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Fourth Semester B.E. Degree Examination, Jan./Feb. 2023 Microcontroller & Embedded Systems

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain the factors that makes ARM instruction set suitable for embedded applications. (05 Marks)
- b. Explain the core extensions of ARM processor with neat block diagrams. (09 Marks)
- c. Explain Embedded system hardware with neat block diagram. (06 Marks)

OR

- 2 a. Explain the purpose of various fields of CPSR with neat diagram. (05 Marks)
- b. Explain various functional units of ARM with the help of ARM core dataflow model. (09 Marks)
- c. Explain the ARM design philosophy. (06 Marks)

Module-2

- 3 a. What is inline barrel shifter? Describe the various operations barrel shifter supports. (06 Marks)
- b. Summarize the cycle timings for common instruction classes on ARM7TDMI. (06 Marks)
- c. Explain the various looping constructs used in ARM. (08 Marks)

OR

- 4 a. What are the various logical instructions supported by ARM? Explain with examples for each. (06 Marks)
- b. Summarize the scheduling of load instructions. (06 Marks)
- c. Explain the following instructions with syntax and example :
 (i) MOV
 (ii) SWI
 (iii) MSR
 (iv) TST (08 Marks)

Module-3

- 5 a. List any four major application areas of embedded systems. Mention atleast two examples for embedded devices in each area. (08 Marks)
- b. What is a relay? Explain transistor-based relay driving circuit with diagram. (06 Marks)
- c. Explain brown out protection. (06 Marks)

OR

- 6 a. List four onboard communication interfaces. Explain any one in detail. (08 Marks)
- b. Explain the purpose of embedded systems. (06 Marks)
- c. Explain matrix keyboard interfacing. (06 Marks)

Module-4

- 7 a. Explain unique characteristics of embedded systems. (06 Marks)
b. What is sequential processing model? Draw a sequential processing model for car seat belt warning system using flow chart. (08 Marks)
c. Explain different types of serial interfaces buses deployed in automotive embedded application. (06 Marks)

OR

- 8 a. Explain operational quality attributes of embedded system design. (06 Marks)
b. Explain high level language based embedded firmware development. List the advantages and disadvantages. (08 Marks)
c. Explain Data flow graph and control data flow graph computational model with neat diagrams. (06 Marks)

Module-5

- 9 a. List and explain five basic functions of kernel of Real Time Operating System. (10 Marks)
b. What is a simulator? Explain features, advantages and disadvantages of simulator based debugging. (10 Marks)

OR

- 10 a. Explain JTAG Based boundary scan with diagram. (10 Marks)
b. What is a process? Explain the structure of process, process states and state transition. (10 Marks)
