Question Paper

Exam Date & Time: 07-Jun-2019 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIECES
IV SEMESTER B.Sc. (APPLIED SCIENCES) IN ENGINEERING
END SEMESTER THEORY EXAMINATION-APRIL/MAY 2019
MICROCONTROLLER AND APPLICATIONS [IMET 241]

Marks: 100 **Duration: 180 mins.**

Answer 5 out of 8 questions.

Missing data, if any, may be suitably assumed.

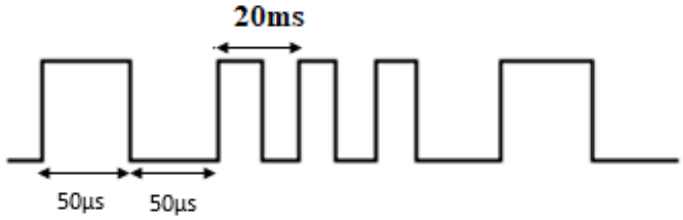
1)	A)	Discuss the need for stack memory in microcontroller. Interpret the operation of stack in 8051 microcontroller? What is the default location of stack?	(6)
	B)	Outline the complete architecture of 8051 micro controller with a neat block diagram and explanation.	(8)
	C)	Transfer the content of memory address 41H serially (one bit at a time) via pin P2.1. Put two highs at the start and end of the data. Send the byte LSB first.	(6)
2)	A)	With the help of suitable examples summarize the different assembler directives used in an assembly language programming.	(8)
	B)	In an 8051 microcontroller based temperature monitoring system, temperature sensor is connected to 8051 microcontroller and is calibrated to test it for the value 75. Create an ALP to test the results and place the temperature value into the registers indicated by the following. a) If T = 75then A = 75 b) If T < 75then R1 = T c) If T > 75then R2 = T	(6)
	C)	Consider the internal crystal frequency of a system to be 11.0592MHz , deduct the baud rate for the following cases with SMOD=0 and SMOD=1: a) TH1=-3 b) TH1=-12 c) TH1=-24	(6)
3)	A)	Develop an assembly language program that performs addition of two 32bit numbers stored in location starting from 40H and 50H respectively, 40H and 50H containing the MSB bits, and store the result in memory address	(8)

staring from 60h, Where 60H holds the MSB bit of the result.

B) Illustrate on the following instruction mentioning their addressing mode and byte size with proper examples. (6)
a) XCHD A,@R0
b) MOVC A,@A+DPTR
c) DA A

C) Construct an 8051 embedded C program that continuously gets a single bit of data from P1.7 and sends to P1.0, while simultaneously creating a square wave of 200µs period on P1.2. Use timer 0 to create a square wave. Assume that XTAL = 11.0592 MHz (6)

4) A) With the help of a diagram, outline the interface between 8051 microcontroller and DAC, also make use of assembly language program to generate the waveform depicted in the figure below at p1.5. (8)



B) Discuss on the output obtained in the following example with respect to DA A command. (4)

A). MOV A,#53H
MOV R1,#58H
ADD A,R1
DA A
B).MOV A,#23H
MOV R1,#55H
ADD A,R1
DA A

C) Assume that XTAL = 11.0592 MHz for the following program, state (8)
(a) The outcome of each command and finally the outcome of the program
(b) Compute the frequency used by timer 1 to set the baud rate, and
(c) Find the baud rate of the data transfer.

```
MOV  A,PCON
MOV  ACC.7
MOV  PCON,A
MOV  TMOD,#20H
MOV  TH1,-3
MOV  SCON,#50H
```

```
SETB TR1
MOV  A,#"B"
A_1:   CLR  TI
MOV  SBUF,A
H_1:   JNB  TI,H_1
SJMP A_1
```

5) A) Explain the need for MAX232 line driver for connecting RS232 to 8051. Show the interface of RS232 with 8051 using MAX232. (6)

B) Develop an embedded C program to send two messages "Normal Speed" and "High speed" to serial port. Assuming that SW is connected to P2.0, monitor its status and set the baud rate as following. (8)
SW = 0, 28,800 baud rate
SW = 1, 56K baud rate
Assume that XTAL = 11.0592 MHz for both cases.

C) With regards to interrupts of 8051, (6)
a) Give the vector addresses of interrupt
b) Indicate the default priority on reset and procedure to alter default priority
c) Difference with respect to polling

6) A) Assume that 1Hz external clock is being fed into pin T0 (P3.4). Develop an embedded C program for counter 0 in mode 2 to display the count by converting binary input in ASCII. Display the ASCII digits on P0, P1 and P2 where P0 has the least significant digits. (8)

B) Summarise the output of the following programs. (6)

a)
```
MOV R1, #10H
MOV R2, # 15 H
MOV R0, #00H
CLR C
CLR A
LOC_1: ADD A, R1
JC LOC_2
DJNZ R2 LOC_1
SJMP STOP
LOC_2: INC R0
STOP: SJMP STOP
```

b)
```
MOV R6, #25H
MOV R1, #12H
MOV R4, #0F3H
PUSH 6
PUSH 1
POP 6
POP 1
POP 4
```

C) A 24 bit number stored in internal memory location starting from 55H is to be shifted left logically four places. Assume that the least significant byte of data is stored in lower address. Develop an assembly language program for the same. (6)

7) Explain with proper examples different type of jump instructions in 8051 microcontroller. (6)

A)

B) Highlight the significance of Data transmission equipment and Data communication equipment in data communication and also depict the functionality of DB-9 pin connector. (6)

C) The data pins of LCD are connected to P1.The information is latched into LCD whenever its enable pin goes from high to low. Synthesis an 8051 C program to send" YOUR NAME "to this LCD. (8)

8) Two switches are connected to pin P3.2 and P3.3. When a switch is pressed, the corresponding line goes low. Make use of assembly language to program the given conditions using internal interrupts. (8)

A)

a) Light all LEDs connected to port 0, if the first switch is pressed.
b) Light all LEDs connected to port 2, if the second switch is pressed.

B) Assume that XTAL = 11.0592 MHz, Illustrate the value we need to load the timer's register if we want to have a time delay of 5 milliseconds? Show the program in assembly language for timer 0 to create a pulse width of 5 ms on P2.3. (8)

C) The interrupt priority register is set with the instruction MOV IP, #00001101B. Deduct the sequence in which the interrupts are serviced. Consider initial condition to be reset. (4)

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