



CBCS SCHEME

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15EC62

Sixth Semester B.E. Degree Examination, Jan./Feb. 2021 ARM Microcontroller and Embedded Systems

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Describe the functions of various units of the architecture of ARM Cortex M3 with neat block diagram. (07 Marks)
- b. Explain 3 special function registers of ARM Cortex M3. (06 Marks)
- c. State the applications of ARM Cortex M3. (03 Marks)

OR

- 2 a. Explain in detail the functions of registers $R_0 - R_{15}$ only of ARM Cortex M3. (04 Marks)
- b. Explain in detail the operating modes of ARM Cortex M3 with switching diagrams. (06 Marks)
- c. Describe the functions of exceptions with vector table and priorities. (06 Marks)

Module-2

- 3 a. Explain Briefly about the basic syntax and the use of suffixes in assembly language instructions of Cortex M3 processor. (04 Marks)
- b. Explain the following ARM Cortex M3 instructions with examples :
i) RSB ii) BIC iii) ASR iv) BFI v) SBFX vi) REVSH. (12 Marks)

OR

- 4 a. Construct and explain in detail the predefined memory map of Cortex M3. (12 Marks)
- b. Write an ALP to find the sum of first 10 integer numbers $1 + 2 + 3 + \dots + 10$. (04 Marks)

Module-3

- 5 a. Compare embedded system and general purpose computing system. (04 Marks)
- b. Explain the components of a typical embedded system in detail. (08 Marks)
- c. Give the various application areas of embedded system. (04 Marks)

OR

- 6 a. Explain the different types of memories used in embedded system design. (05 Marks)
- b. Explain in detail the SP2 communication interface with sequence of operation for communicating with slave device. (05 Marks)
- c. Explain the role of reset circuit and watch dog timer in embedded system. (06 Marks)

Module-4

- 7 a. Explain the characteristics of an embedded system. (05 Marks)
- b. What is operational quality attribute? Explain the important operational quality attributes to be considered in any embedded system design. (08 Marks)
- c. Explain the different communication buses used in automotive application. (03 Marks)



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OR

- 8 a. With FSM model, explain the design and operation of automatic seat belt warning system. (05 Marks)
b. Explain the different firmware design approaches in detail. (08 Marks)
c. Bring out the advantages of high level language based firm ware development. (03 Marks)

Module-5

- 9 a. What is a kernel? Mention the functions of real time kernel. (04 Marks)
b. What is pre-emptive scheduling? Three processes with process ID's P1, P2, P3 with estimated completion time 10, 5, 7 ms and priorities 1, 3, 2 (0- highest priority, 3 – lowest priority) respectively enters the ready queue together. A new process P4 with estimated completion time 6ms and priority 0 enters the ready queue after 5ms of start of execution of P1. Calculate the average waiting time and turnaround time. (07 Marks)
c. Explain the transition of process with state transition diagram. (05 Marks)

OR

- 10 a. Explain out of circuit and in system programming methods for integration of firmware with hardware. (08 Marks)
b. Explain simulator based debugging and ICE based target debugging techniques. (08 Marks)

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