

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), April-May 2015

M. Tech in Electronics and Communication Engineering, Semester II



Roll No.....

MTECH 205: ELECTRONIC SYSTEM DESIGN

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	The main difference between microprocessor based systems and embedded processor based systems is the amount of support logic needed for microprocessor based systems. (True / False)	
ii.	A device driver is a (a) hardware (b) software (c) an input device (d) an output device.	
iii.	A context of a program includes program counter as well as (a) the program status word (b) stack pointer (c) processor registers (d) all of them.	
iv.	A superscalar processor has (a) multiple functional units (b) a high clock speed (c) a large amount of RAM (d) many I/O ports	
v.	What is the address range of SFR Register bank? a) 00h-77h b) 40h-80h c) 80h-7Fh d) 80h-FFh	
vi.	After reset, SP register is initialized to address _____. (a) 08h (b) 09h (c) 07h (d) 06h	
vii.	A task of an RTOS is a program that also has an infinite loop and starts only on a signal or action from OS. (True / False)	
viii.	In 89C51RD2 the Expanded RAM (XRAM) is available as _____ memory. (a) On-chip (b) Off-Chip (c) Both (d) None of these.	
ix.	The RTX51 Tiny has _____ tasks. (a) 32 (b) 16 (c) 64 (d) 256	
x.	In pre-emptive scheduling technique the low priority task will be executed first. (True / False)	

Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i.	Which of the following is a real time embedded system? Justify each case (a) A Microwave Oven (b) Automatic Teller Machine (ATM) (c) A Disk drive (d) An LCD TV	
ii.	Does 8051 make use of Harvard Architecture efficiently? Justify.	
iii.	A 16-bit auto-reload timer is loaded with an initial value of 511d. The timer receives its clock input from a clock source of 12 MHz after pre-scaling it by 32. What will be the overflow period or timeout of the timer?	

- iv. In an 8051 microcontroller R0 contains 7Fh (01111111B). Internal RAM locations 7Eh and 7Fh contain 00h and 40h, respectively. When the following instruction sequence is executed what will be the contents of R0, 7Eh and 7Fh?

DEC @R0
DEC R0
DEC @R0

Q.3A What do you understand by an embedded system? List at least four characteristics of a real-time system in an embedded system (give a very brief description, max. one line for each). 05

Q.3B Discuss any five addressing modes of 8051 microcontroller in brief with examples. 05

Q.4A A delay subroutine is shown below for an 8051 operating at a frequency of 12 MHz. Calculate the total delay. 05

Machine Cycle (MC)

DELAY:	MOV	R6, #250	1
L1:	MOV	R7, #200	1
L2:	NOP		1
	DJNZ	R7, L2	2
	DJNZ	R6, L1	2
	RET		2

Q.4B Write 8051 assembly codes to push registers R2, R4 and R6 of bank 0 on to the stack and pop them back into registers R1, R3, R5 respectively in bank 2. 05

Q.5A If the clock frequency of a generic 8051 is 6 MHz, compute the execution times for each of the following instructions given in the table below: 05

Instruction	No. of Machine Cycle	Execution Time
MOV R0, #07H	1	?
MOV A, R1	1	?
DJNZ R1, Label	2	?
RET	2	?
JNC START	2	?

Q.5B For an 8051 timer the details of the registers are shown below, indicate the bit details that will be loaded in the registers to configure Timer 0 in Mode 1 and Timer 1 in Mode 3. What value will be loaded in Timer 0 to generate a pulse of 20 msec? 05

Add	Bit 7	6	5	4	3	2	1	Bit 0	Name
88h	TF1	TR1	TF0	TR0	IE1	IT1	IE0	IT0	TCON
89h	GATE1	C/T1#	M11	M01	GATE0	C/T0#	M10	M00	TMOD
8Ah									TL0
8Ch									TH0
8Bh									TL1
8Dh									TH1

- Q.6A A 50% duty cycle square wave is generated by an 8-bit timer of 8051 with clock frequency of 33 MHz. Find the lowest and highest frequencies it can generate. 05
- Q.6B Write an assembly language program for the 8051 microcontroller, to transfer 5 bytes stored in the internal memory from address 40h onwards to the address 30h onwards. (**Hint:** use Indirect addressing) 05

OR

- Q.6B Assuming for an 8051 the value of XTAL = 11.0592 MHz, indicate when the TF0 flag is raised for the following program. 05

```
MOV    TMOD, 01h      ; 16-bit timer
MOV    TL0, 12h
MOV    TH0, 1Ch
SETB   TR0
```



- Q.7A Discuss the methods of synchronizing the software with the hardware (i.e. I/O devices) in brief. 05

- Q.7B Discuss the round-robin scheduling method for RTX51 Tiny RTOS with an example. 05

OR

- Q.7B Discuss the co-operative scheduling method for RTX51 Tiny RTOS with an example. 05

- Q.8A Show the calculations and also indicate the bits to be programmed in the table below for an 89C51RD2@16 MHz microcontroller to be configured to ensure that it generates a baud rate of 12.21 Kbps using Timer 1. Verify your calculations when the baud rate is calculated using the internal baud rate generator. 10

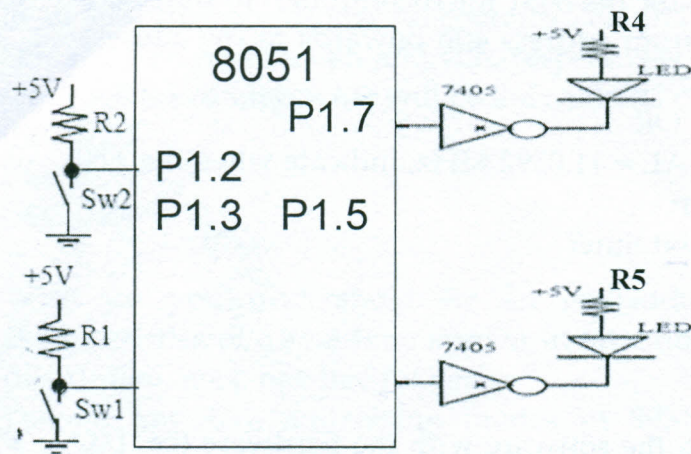
Add	Bit 7	6	5	4	3	2	1	Bit 0	Name
98h	FE/SMO	SM1	SM2	REN	TB8	RB8	TI	RI	SCON
99h									SBUF
87h	SMOD1	SMOD0	-	POF	GF1	GF0	PD	IDL	PCON
9Bh	-	-	-	BRR	TBCK	RBCK	SPD	SRC	BDRCON
9Ah									BRL

- Q.9A Discuss the task states of an RTX51 Tiny real-time operating system (RTOS) by indicating each task states and their transitions. 10

- Q.9B Two LEDs and two switches are attached to Port 1 of an 8051 controller as shown below. The other 4 bits of Port 1 are used for other unrelated tasks. 10

Note: when the switch is pushed the input becomes 0.

Devise your logic and write pseudo codes (like READ, IF, ELSE, AND, OR etc.) that **continuously** reads the two inputs. After reading the value of the two switches you should turn on both LEDs if either switch is pressed or turn off both LEDs if both switches are not pressed.



OR

- Q.9B You have been asked to design an "Electronic Voting Machine System" to be used in elections. The system will have additional facility to webcast the voting process live to a central station using Wi-Fi/3G connection. 10
- Requirement analysis
 - List the specifications of the system
 - Show the architectural block diagram of the system
 - Show the hardware block diagram of the system.

***** ALL THE BEST *****