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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E.
Branch: Electronics and Instrumentation Engineering
Course Code: 19EI6PCESD
Course: EMBEDDED SYSTEM DESIGN

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

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

1 a) Define embedded system. List four application area where you find Embedded Systems being deployed for smart functioning. **06**

 b) List four services provided by an embedded system and discuss about the basic elements necessary to build an embedded system. **07**

 c) Explain any two serial communication interfaces used for onboard communication in an Embedded controller. **07**

OR

2 a) Explain the working of sensors and actuators in an embedded system. How are they controlled using Embedded firmware? **06**

 b) With interfacing diagram explain the working of serial communication interfaces, I2C and SPI. **07**

 c) List the quality attributes of an Embedded System. How do they play a key role in evaluating the performance of systems? **07**

UNIT - II

3 a) With the help of a block diagram, explain the architecture of ARM Cortex – M3 CPU operated STM controller. **08**

 b) Differentiate Advanced High-Speed Bus (AHB) and Advanced Peripheral Bus (APB) used for connecting various peripherals inside the ST Microcontroller (STM32F0xxx) IC. How do they communicate with CPU within the microcontroller? **06**

 c) What are the registers available in ARM Cortex M3 based controller, STM32Fxxx? Illustrate load/store instruction supported with an example. **06**

OR

4 a) With the help of a diagram describe the memory organization of STM Controller based on ARM Cortex -M3 processor. **08**

b) Explain the working of Reset and Clock Circuit (RCC) for generation of different peripheral clock frequencies in Cortex-M3 based STM Controller. **06**

c) Discuss the bus structure and memory mapping in ARM Cortex-M3 based STM controller, with the help of a block schematic. **06**

UNIT - III

5 a) What are the modes of operation for GPIO programming in ARM Cortex-M3 based STM32Fxxx microcontroller? Explain Alternate Function Mode in detail. **07**

b) Explain the working of USART for asynchronous serial communication in ARM Cortex-M3 based STM32Fxxx controller. Provide the necessary steps for programming USART using standard peripheral library in an IDE. **07**

c) With necessary calculations, illustrate baud rate generation for USART communication using timer TIM6 of STM Controller. **06**

UNIT - IV

6 a) Explain the interrupt structure in ARM Cortex -M3 based-STM controller. Describe how interrupt priority mechanism is managed through the Nested Vectored Interrupt Controller (NVIC)? **10**

b) How does Real Time Operating System (RTOS) help in handling timing constraints when multithreaded programming is to be supported in a microcontroller? Discuss. **10**

UNIT - V

7 a) With the help of a block diagram, discuss the ARMv6 microprocessor architecture available in Raspberry-Pi **07**

b) Explain the GCC tool chain for generating .hex file, in program execution. **06**

c) With the help of Raspberry Pi block diagram, explain the concept of System on Chip (SoC). **07**

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