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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fourth Semester, B.E. - Computer Science and Engineering

Semester End Examination; July / August - 2022

AVR Microcontroller

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:
*CO1- **Compare and contrast** Microprocessor and Microcontroller*
*CO2- **Code** simple AVR assembly language instructions*
*CO3- **Code** assembly language to use the ports for input or output*
*CO4- **Code** c program for time delay, logical and arithmetic operations and fro data serialization*
*CO5- **Interfacing** the keypad to the AVR using assembly and C*

Note: *i) PART-A is compulsory. One question from each unit for maximum of 2 marks.*
*ii) PART-B: Answer any **TWO** sub questions (from a, b, c) from each unit for a Maximum of 18 marks.*

Q. No.	Questions	Marks	BLs	COs
	I : PART - A	**10**		
I a.	Discuss the following with respect to ATmega169: i) Size of ROM ii) Size of PC iii) Last address of the location in code ROM iv) Is it byte addressable or word addressable?	2	L2	CO2
b.	Show a simple AVR code to send 0X99 to Port B and Port C	2	L1	CO3
c.	Determine the content of R1 register and status register after the execution of the following instruction by assuming R1 = $95 and R2 = $4F CF = 1 ADC R1,R2	2	L2	CO4
d.	List the three parts of Macro.	2	L1	CO4
e.	Why is the use of packed BCD preferable to ASCII.	2	L2	CO2
	II : PART - B	**90**		
	UNIT - I	**18**		
1 a.	Differentiate between; i) Micro processor and Microcontroller ii) Harvard Architecture and Vonnuman architecture iii) SRAM and DRAM	9	L2	CO1
b.	Explain AVR status register what is largest hex value that can be moved into a location in the data memory? What is its decimal equivalent?	9	L2	CO1
c.	With figure, explain data memory for AVR's with extended I/O memory.	9	L2	CO1

Contd…2

UNIT - II **18**

2 a.	Explain the following instruction with an example: i) BREQ ii) CALL iii) CBI	6	L2	CO3
	ii) using stack write a program to swap two number	3	L3	CO3
b.	Name the ports of 40 pin AVR and explain. A switch is connected to PB3. Using bit manipulation instruction write a program to check the status of switch and perform the following: if $s_w = 0$ send letter 'N' to port D if $s_w = 1$ send letter 'Y' to port D	9	L2	CO3
c.	I) Explain the following instruction with an example: i) RJMP ii) SBIS iii) BRLO	6	L2	CO3
	II) Using out instruction for AVR chip write sequence of instruction to toggle all the bits of PORT B, PORTC and PORT D continuously	3	L2	CO3

UNIT - III **18**

3 a.	Explain the following instruction with syntax and example. i) ADC ii) AND iii) BRVS also determine the content of R20 after the execution of each instruction show each step i) LDI R20, 0X56 ii) LDI R20, 0X39 swap R20 SEC ROR R20 ROL R20 ROR R20 ROL R20	9	L2	CO4
b.	Explain the difference between C and V flags and where each one is used. Assume port B is an input port connected to temperature sensor. Write a program to read the temperature and test it for value 75. According to the test result place the temperature value in the register indicated by the following If T = 75 R16 = T R17 = 0 R18 = 0 T > 75 R16 = 0 R17 = T R18 = 0 T< 75 R16 = 0 R17 = 0 R18 = T	9	L3	CO3
c.	I) Explain the following instruction with an example: i) ex-OR ii) NEG iii) ASR	6	L2	CO3

Contd…3

	II) Write a code to add two signed number stored at 0X200 and 0X201 the result is stored at 0X202. If the result is not collect the program should put 0XAA to Port A char R21	3	L2	CO3
	UNIT - IV	**18**		
4 a.	Show code to convert packed BCD to two ASCII numbers and place them in R21 and R22	9	L2	CO3
b.	Explain the following addressing mode with an example to each: i) Register ii) Direct iii) Register indirect	9	L2	CO3
c.	i) Define macro and explain the same with an example. Also list the advantage of it	5	L2	CO3
	ii) Differentiate between macro and subroutine. Which one will use more flash ROM	4	L2	CO2
	UNIT - V	**18**		
5 a.	i) List and explain the ways to create time delay in C. Also list factor that can affect delay size	4	L2	CO4
	ii) Write an AVR C program to toggle all the pins of Port C continuously with delay	5	L3	CO4
b.	Write an AVR C program to covert $FD to decimal and display the digits on PB, PC and PD	9	L3	CO4
c.	Explain the interfacing of keyboard to AVR with flowchart and figure.	9	L2	CO5

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