B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

July 2023 Semester End Main Examinations

Programme: B.E.
Branch: Electronics and Instrumentation Engineering
Course Code: 19EI6PCESD
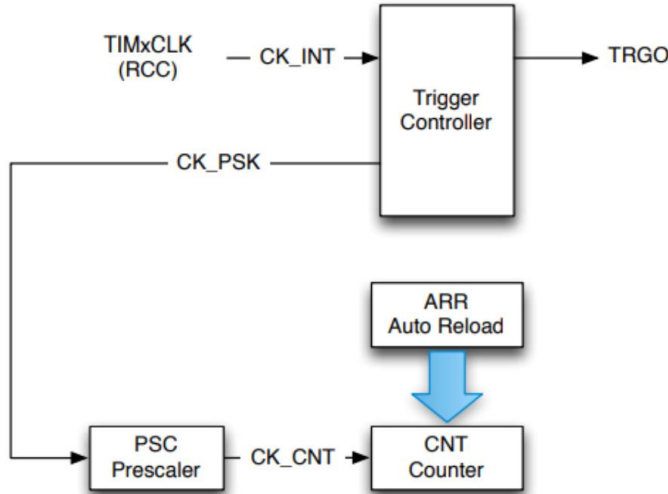Course: Embedded System Design

Semester: VI
Duration: 3 hrs.
Max Marks: 100
Date: 10.07.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	CO	PO	Marks
1	a)		Name the elements of a typical Embedded system and explain the block diagram of Embedded system showing their interconnections.	CO1	PO1	**07**
	b)		Illustrate Interfacing of a stepper motor through a driver circuit and microcontroller port lines to build an Embedded system for a controlling purpose.	CO2	PO2	**08**
	c)		Classify the program memory used in an Embedded System to store the program code based on its type.	CO2	PO2	**05**
			OR			
2	a)		Bring out the importance of throughput and response time as quality attributes of an Embedded system with an example for each.	CO2	PO2	**08**
	b)		Discus about the product development life cycle of an Embedded System with relevant diagram.	CO1	PO1	**08**
	c)		Elaborate on (i) Interrupt Latency (ii) Real time Issues for Embedded system design	CO2	PO2	**04**
			UNIT-II			
3	a)		The following diagram (Fig3 (a)) shows three stage pipelining in ARM Controller. Explain the concept of instruction pipelining. Fig-3(a)	CO2	PO2	**05**

				CO2	PO2	08
		b)	With the help of a block diagram, discuss about the on-chip peripherals and their interconnection with ARM CPU in a STM32 F1xx, Cortex M3 microcontroller	CO2	PO2	08
		c)	With the help of a diagram depicting the memory model of STM32 controller and illustrate memory mapped Input /Output operation of microcontroller	CO2	PO2	07
			OR			
	4	a)	What is an Interrupt Request (IRQ) Handler in an ARM based STM controller? How is it applicable to peripheral interrupt handling? Illustrate with an example	CO4	PO4	08
		b)	List the four sequences of operations and necessary software tools in execution of an Embedded 'C', program, while creating an application. Bring out the significance of a '.out' file.	CO5	PO4	06
		c)	Name the modes of operation of General-Purpose Input Output (GPIO) Ports in ST Microcontroller. Configure the registers and realize the operation of (i) Simple Input /Output mode (ii) Alternate function mode	CO3	PO3	06
			UNIT - III			
	5	a)	With the register level program, realize the working of serial data transmission using inbuilt USART in STM32F1xx microcontroller.	CO3	PO3	10
		b)	Identify the blocks associated with Timer operation and also write the program if the timer is having TMIxCLK as 48 MHz and Prescaler register and ARR values are 49999 and 3 respectively shown in fig 5b.	CO3	PO3	10

Fig 5b

			UNIT - IV			
	6	a)	With an Embedded 'C' program, implement the operation of GPIO programming in STM Controller to switch on LED connected port pin PC13 upon closing a switch connected to port pin PA5. Show the port connection diagram.	*CO3*	*PO3*	**08**
		b)	Differentiate Bluetooth from ZigBee protocol in terms of number of users, power consumption and data rate supported. Show that the protocols can be built using the underlying USART communication module of the ST microcontroller.	*CO2*	*PO2*	**07**
		c)	List five IRQs with their vector addresses in STM32F1xx controller? Implement the interrupts with priorities	*CO3*	*PO3*	**05**
			UNIT - V			
	7	a)	Explain the open architecture of Raspberry -Pi, as an example for ARM6 microprocessor.	*CO4*	*PO4*	**10**
		b)	How does RTOS help in handling timing constraints while multiple tasks are to be operated in an Embedded System? List the features provided by RTOS	*CO4*	*PO4*	**10**

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