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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E.
Branch: Computer Science and Engineering
Course Code: 19CS3ESMMC
Course: Microprocessors and Microcontrollers

Semester: III
Duration: 3 hrs.
Max Marks: 100

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

<table>
<tr><td rowspan="12" style="writing-mode:vertical">Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.</td><td colspan="3" style="text-align:center">UNIT - I</td><td><i>CO</i></td><td><i>PO</i></td><td>Marks</td></tr>
<tr><td>1</td><td>a)</td><td>Identify and explain the Destination Addressing modes for the following
Instructions.
i) SUB AX,0FFh
ii) MOV [BX]+0400h, CX
iii) ADD [DI], AX
iv) MOV [1000h], SI
v) MOV [BX][DI]+0400H, AL
vi) MOV 500h[SI], BX</td><td><i>2</i></td><td><i>2</i></td><td>6</td></tr>
<tr><td></td><td>b)</td><td>Calculate the physical address generated by the following instructions given that:
DS= 1000h   SS=2000h   DI =0100h   BX=4050h   SI=0200h
i) MOV AL, [234fh]
ii) MOV [BX][DI], CL
iii) MOV AX, [SI]</td><td><i>1</i></td><td><i>1</i></td><td>6</td></tr>
<tr><td></td><td>c)</td><td>Write an assembly language program in 8086 microprocessor to find average of N-eight bit numbers.</td><td><i>1</i></td><td><i>1</i></td><td>8</td></tr>
<tr><td colspan="3" style="text-align:center">OR</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>a)</td><td>With a neat diagram, explain the architecture of 8086 microprocessor.</td><td><i>1</i></td><td><i>1</i></td><td>10</td></tr>
<tr><td></td><td>b)</td><td>Discuss the various addressing modes supported by 8086 microprocessor with an example for each.</td><td><i>1</i></td><td><i>1</i></td><td>10</td></tr>
<tr><td colspan="3" style="text-align:center">UNIT - II</td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>a)</td><td>Calculate the machine code for the following instructions.
Assume the opcode for MOV is 100010.
   (i)   MOV AX, BX
   (ii)   MOV AX, 1234H[SI]</td><td><i>1</i></td><td><i>1</i></td><td>6</td></tr>
</table>

	b)	Write a program to generate a delay of 100 ms using an 8086 system that runs on 10 MHz frequency.	*1*	*1*	**8**
	c)	Demonstrate with a neat diagram the structure of Interrupt Vector Table.	*1*	*1*	**6**
		OR			
4	a)	Write a delay routine to generate the delay of 100 ms for 8086 microprocessor that operates at 5 MHz frequency.	*1*	*1*	**6**
	b)	Compute the contents of destination register after the execution of the following instruction. Also mention the effect on flags after execution of these instructions. i) ROL AX,CX if AX=0842h CX=0002h ii) ROR AX,CX if AX=0842h CX=0002h iii) SHR AX,CX if AX=0842h CX=0002h iv) SAR AX,CX if AX=0842h CX=0002h	*1*	*1*	**8**
	c)	Write an 8086 assemble level language program to check whether given string is palindrome or not	*1*	*1*	**6**
		UNIT - III			
5	a)	Describe the functionality of the following pins of 8086 microprocessor operating in minimum mode i) INTR ii) HOLD iii) M/$\overline{\text{IO}}$ iv) $\overline{\text{TEST}}$	*1*	*1*	**6**
	b)	Analyze each bit of the control word given below designed for 8255 and specify the operation mode of PORT A, PORT B, PORT C UPPER and PORT C LOWER. Also specify whether it is operating in I/O mode or BSR mode. | **1** | **0** | **1** | **1** | **0** | **1** | **0** | **1** |	*2*	*2*	**4**
	c)	Interface an 8255 with 8086 to work as an I/O port. Initialize port A as output port, port B as an input port and port C as output port. Port A address should be 0740 H. write a program to sense switch positions SW0 – SW7 connected at port B. the sensed pattern is to be displayed on port A, to which 8 LEDS are connected, while the PORT C lower displays number of on switches out of the total 8 switches.	*2*	*2*	**10**
		OR			
6	a)	Design a timing diagram for Memory Read Cycle. Explain the same.	*3*	*3*	**8**
	b)	Describe the functionality of the pins used in maximum mode of operation of 8086.	*1*	*1*	**6**
	c)	Explain the usage of Input control signals in Mode 1 of operation of 8086.	*1*	*1*	**6**

			UNIT - IV			
7	a)		Describe the internal RAM organization of 8051 microcontroller with a neat diagram.	*1*	*1*	**5**
	b)		Based on features supported, compare Microprocessor and Microcontroller.	*1*	*1*	**5**
	c)		Apply different addressing mode supported by 8051 Microcontroller to put the number 8DH in RAM locations 30H to 34H.	*1*	*1*	**10**
			OR			
8	a)		Based on the functionality provided by ports of 8051 Microcontroller, differentiate among Port0, Port1, Port2 and Port3	*1*	*1*	**10**
	b)		Design a code snippet for 8051 Microcontroller to swap the content of register R7 and R6 in register bank 0 using • Register Addressing Mode • Using Exchange instruction	*1*	*1*	**10**
			UNIT - V			
9	a)		Design a program for 8051 Microcontroller to interface seven segment and display number "1234" with flashing effect.	*3*	*3*	**8**
	b)		Develop a 8051 Microcontroller program to Swap every even numbered bit of register R3 in Bank 0 with Odd numbers bit to its left . Swap bit 0 with bit1, bit 2 with bit 3 until bit 6 is swapped with bit 7.	*3*	*3*	**6**
	c)		Explain the following byte level logical operations in 8051 microcontroller: (i) ORL A, @R1 (ii) ANL R0, A (iii) XRL A, #12h	*1*	*1*	**6**
			OR			
10	a)		Design a microcontroller interfacing with stepper motor to rotate the motor in clockwise and anticlockwise direction.	*3*	*3*	**10**
	b)		Write the code snippet for 8051 microcontroller to perform the following task i) Double the number in register R2 and put the result in registers R3(High byte)and R4(Low byte). Find a number that when XORed to the register, results in the number 3F in A. ii) Exchange both low nibbles of reg R0 and R1; Put the low nibble of R0 in R1 and low nibble of R1 in R0	*3*	*3*	**10**

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