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15EC62

Sixth Semester B.E. Degree Examination, Aug./Sept. 2020 ARM Microcontroller and Embedded System

Time: 3 hrs.

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 neat block diagram. (08 Marks)
- b. Describe the memory map of Cortex-M3 with neat diagram. (04 Marks)
- c. List the applications of ARM processor. (04 Marks)

OR

- 2 a. Discuss the operating modes of cortex-M3 at different privilege levels. Depict the operating modes with state diagram. (06 Marks)
- b. Explain two stack model of cortex-M3 with diagrams. (04 Marks)
- c. Describe the special function registers of cortex-M3. (06 Marks)

Module-2

- 3 a. Explain the working of following instructions : i) LDMIA ii) BFC iii) SXTB. (06 Marks)
- b. Write on ALP to add two 64-bit numbers. (04 Marks)
- c. Explain any two methods of accessing memory mapped registers in C. (06 Marks)

OR

- 4 a. What is bit-band operations? With an example, explain assembler sequence to write a bit with and without bit-band. (06 Marks)
- b. Write a C language program to toggle an LED with a small delay in cortex M3. (05 Marks)
- c. Explain the working of TBB instruction. (05 Marks)

Module-3

- 5 a. Define the term RAM. Mention different types of RAM and explain any one with neat circuit diagram. (06 Marks)
- b. With a neat interfacing diagram explain the SPI bus. (06 Marks)
- c. Bring out differences between FPGA and CPLD. (04 Marks)

OR

- 6 a. Mention all the cores around which an embedded system is built. Discuss any two in detail. (08 Marks)
- b. Write a note on embedded firmware. (04 Marks)
- c. Explain the importance of brown out protection circuit with a neat diagram. (04 Marks)

Module-4

- 7 a. Discuss the 6 operation quality attributes of an embedded system. (06 Marks)
- b. With FSM model, explain the design and operation of automatic seat belt monitoring system. (06 Marks)
- c. Compare CDFG and DFG with an example. (04 Marks)



15EC62

OR

- 8 a. With a neat flow diagram, explain high level language to machine language conversion process. (05 Marks)
- b. With a block diagram, mention the components used in the design of a washing machine and also explain its working. (06 Marks)
- c. Describe in brief the typical characteristics of an embedded system. (05 Marks)

Module-5

- 9 a. Define the term operating system. With a neat diagram explain the different function of operating system. (08 Marks)
- b. Discuss the different techniques for embedding the firmware into the target. (08 Marks)

OR

- 10 a. Bring out difference between simulator and emulator. (02 Marks)
- b. Describe a preemptive SJF scheduling. Determine average turnaround time and average waiting time, if process P1, P2 and P3 with estimated completion time of 1.2, 6, 7 milliseconds enter ready queue together and later P4 with a completion time of 2 msce enters ready queue after 2ms. (07 Marks)
- c. Explain the terms process, task and thread. (07 Marks)

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