16CS53

USN | | | | | | | | | | |

R. V. COLLEGE OF ENGINEERING

Autonomous Institution affiliated to VTU

V Semester B. E. Examinations Nov/Dec-18

Computer Science and Engineering

MICROCONTROLLER AND EMBEDDED SYSTEMS

Time: 03 Hours ***Maximum Marks: 100***

Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6

PART-A

1	1.1	The total external data memory that can be interfaced to the 8051 is _____.	01
	1.2	The content of accumulation after the execution of the following instructions is _____. $MOV\ A,\#30$ $ADD\ A,\#15$	01
	1.3	On power-up, the 8051 uses which RAM locations for registers $R0-R7$?	01
	1.4	Assume a single digit common anode display is connected to PO, with segment $'a'$ connected to $P0.0$ and dp connected to $P0.7$. Indicate the hex value to be sent to port PO to get the display $'F'$.	01
	1.5	Indicate the value to be loaded into the timer 1 register $TH1$, to get 4800 band rate at 8051 serial port, given the crystal frequency $11.059MHz$.	01
	1.6	What is the status of carry, auxiliary carry and parity flag after the execution of following instruction: $MOV\ A,\#98$ $ADD\ A,\#64H$	01
	1.7	Name two $16-bit$ registers in 8051.	02
	1.8	In the ADD instruction when is CV and AC raised?	02
	1.9	What is the target address range for $ACALL$ and $LCALL$ instructions?	02
	1.10	Name the register of ARM architecture, which is called as Link register (LR) and Stack Pointer (SP).	02
	1.11	Compute the value stored in A, after the execution of the following code: $MOV\ RO,\#7AH$ $MOV\ A,RO$ $RR\ A$ $RR\ A$ $SUBB\ A,\#IEH$	02

	1.12	Indicate the total time taken to execute the following 8051 code, given the crystal frequency $24MHz$. $MOV\ R1,\#3$ $CONT: NOP$ $DJNZ\ R1, CONT$	02
	1.13	What is the contents of registers $R2, R1\ \&\ RO$ after the execution of following code: $MOV\ A,\#9CH$ $MOV\ B,\#OAH$ $DIV\ AB$ $MOV\ RO, B$ $MOV\ B,\#OAH$ $DIV\ AB$ $MOV\ R1, B$ $MOV\ R2, A$	02

PART-B

2	a	With an example, explain the different addressing modes of 8051.	05
	b	Briefly describe the block diagram of 8051 microcontroller and discuss its features.	05
	c	Discuss the bits of PSW register and stack structure of 8051.	06
3	a	Write an ALP to perform the linear search on N 8-bit numbers and indicate the result and match position.	05
	b	Write an ALP to find the smallest of three numbers. The numbers are stored in code memory and result to be stored in data memory.	05
	c	The selling price of 5 items are stored in ROM locations $0100H$ onwards. The corresponding cost prices are entered in RAM locations from $40H$ onwards. Write an 8051 ALP to calculate the average profit of the five items.	06
		OR	
4	a	Write an 8051 ALP to convert an 8-bit binary number to BCD.	05
	b	Indicate the meaning of different bits of the following special function register: i) $TMOD$ ii) $TCON$.	05
	c	Write an 8051 C program to transfer the message "YES" serially at 9600 band, 8-bit data, 1 stop bit. Do this continuously.	06
5	a	Write an 8051 C program to toggle only pin $PI \cdot 5$ continuously every $250ms$. Use Timer 0, mode – 2 to create the delay.	05
	b	Write a program in which the 8051 gets data from $P1$ and sends it to $P2$ continuously while incoming data from the serial port is sent to $P0$. Assume that $XTAL = 11.0592MHz$. Set band rate to 9600.	05
	c	Design an 8051 microcontroller interfaced to a stepper motor and a transducer. Transducer is connected to port $P3$. If the humidity level read is less than $30H$ from $P3$, rotate the stepper motor connected to port $P2$ to turn a tap by 30°. After some period, read the status of humidity. If it is improved, turn off the tap by controlling the stepper motor. Show that block diagram and relevant code to achieve the above objective.	06
		OR	

6	a	8051 microcontroller has to send two different strings to the serial port. Switch SW is connected to pin $P2.0$. Write an 8051 C program to monitor the status of SW. If $SW = 0$: send "John" and $SW = 1$: send "Smith". Assume $XTAL = 11.0592MHz$, 9600 band rate, 8-bit data and 1 stop bit.	05
	b	Compare interrupt driven and polling method of data transfer. Discuss the bits of IE (Interrupt Enable) register.	05
	c	Design a security system for a building. The main door of the building will open only when a code is pressed on a keypad available on the door. Show a block diagram and write a 8051 code to achieve the same. Make suitable assumptions.	06
7	a	Write an Embedded C program to implement Decimal Up/Decimal Down/Ring counter using logic controller interface module.	08
	b	Briefly describe the characteristics of Embedded Systems.	04
	c	Briefly discuss the classification of Embedded Systems.	04
8	a	Describe the different ARM operating modes.	08
	b	Write an ALP for $ARM7$, to solve $3x + 8y + 9z$, where $x = 2, y = 3$ and $z = 4$.	08