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ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APR / MAY 2025

ELECTRONICS AND COMMUNICATION ENGINEERING
Semester VII
EC5071 & ADVANCED MICROCONTROLLERS
(Regulation2019)

Time:3hrs   Max.Marks: 100

CO1	Ability to discriminate RISC and CISC processors, and work with PIC microcontrollers.
CO2	Ability to work with the 16-bit microcontroller RL78 and design microcontroller based systems for a real-world application.
CO3	Gaining design knowledge and concepts on the MSP430 family of microcontrollers.
CO4	Ability to design real time systems by deploy the Interfacing peripherals.
CO5	Ability to design and develop microcontroller based smart electronic systems and home appliances.

BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)
(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Explain the function of the WDT (Watchdog Timer) in PIC18FXX microcontrollers	2	1	2
2	Calculate the baud rate error when the Fosc = 16MHz and desired baud rate = 9600 at BRGH = 1 high speed. Assume SYNC = 0	2	1	3
3	How does the RL78 microcontroller achieve low power consumption?	2	2	2
4	Write a program using the register indirect addressing.	2	2	4
5	What are the two types of memory technologies used in MSP430 for non-volatile storage?	2	3	1
6	What is the main advantage of using FRAM over Flash in MSP430?	2	3	1
7	What is the function of an RTC in embedded systems	2	4	1
8	How does memory-mapped i/O differ from port-mapped I/O?	2	4	2
9	How many lines are used in I2C communication and what are they?	2	5	1
10	Name any two development tools used for MSP430 programming.	2	5	1

PART- B(5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	i) Explain the pin configuration of a PIC18F microcontroller with a neat diagram.	5	1	1
	ii) Explain the MSSP module for I2C mode operation in PIC18F8620 microcontroller	8	1	1
OR				
11 (b)	i) Discuss the Timer1 module of a 16-bit READ/WRITE mode of PIC18F with a block diagram	8	1	1
	ii) Explain the CCP module with the registers in a format.	5	1	1

Q.No.		Marks	CO	BL
12 (a)	Explain in detail about the architecture of the RL78/G23 16-bit microcontroller with a neat diagram	13	2	1
	OR			
12 (b)	With an example, explain the addressing for processing data addresses and the addressing for program addresses in RL78 microcontroller	13	2	4
13 (a)	Explain the architecture of the MSP430 microcontroller in detail. Include its main components, CPU registers, memory organization, and clock system.	13	3	5
	OR			
13 (b)	Discuss the memory technologies used in MSP430 (Flash and FRAM). Compare them in terms of speed, power, endurance, and reliability. Why is FRAM more suitable for low power embedded systems?	13	3	5
14 (a)	Explain how peripherals are interfaced and controlled in the MSP430 using memory-mapped I/O. Discuss GPIO programming with examples.	13	4	4
	OR			
14 (b)	Design and explain a remote control system for air conditioners or home appliances using MSP430. Include hardware, software, and power optimisation strategies	13	4	6
15 (a)	Compare synchronous and asynchronous communication. How are SPI and I2C protocols implemented in MSP430? Provide configuration steps and use cases.	13	5	4
	OR			
15 (b)	Discuss the architecture, features, and applications of the Zigbee wireless protocol. How is it used in home automation systems?	13	5	4

PART- C(1x 15=15Marks)
(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	i) .Design a Stepper motor using PIC18F microcontroller with rotation in clockwise and anticlockwise direction. Assume 1sec delay.	9	1	6
	ii) A door sensor is connected to the RB1 Pin, and a buzzer is connected to RC7. Write a C18 program to monitor the door sensor, and when it opens, sound the buzzer by sending a square wave of a few hundred Hz frequency to it.	6	2	6