CBCS SCHEME

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BEE403

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Microcontrollers

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	What are the differences between microcontroller and microprocessor?	05	L1	CO1
	b.	Draw the programming model of 8051 microcontroller and explain the following: (i) Program counter and data pointer (ii) Accumulator A, Register B and CPU Registers (iii) Stack and stack-pointer	10	L2	CO1
	c.	Draw the status of PSW register. What is the status of AC and CY flags after adding 52H with 74H.	05	L2	CO1
		OR			
Q.2	a.	Define addressing mode. Explain the following types of addressing modes with examples: (i) Immediate addressing mode (ii) Register addressing mode (iii) Register indirect addressing mode (iv) Indexed addressing mode	10	L1	CO1
	b.	Calculate the memory capacity for following cases: (i) 512 bytes of RAM (ii) 8 KB RAM	05	L2	CO1
	c.	Explain the functions of following pins: (i) External Access Input ($\overline{EA}$) (ii) Program Store Enable ($\overline{PSEN}$)	05	L1	CO1
		Module – 2			
Q.3	a.	Define assembler directive. Use assembler directive to place constants 0FFH, 07H, 82H, 31D and character string 'VTU' in program memory starting from 0080H. Explain the content of each location.	05	L3	CO2
	b.	Explain port 0 as input port and output port. What is the dual role of port 0?	05	L1	CO2
	c.	Explain the working of DAA instruction. Write a program to add the following 6, BCD numbers from the location 90H onwards. Save the carry in register R5 and sum in register R4. Data : 10, 20, 30, 40, 50, 60.	10	L3	CO2
		OR			
Q.4	a.	Explain the working of SUBB instruction, when Borrow = 0 and Borrow = 1. Write a program to subtract 2 numbers using 2's complement arithmetic.	10	L3	CO2
	b.	Check the following instructions to be valid or invalid. Justify with reasons: i) MOV P2, #0FFH ii) MOV R3, R4 iii) SETB PCON·7 iv) MOV A, @R2 v) PUSH R7	05	L3	CO2
	c.	Explain the working of RLCA and RLA instructions with examples.	05	L1	CO2
		Module – 3			
Q.5	a.	State the advantages of programming 8051 in 'C'.	05	L1	CO3
	b.	Explain the differences between sbit, bit and str declarations in 8051 'C' program.	05	L2	CO3
	c.	Write 8051 C program to: (i) Convert packed BCD to ACSII and display bytes on port P0 and P1 (ii) Convert ASCII digits to packed BCD and display it on port P2.	10	L3	CO3

		OR			
Q.6	**a.**	Explain the characteristics and operations of mode-1 timer in 8051. Also explain the steps to program in mode-1. How do you calculate initial count for given delay.	**10**	**L2**	**CO3**
	b.	Write a program to generate square wave of frequency 1 kHz on bit 3 of port 1. Consider timer-0 in mode-2. Show initial count and TMOD calculations in detail. Assume XTAL = 22 MHz.	**10**	**L4**	**CO3**
		Module – 4			
Q.7	**a.**	Explain the bit status of SCON register.	**05**	**L2**	**CO4**
	b.	Write a program to transfer the message 'GOOD' serially at 9600 baud rate, 8-bit data, one start and one stop bit. Show TH1, TMOD and SCON calculations in detail. Assume XTAL = 11.0592 MHz.	**10**	**L4**	**CO4**
	c.	Explain the steps to program 8051 to receive the data serially.	**05**	**L2**	**CO4**
		OR			
Q.8	**a.**	Compare interrupts method with polling method.	**05**	**L2**	**CO4**
	b.	Write a program to real data from port-0 and sends it to port P2 continuously, creating a square wave of 200 μs on P2.5. Use timer-0, XTAL = 11.0592 MHz, in mode-2. Show TMOD, THO and IE calculations. Use timer-0 interrupt. Explain the working of program.	**10**	**L4**	**CO4**
	c.	Assume that after RESET, the interrupt priority register IP is set by MOV IP, # 00001100 B. Discuss the default sequence and sequence of interrupts that are serviced.	**05**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Calculate the address range of: (i) 40 × 2 LCD (ii) 16 × 2 LCD	**05**	**L2**	**CO5**
	b.	Draw the interfacing circuit of DAC 0808 with 8051 microcontroller. Write a program to generate sinewave. Assume 30° interval between each steps. Show the look-up table calculations	**10**	**L4**	**CO5**
	c.	Draw the control word format of 8255A programmable peripheral IC. What is the control word if all the ports are output ports?	**05**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain the construction and working of stepper motor. Define step angle and steps per revolution.	**10**	**L2**	**CO5**
	b.	Write a program to rotate stepper motor 68° clock wise. Assume step angle = 2°. Use 4 step sequence.	**05**	**L3**	**CO5**
	c.	What is an optoisolator? Draw the interfacing circuit of optoisolater with 8051 microcontroller.	**05**	**L1**	**CO5**

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