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RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)

V Semester B. E. Examinations Jan/Feb-21

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	8051 series has how many 16 bit registers?	01
	1.2	When 8051 microcontroller executes arithmetic operations then flag bits of which register is affected?	01
	1.3	On power up, the 8051 uses which RAM locations for Registers $R_0 - R_7$	01
	1.4	Calculate the $JUMP$ code for $AGAIN$ and $HERE$ if code starts at $0000H$. $MOV\ R_1, \#0$ $MOVA, \#0$ $MOV\ R_0, \#25H$ $AGAIN:\ Add\ A, \#0ECH$ $JNC\ HERE$ $HERE:\ INC\ R_1$ $DJNZ\ R_0, AGAIN$ $MOV\ R_0, A$ END	02
	1.5	What is the time taken by one machine cycle if crystal frequency is $20MHz$?	01
	1.6	Indicate the value to be loaded into Timer 1 register $TH1$, to get 2400 baud rate at 8051 serial port, given crystal frequency 11.059 MHz.	01
	1.7	Indicate the total time taken to execute the following ALP program (include all the instructions for the calculations), given the crystal frequency- $24MHz$. $MOV\ R1, \#5$ $CONT:\ NOP$ $DJNZ\ R1, CONT$	02
	1.8	Name the register of ARM architecture, which is called link register	01
	1.9	With an example explain the working of the following instructions i) MVN ii) $MOVS$.	02
	1.10	Write output (in R_0 register) $MOV\ R_0, \#0X04$ $MOV\ R_1, \#0X02$ $ORR\ R_0, R_0, R_1, LSL\ \#1$	02
	1.11	Given stepper motor with 200 teeth rotor, indicate number of steps required to rotate 270°.	02

	1.12	What is the dual purpose of $PORT0$ of 8051 microcontroller?	01
	1.13	What is the size of PC in ARM architecture?	01
	1.14	What are the condition code bits of $CPSR$ register of ARM and define their purpose.	02

PART-B

2	a	Describe 8051 microcontroller architecture and give complete memory organization.	08
	b	With examples explain the different addressing modes of 8051.	08
3	a	Write ALP to create a square wave of 50% duty cycle on $P_{1.5}$bit. Timer 0 is used to generate Time Delay ($XTAL = 11.0592MHz$).	08
	b	Write 8051 ALP program to perform sorting (Ascending order).	08
		OR	
4	a	Indicate the meaning of different bits of the following function register i) $TMOD$ ii) $TCON$	08
	b	Compare interrupt driven and polling method of data transfer. Tabulate any four differences	04
	c	Write an 8051 C program to transfer message "Yes" serially at 9600 baud, 8-bit data, 1 stop bit. Do this continuously.	04
5	a	Discuss the following signal descriptions of 8051. i) ALE ii) TO iii) $\overline{\text{PSEN}}$ iv) $\overline{\text{EA}}$ v) $\overline{\text{INT0}}$	10
	b	Explain the major steps followed for keyboard interfacing in 8051 with schematic representation.	06
		OR	
6	a	Design microcontroller based door-locking system. User will feed pre-stored 4-digit key code (1234), if the key code matches the door must open. Opening and closing of door is controlled by stepper motor. Draw interfacing circuit and embedded C code to perform required code?	10
	b	Compare working of LCD and LED.	06
7	a	Briefly discuss the classification OF embedded systems.	08
	b	Briefly discuss any five features of ARM architecture/ core.	08
8	a	Write an ALP for ARM 7, to solve $3x + 8y - 9z$, where $x = 2, y = 3, z = 4$.	08
	b	Explain the programming of $GPIO$ pins of $ARM\ LPC$ 2148 microcontroller.	08