

CBCS SCHEME

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20EVE13

First Semester M.Tech. Degree Examination, Feb./Mar. 2022

Advanced Embedded System

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Differentiate between:
 - (i) General purpose computing system and embedded system
 - (ii) SRAM and DRAM with figures (08 Marks)
- b. Describe the operation of optocoupler with a diagram. (06 Marks)
- c. Explain the six purposes of embedded system with an example for each. (06 Marks)

OR

- 2 a. Differentiate between:
 - (i) RISC and CISC architectures
 - (ii) Harvard and Von-Neumann architectures with diagrams. (08 Marks)
- b. Describe the operation of I²C (I2C) bus with a diagram along with the features of this bus, used for communication. (06 Marks)
- c. Explain the six operational quality attributes of an embedded system. (06 Marks)

Module-2

- 3 a. Compare DFG and CDFG with figures and an example. (04 Marks)
- b. Describe Tea/Coffee vending machine design with an FSM, for a given set of requirements. (06 Marks)
- c. Describe Embedded firmware design using assembly language programming. Mention the advantages and drawbacks of this method. (10 Marks)

OR

- 4 a. Differentiate between monitor program based firmware debugging and In-circuit emulator based target debugging with diagrams. (08 Marks)
- b. Describe out-of circuit programming and In-system programming methods for integration of hardware and firmware. (06 Marks)
- c. Write the sequential program model for seat belt warning system with a sequence of algorithm steps. (06 Marks)

Module-3

- 5 a. Explain four applications of ARM with an example for each and the features of ARM supporting the same. (04 Marks)
- b. With a block diagram, explain the functions of the various units of ARM CORTEX M3 processor. (08 Marks)
- c. Explain the reset sequence with two diagrams and PUSH and POP operations related with stack structure with an example. (08 Marks)

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.

OR

- 6 a. Describe the functions of general purpose and special registers in ARM CORTEX M3. (08 Marks)
- b. Explain the exceptions of ARM CORTEX M3 microcontroller with exception vectors and their operations. (08 Marks)
- c. What is Thumb-2 technology? How thumb mode differs from ARM mode and how switching happens from ARM to THUMB mode? (04 Marks)

Module-4

- 7 a. Explain the following 16 bit instructions with an example for each:
 (i) CMN (ii) EOR (iii) MVN (iv) SBC
 (v) BL (vi) LDR (vii) RSB (viii) TST (08 Marks)
- b. Describe SSAT and USAT instructions with diagrams. (06 Marks)
- c. Write the predefined memory map of ARM CORTEX M3 and explain memory access attributes. (06 Marks)

OR

- 8 a. Explain the following 32 bit instructions with an example for each:
 (i) ADD (ii) BIC (iii) CLZ (iv) MUL
 (v) STR (vi) LDM (vii) TBB (viii) MRS (08 Marks)
- b. Describe logical and arithmetic shift operations with diagrams in ARM Cortex M3. (05 Marks)
- c. Explain the three stage pipeline and the 5 buses which are used for interfacing in ARM Cortex M3 architecture. (07 Marks)

Module-5

- 9 a. Describe nested vector interrupt controller with diagrams and formats. (08 Marks)
- b. Explain SysTick timer with the required registers and its application. (07 Marks)
- c. Write an ALP to find sum of first 10 integer numbers. (05 Marks)

OR

- 10 a. With a flow diagram, explain ARM development tools. (05 Marks)
- b. Describe CMSIS structure and organization with the required diagrams. What are the benefits of CMSIS? (10 Marks)
- c. Write a C language program to switch ON or OFF an LED with required delay. (05 Marks)

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