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B.E. (Full Time) DEGREE END SEMESTER EXAMINATIONS, MAY 2013

ELECTRICAL & ELECTRONICS ENGINEERING
Fourth Semester

EE 9252 Microprocessors and Microcontroller
(Regulation 2008)

Time : 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. State the purpose for the µP signal: 'Ready' ?
2. What is the benefit of employing 6-byte long 'instruction queue' in µP 8086?
3. When DS contains 2000h and SI contains 0123h, evaluate the physical address of the source operand referred by the µP 8086 instruction: MOV AL, 45h[SI] .
4. Distinguish between the 'PUSH PSW' instruction of µP 8085 with the same instruction of µC 8051 ?
5. How would you know if the recently received byte of data had the correct STOP bit, in USART8251?How would you know it in the case of 8051 based serial communication?
6. Write a program to generate a square wave of 50% duty cycle and frequency of 10Hz, at the pin P1.2 of µC 8051? Assume that there is a suitable delay subroutine available.
7. Find the value of 'Overflow flag(OV)', after ADD A,R0 instruction is executed, following each set of values for A & R0 : (78h, 0Fh) , (78h, 02h) and (81h, 80h).
8. When is it necessary to use ICW3 in the 8259 initialization?
9. List the interrupts available in µP 8085? Specify the vector location for anyone of them. Also list the interrupts available in µC 8051? Specify their vector location.
10. Name the following ICs and state their role in a µP based system: 74244 and 74373 ?

Part – B (5 x 16 = 80 marks)

11. Along with a neat sketch of the architecture/ functional block diagram, describe the salient features of the microprocessor µP 8085 or microcontroller µC 8051 ?

12. a) i) Show how would you interface a 4Kbyte EPROM and a 2Kbyte RAM to 8085. The memory map required is: 4K EPROM → A000h to AFFFh and 2K RAM → 8000h to 87FFh. You are permitted to use one 74138 IC, apart from one 7404 and one 7432.
ii) Draw the timing diagram showing fetching and complete execution of the µP 8085 instruction STA 789AH. Assume that this instruction is fetched from memory location 5432h. (8 + 8)

OR

b) i) Write an assembly language program using µP 8085 for conversion of a given single byte number to its equivalent unpacked BCD number. Write and use a subroutine for division by 'repeated subtraction' for finding the number of hundreds and tens.
ii) Write an assembly language program using µC 8051 for performing multiplication and division of given two 8-bit numbers. Use MUL AB and DIV AB instructions respectively, after describing their operation. (8 + 8)

13. a) i) Along with internal block diagram and relevant mode/ command/ status word formats, describe the salient features of 8251 – Universal Synchronous Asynchronous Receiver Transmitter.
ii) Compare these features with those UART features available in serial communication/ mode1 of µC 8051. Also write a program for transmitting continuously, the 8-bit number input through DIP switches connected to Port-1.
(8 + 8)

OR

b) i) Correct the mistake in the following delay subroutine of µP 8085. After correcting the program by adding required additional instructions, evaluate approximately the count required to obtain a time delay of 5 msec. Assume a µP clock frequency of 3 MHz.

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Delay :    LXI B, 16-bit count
Repeat :   DCX B
           JNZ Repeat
           RET.
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ii) Rewrite the delay subroutine for the generating the time delay of 5 msec, using the programmable interval timer 8253/ 8254 in mode-0. Use Counter-0 in BCD count mode. Assume a timer clock of 1 MHz and use 'Latch on count' feature.
iii) Using µC 8051 assembly language, write a time delay subroutine, which generates a delay of 5 msec. Use one of its internal timers in any suitable mode. Assume the crystal frequency to be 12 MHz. (5 + 5 + 6)

14. a) i) A thumb wheel switch is connected as the input device, and two number of 7-segment LEDs connected through 7447 decoders form the output device. Both these are interfaced to µP 8085 through 8255 PPI. Assume suitable port connection. 8255 PPI itself is required to be connected following memory mapped I/O with address range of F000- F003H. Draw the hardware connections. Also write a program which reads in the BCD input from thumb wheel switch and displays the value of its square at the 7-segment displays?
ii) Same external hardware is now connected to a µC 8051; thumbwheel switch to port -1 and 7447 decoder ICs to the port-2. Write a program in µC 8051 assembly language, to perform the same task? (10 + 6)

OR

b) A room's temperature is to be maintained in the range 10^{o}C to 35^{o}C, by switching ON a fan in case of temperature exceeding 35^{o}C and by switching ON a heater in case of temperature going below 10^{o}C. Draw the necessary hardware and give required 8085 program for achieving this objective. Assume LM 135 temperature sensor, connected to µP 8085 through 8255 PPI and ADC 0801-? Employ BSR mode for the necessary control bits, by choosing Port C pin connections suitably.

15. a) Along with relevant external hardware, internal block diagram and relevant control word formats, explain how keypad and displays have been interfaced to µP 8085 using 8279 in the µP kits. Also write a program segment which would display the messages '8085' and 'ISa uP' alternately (using the address and data fields of the µP kit display).

OR

b) Along with the machine cross-sectional diagram, explain how a variable reluctance type stepper motor can be controlled in 'Single phase ON mode' and 'Two phase ON mode'. You might use the port-1 of µC 8051, or alternately you might consider µP 8085 along with 8255 for sending the bit patterns. Assuming that stepper motor is available with a step angle of 2 degrees, write a program using 8085 or 8051 assembly language for deflecting the stepper motor shaft by 30 degrees. Assume half-step mode.