

16 - BIT MICROCONTROLLER / ADVANCED MICROCONTROLLERS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	MSP430 is mainly used for (i) Gaming (ii) High-speed computing (iii) Low-power embedded systems (iv) Graphics processing	K1	CO1
	2	During interrupt handling, which operation occurs first? (i) ISR execution (ii) Reset (iii) Current instruction completion and context saving (iv) Stack clearing	K2	CO1
2	3	Which clock source in MSP430 is internally generated? (i) LFXT1 (ii) XT2 (iii) DCO (iv) VLO	K1	CO2
	4	Debugging clock issues mainly involves checking: (i) Memory size (ii) Clock stability and configuration (iii) Register width (iv) Stack pointer	K2	CO2
3	5	MSP430 flash memory is: (i) Volatile (ii) Non-volatile (iii) Cache memory (iv) Temporary memory	K1	CO3
	6	Power consumption depends on: (i) Clock frequency (ii) Supply voltage (iii) Active peripherals (iv) All of the above	K2	CO3
4	7	Which register controls direction of I/O pins? (i) PxIN (ii) PxOUT (iii) PxDIR (iv) PxSEL	K1	CO4
	8	Reset in MSP430 is used to: (i) Start ADC (ii) Initialize system (iii) Stop timer (iv) Enable interrupts	K2	CO4
5	9	Which of the following does NOT require a clock signal? (i) SPI (ii) I ² C (iii) UART (iv) USCI	K1	CO5
	10	MOSI stands for: (i) Master Output Slave Input (ii) Master Output Serial Input (iii) Memory Output Serial Input (iv) Master Operation Serial Interface	K2	CO5

Cont...

SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the role of registers (PC, SP, SR) in MSP430 CPU operation.	K2	CO1
		(OR)		
	11.b.	Illustrate the memory structure of MSP430 and analyze how RAM, ROM, and peripherals are organized.		
2	12.a.	Summarize the role of ACLK, SMCLK, and MCLK in MSP430.	K3	CO2
		(OR)		
	12.b.	Assess the function of Watchdog Timer in embedded systems.		
3	13.a.	Discuss low power modes in MSP430.	K3	CO3
		(OR)		
	13.b.	Illustrate how flash memory is programmed and erased?		
4	14.a.	Explain the various features of MSP430 I/O ports.	K4	CO4
		(OR)		
	14.b.	Analyze the advantages of hardware multiplier in MSP430.		
5	15.a.	Classify the communication peripherals available in MSP430.	K4	CO5
		(OR)		
	15.b.	Explain the role of I ² C bus in communication.		

SECTION - C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Draw and explain the architecture of MSP430 in terms of power efficiency and performance compared to other microcontrollers.	K2	CO1
2	17	Analyze the MSP430 clock system in detail, including crystal oscillator, DCO, and high-frequency clocks.	K3	CO2
3	18	Develop a strategy to optimize low power consumption in MSP430 using battery-powered temperature monitoring system.	K5	CO3
4	19	Design a system that reads sensor data using ADC and displays it on LCD.	K6	CO4
5	20	Design a system that reads sensor data using UART in detail with block diagram and frame structure.	K6	CO5