

# CBCS SCHEME

15EC62



Sixth Semester B.E. Degree Examination, July/August 2022

## ARM Microcontroller and Embedded Systems

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Explain the architecture of ARM Cortex M3 processor with the help of a neat block diagram. (10 Marks)  
b. Discuss the functions of R0 to R15 and other special registers in Cortex-M3, with register organization figure. (06 Marks)

OR

- 2 a. List the applications of ARM cortex M3 processor. (04 Marks)  
b. Explain the operation modes of cortex M3 with diagrams. (04 Marks)  
c. Explain ARM cortex M3 Program Status Register (PSR) format in detail. (08 Marks)

### Module-2

- 3 a. Explain the following instructions with example: ASR, LSR, ROR, RRX. (10 Marks)  
b. Write the memory map of cortex M3 and explain briefly bit band operations. (06 Marks)

OR

- 4 a. Explain the following 32-bit instructions in cortex M3 ADC, ORR, LDR, SDIV, STR, MRS, MSR, POP, (08 Marks)  
b. Explain any two methods of accessing memory mapped registers in C. (08 Marks)

### Module-3

- 5 a. Explain the components of typical embedded systems in detail. (08 Marks)  
b. Differentiate between computer system and an embedded system. (08 Marks)

OR

- 6 a. Differentiate between microcontroller and microprocessor. (06 Marks)  
b. Give the memory classification. Explain the SRAM cell. (10 Marks)

### Module-4

- 7 a. Explain the different characteristics of embedded system. (08 Marks)  
b. What is non-operational quality attribute? Explain the important non-operational quality attribute to be considered in any embedded system design. (08 Marks)

OR

- 8 a. What is Hardware and software co-design? Explain the fundamental design approaches in detail. (08 Marks)  
b. Differentiate: i) C-language vs embedded C ii) Compiler vs cross compiler. (08 Marks)

### Module-5

- 9 a. Explain multi processing, multitasking and multiprogramming. (10 Marks)  
b. Describe the RR (Round Robin) algorithm. Three processes with process 1DS P1, P2, P3 with estimated completion time 6, 4, 2 milliseconds respectively, enters the ready queue together in order P1, P2, P3. Calculate waiting time and Turn Around Time (TAT) for each process and the average waiting time and Turn Around Time in RR algorithm with Time slice = 2ms. (06 Marks)

OR

- 10 a. Explain Inter task communication process pipe, message queues and mailbox. (08 Marks)  
b. Explain the simulator and emulator. (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

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