to the port pins P0.4 to P0.11 and the SSD units can be enabled one by one using the port pins P0.15 to P0.18. The hex codes for the digits from 0 to 9 are 0x3F, 0x06, 0x5B, 0x4F, 0x66, 0x6D, 0x7D, 0x07, 0x7F, 0x6F respectively.

Expected Output: U	Unit3 U	nit2	Unit1	Unit0	
Iteration 1:		0			
Iteration 2: 1	l				
Iteration 3: and so on.		2			5M