INDIAN INSTITUTE OF TECHNOLOGY

DATE: **FN/AN** **Time: 3 Hrs** **Full Marks:100** **No. of students:**

Spring Semester, 2011 Deptt: Electronics & Elec. Comm. Engg. **Sub. No.: EC31006**

3rd Year B.Tech(H) **Sub. Name: Microcontroller and Embedded Systems**

Instruction: Attempt all questions.

Q1. Assuming crystal frequency of 20MHz, write a program in the assembly language of 8051 to generate a square wave of 10 KHz with 75% duty cycle on Port bit P1.1. [10]

Q2. Suppose we need to communicate between 8051 and a computer via serial port. Assume that the serial port of the computer is compatible with RS-232C interface. Show the circuit diagram. Write the program to use the serial interrupt in 8051 to transmit and receive bytes. Upon receiving a byte, it should store the value at RAM location 50H and send the character 'A' to acknowledge. [12]

Q3. It is needed to interface 16KB external program memory (ROM) and 16KB external data memory (RAM) with the 8051 chip. Draw the interface diagram. What is the difference between MOVC and MOVX instructions? [4+2]

Q4. (a) Define a process. [2]
(b) Mention the essential contents of PCB. [2]
(c) Distinguish between (i) process and thread, (ii) user-mode and kernel mode, (iii) system call and library routine. [6]

Q5. Consider the following snapshot of a system. Using Banker's algorithm, explain whether the system is in a SAFE state or not. Whether a request of P1 for (0,4,2,0) be granted immediately? [5+5]

	Allocation				Maximum requirement				Available
	A	B	C	D	A	B	C	D	A B C D
P0	0	0	1	2	0	0	1	2	1 5 2 0
P1	1	0	0	0	1	7	5	0	
P2	1	3	5	4	2	3	5	6	
P3	0	6	3	2	0	6	5	2	
P4	0	0	1	4	0	6	5	6	

Q6. For the following page reference stream, identify the number of page faults in FIFO, LRU and Optimal replacement policies, assuming 3 memory frames in each case. [12]

1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 5, 4, 5, 4, 2