CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

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 I^2C (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)**

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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