Question Paper

Exam Date & Time: 03-May-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

IV Semester B.Tech (BME) End Semester Examination APRIL - MAY 2024

MICROCONTROLLERS [BME 2224]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

*** Draw neat diagrams whereever necessary**
*** Give examples/illustrations wherever necessary**
*** Write neatly and legibly**

1)		Distinguish the hardware and software architectures of the 8051 and the ARM Cortex-M3 microcontrollers.	(4)
	A)		
	B)	Give justification for the following: (i) With pin of the 8051 connected to +Vcc, the external Program memory must and should get mapped to address 1000H. (ii) On reset the register SP of the 8051 microcontroller gets initialized to 07H. (iii) Port-0 of the 8051microcontroller requires external pull-up.	(3)
	C)	Distinguish between the stack pointers of the 8051 and the ARM Cortex-M3 microcontrollers.	(3)
2)		Develop a readable assembly language program to convert an 8-bit binary number into a grey code.	(4)
	A)		
	B)	How do you make use of SPI protocol in Bus and cascaded topologies? Illustrate.	(3)
	C)	Develop a multiplexed 2-digit seven-segment display system using the 8051 microcontroller and common anode seven-segment display units. Depict the hardware and explain how you are going to refresh the display at a rate of 100Hz?	(3)
3)		How do you implement stack in an ARM cortex-M3 based system without making use of hard-wired stack pointer? Illustrate in detail.	(4)
	A)		
	B)	If an 8051 microcontroller is operated at a clock speed of 16 MHz and the timer-0 of the microcontroller is configured for Mode-2 operation: (i) Determine the maximum time delay the Timer-0 can generate? (ii) Decide the initial count to be loaded into the timer register to generate a delay of 65 micro-second. (iii) Choose an appropriate storage location for the initial count.	(3)
	C)	Develop a product counter using an 8051 microcontroller. Depict the hardware and software.	(3)
4)		Design an interface to have two 4 Kbyte EPROM memory chips and two 4 Kbyte SRAM memory chips in an 8051-microcontroller system. Draw the interface diagram and write address allocation table.	(5)
	A)		
	B)	An 8051 based system requires time stamp for the data acquired from the real world. How are you going to generate this timing information? Illustrate in detail.	(3)
	C)	How do you make use of an 8051 microcontroller to measure frequency of a signal? Illustrate.	(2)

5)		There are hundred 2-digit BCD numbers available in the external memory of an 8051-microcontroller system, beginning at address 2500H. Develop a readable assembly language program to separate these elements into even and odd elements and store the even elements from location 3500H, odd elements from location 4500H.	(4)
	A)		
	B)	Design an 8051 based system to generate a pulse train of frequency 1KHz, duty cycle 75% and amplitude 10V. Depict both hardware and software.	(4)
	C)	How do you switch the register bank of an 8051 microcontroller? Illustrate.	(2)

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