Reg. No.



V SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS NOV/DEC 2016

SUBJECT: MICROCONTROLLER BASEDSYSTEM DESIGN [ELE 3106]

REVISED CREDIT SYSTEM

Time: 3	Hours	Date: 05 December 2016	MAX.	MARKS: 50
Instructi	ons to Ca	andidates:		
* * *	AnsweiMissingSupport	r ALL the questions. g data may be suitable assumed. rt all your programs with relevant comments.		
1A.	With the Describe	e help of a neat sketch, explain the architecture of 8051 microcontro e the functions of following registers of 8051 i. PC ii. DPTR	ller.	(04)
1B.	Write an array in in accun the coun	n ALP to check whether 8 bit binary number stored in 60H is ava external locations starting from 0500H to 051DH; if available store nulator and address of location of first appearance in P1 and P2, a at of availability at port '0'.	ailable in the num Also disp	an ber blay (03)
1C .	What is default s in detail	the role of stack pointer register in accessing the stack memory? stack memory space in 8051? Describe the PUSH and POP instruction by taking a relevant example.	What is ons of 8	the 051 (03)
2A.	Three 8 and 22H	bit numbers X, N1 and N2 are stored in internal data RAM location respectively. Write an 8051 ALP to perform the following operation	ns 20H, 2 ns	21H
	If X=00H	I; then LSB of 23H = LSB of N1 (AND) LSB of N2,		
	If X=01H	I; then MSB of 23H = MSB of N1 (OR) MSB of N2,		
	If X=02H	I; then MSB of 23H = compliment of MSB of N2.		(04)
2B.	Explain	the following with respect to 8051 microcontroller		
	i.	Power on Reset circuit with connection diagram		
	ii.	Alternate functions assigned to each of the pins of Port "3".		(03)
2C.	Determi 12MHz.	ne the exact delay generated by the following 8051 program. Assum	e XTAL =	=
	UP:	MOV A, #19H MOV R0, #0A0H MOV R1,# 0AH NOP INC R0 DJNZ R1, UP		
	REPEAT	DIV AB MOV R2,A DJNZ R2, NEXT CJJNZ R0, REPEAT		(03)

- **3A.** Answer the following with respect to 8051 timers
 - i. Applications of timer mode and counter mode
 - ii. Maximum delay with single overflow in case of timer mode '1' and '2', if the crystal frequency is 8MHz.
 - iii. Details of TMOD register and functions of all the bits.
 - iv. 8051 instruction to configure timer '0 in timer mode '0 ' with hardware start / stop control and timer '1' in counter mode '1' with software start / stop control. (05)
- **3B.** Compare polling and interrupt methods of serving different devices by a processor like 8051.List their relative merits and demerits. Explain about the enabling process, sampling and detection of edge and level triggered external interrupts by 8051.
- **3C.** Calculate the exact time delay generated by the following program, if crystal frequency is 10MHz.

MOV R0, # 0F0H MOV TMOD, # 02H MOV TH0, #1CH SETB TR0 AGAIN: MOV R1, # 0FH WAIT: JNB TF0, WAIT CLR TF0 DJNZ R1, WAIT DJNZ R0, AGAIN CLR TR0

- **4A.** Write an 8051 program to read the status of the switches connected to pins P1.0 and P1.1. Wait till a switch is closed and if switch P1.0 is closed; transmit serially the message "Normal Speed" at 19200 baud. If P1.1 is closed, transmit serially the message "High speed" at 19200 baud rate. XTAL=11.0592MHz.
- **4B.** Interface a matrix key board in a 2X 5 matrix form containing ten keys '0' to '4' in Row 1 and '5' to '9' in Row 2, to 8051. Use port '0'(P0.0 and P0.1) pins for the rows and port '1' pins (P1.0 to P1.4) for the columns. Show the connection diagram and write an 8051 ALP to detect any key pressed and transfer the ASCII code of the key pressed to port '2'. Use software debouncing technique. Assume XTAL=11.059sMHz.
- **4C.** Explain the importance of busy flag in LCD. How can it be accessed? Also suggest an alternate method to avoid writing to LCD before it is ready.
- 5A. List and describe with an example, the various shift and rotate operations supported by (03) ARM7 instruction set. Mention constraints, if any in case of each of these operations.
- **5B.** Write a note on the register bank of ARM7 processor, indicating clearly the visible registers in different modes of operation. Describe the functions of following bits of **(04)** CPSR register: 'N', 'Z', 'C', 'V', 'I' and 'F'.
- **5C.** 16 bit data corresponding to armature current, armature resistance, series field resistance and terminal voltage of a DC compound generator are available in successive memory locations starting at 0X00009000 ('2' memory locations for each data). Write an ARM7 ALP to determine the EMF generated and store the result in next '4' memory locations. $(E_g = V + l_a * (R_a + R_{se}))$.

(03)

(02)

(04)

(04)