Question Paper

Exam Date & Time: 04-Dec-2023 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, NOV/DEC 2023

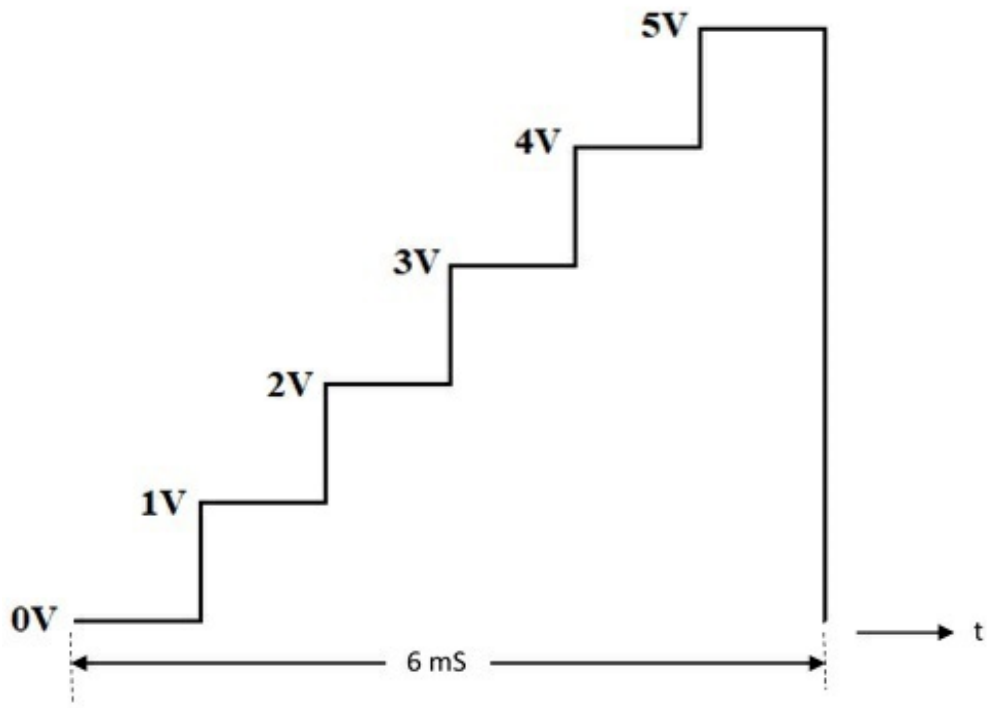
MICROCONTROLLER BASED SYSTEMS [BME 3154]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

Missing data may be suitably assumed

1)		What are the applications of the 8051 register PSW? Explain in detail.	(4)
	A)		
	B)	How do you make use of the 8051 Timer, Timer-0 to count external pulses by controlling the timer by $\overline{INT0}$ input? Illustrate.	(3)
	C)	How do you make use of the 8051 microcontroller as a serial shift register? Illustrate.	(3)
2)		How do you increase driving capability of the address and data bus of the 8051 microcontroller? Explain in detail.	(4)
	A)		
	B)	Develop a subroutine for the 8051 microcontroller to convert a 2-digit hexadecimal number available in the external memory in to BCD equivalent.	(3)
	C)	Develop an embedded-C program for the 8051 microcontroller to transfer 50 bytes available in the internal data memory to external data memory.	(3)
3)		Design a DAC interface to the 8051 microcontroller to generate the waveform as shown below.	(4)
	A)		



	B)	Design an 8255 PPI interface to the 8051 microcontroller to expand the I/O ports of the microcontroller. Draw the interface diagram and allocate address to the interfaced ports.	(3)
	C)	How do you expand hardware interrupt in to 8 interrupts using polling technique? Explain.	(3)
4)		Design an 8051 system to acquire an analog signal of maximum frequency 500 Hz and an amplitude of 0-5V. Draw the diagram of the designed system and write an assembly language program to take 50 samples every second, adhering to the Nyquist criterion.	(5)
	A)		
	B)	For the system developed in Q No. 3B, write a program using the 8051 instructions to reset the PC5 bit.	(3)
	C)	Develop PUSH operation of the ARM Cortex-M3 microcontroller by making use of multiple Load-store instruction and register R8, such that the implemented stack is full-descending stack.	(2)
5)		Design a product counter using the 8051 microcontroller and three 7-segnment display, and explain the system.	(4)
	A)		
	B)	An ECG data acquisition system requires time-stamp to keep track of arrhythmia episodes. Give a microcontroller based solution to provide the required time-stamp. Write all design specifications and drawings.	(4)
	C)	Convince that ARM Cortex-M3 microcontroller architecture is superior compared to that of the 8051 architecture.	(2)

-----End-----