U.S.N.										

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

Autonomous Institute Affiliated to VTU

August 2022 Semester End Main Examinations

Programme: B.E. **Semester: VI**
Branch: Electronics and Instrumentation Engineering **Duration: 3 hrs.**
Course Code: 19EI6PCESD **Max Marks: 100**
Course: EMBEDDED SYSTEM DESIGN **Date: 22.08.2022**

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

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1	a)	Define memory and explain classification of ROM with relevant diagram which is essential for building an Embedded system.	07
	b)	Explain the functions of Sensors and Actuators.	08
	c)	List any five characteristics of an Embedded System.	05

OR

2	a)	Explain Operational and Non-Operational quality attributes of Embedded System	08
	b)	Explain automatic Tea/Coffee vending machine with FSM model	08
	c)	Describe (i) Interrupt Latency (ii) Real time Issues for Embedded system design	04

UNIT - II

3	a)	Discuss the Memory organization of ARM Cortex based, STM32Fxxx microcontroller. Bring out the specific features of Flash memory and discuss Boot from Flash process in the microcontroller-	07
	b)	What is the difference between AHB and APB busses in the STM Microcontrollers? Explain in detail, how the various inbuilt modules get connected to Cortex -M3 Master, using the Bus Matrix	07
	c)	Explain the load/store instructions supported by the Cortex M3 based STM32Fxxx microcontroller.	06

OR

4	a)	Discuss the architectural features and peripherals inbuilt in ARM Cortex based STM32Fxxx microcontroller.	06
	b)	List the four sequences of operations and necessary software tools in execution of an Embedded 'C' program using the hardware, while creating an application. Bring out the significance of a '.out' file.	07

c) What do you mean by Alternate function mode of operation in General Purpose Input Output (GPIO) Ports in ST Microcontroller? With relevant configuration of registers, explain **07**
   (i) Simple Input /Output mode
   (ii) Alternate function mode

UNIT - III

5 a) Explain the working of USART in STM 32 controller. Write the programming steps to transmit the data from host controller to target for serial communication **10**

b) Why is the hardware delay generated by General Purpose Timers in ST Controller is more accurate than the software delay? How will Auto Reload Register (ARR) , Pre-scalar Register (PSR) and the Counter Register (CNTR) are used to program TIM6 in ST Controller for baud rate generation **10**

UNIT - IV

6 a) Differentiate Bluetooth from ZigBee protocol. Show that wireless communication protocols can be built using the underlying USART communication module of the ST microcontroller. **10**

b) What are Interrupt Request Handlers in STM Controllers? How do they help in building embedded system? Explain with an example **10**

UNIT - V

7 a) Explain the architecture of Raspberry -Pi, as an example for ARM6 based microprocessor. **10**

b) How does RTOS help in handling timing constraints while multiple tasks are to be operated in an Embedded System? Discuss the features provided by RTOS. **10**

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