

## CBCS SCHEME

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18CS44

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021  
Microcontroller and 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. Differentiate between RISC and CISC processors. (06 Marks)  
 b. Explain ARM core data flow model, with neat diagram. (08 Marks)  
 c. Explain ARM registers used under various modes. (06 Marks)

**OR**

- 2 a. Explain the architecture of a typical embedded device based in ARM core, with a neat diagram. (08 Marks)  
 b. Explain the various fields in the current program status register. (06 Marks)  
 c. Discuss the following with diagram : (06 Marks)  
 i) Von Neuman architecture with cache.  
 ii) Harvard architecture with TCM.

**Module-2**

- 3 a. Explain the Barrel Shifter Operation in ARM processor, with neat diagram. (06 Marks)  
 b. Discuss the load store instruction with respect to : (08 Marks)  
 i) Single Register Transfer ii) Multiple Register Transfer.  
 c. Write the short notes on : (06 Marks)  
 i) Register Allocation ii) Allocation variables to register numbers.

**OR**

- 4 a. Write an ALP using ARM instruction to find the factorial of a given number. (06 Marks)  
 b. Explain Instruction scheduling with respect to ARM Processor. (10 Marks)  
 c. Show the post condition when MOVs instruction shifts register r1 left by one bit and result is stored in r0. Where  $r0 = 0 \times 00000000$  ,  $r1 = 0 \times 80000004$  and CPSR = nzcvtqif. (04 Marks)

**Module-3**

- 5 a. Differentiate between : (08 Marks)  
 i) Microprocessor and Microcontroller.  
 ii) Little Endian and Big Endian architecture. (06 Marks)  
 b. With neat block diagram, explain the elements of embedded system. (06 Marks)  
 c. Mention the application of embedded system with example of each.

**OR**

- 6 a. Explain the different On board communication interfaces in brief. (08 Marks)  
 b. Write a note on : (06 Marks)  
 i) Reset circuit ii) Watch dog timer. (06 Marks)  
 c. Explain how program memory are classified.

1 of 2

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.

**Module-4**

- 7 a. Explain the Operational and non operational attributes of an embedded systems. (10 Marks)  
b. Explain the different 'Embedded firmware design' approach in detail. (10 Marks)

**OR**

- 8 a. With a neat block diagram, explain design and working of Washing Machine. (10 Marks)  
b. With FSM model, explain the design and operation of automatic tea/coffee vending machine. (06 Marks)  
c. Explain Super loop based approach of embedded firmware design. (04 Marks)

**Module-5**

- 9 a. Explain the concept of 'deadlock' with a neat diagram. Mention the different conditions which favour a dead lock situation. (10 Marks)  
b. Write a note on Message passing. (10 Marks)

**OR**

- 10 a. Explain Multiprocessing , Multitasking and Multi programming. (10 Marks)  
b. Define Process. Explain in detail the structure , Memory organization and State transitions of the process. (10 Marks)

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