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21EC52

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Computer Organization and Arm Microcontrollers

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1 a. With a neat diagram, discuss the operational concepts in a computer highlighting the role of PC, MAR, MDR and IR.   **(10 Marks)**
   b. Explain system software functions in computer.   **(06 Marks)**
   c. Explain computer basic performance equation.   **(04 Marks)**

OR

2 a. Explain operation of DMA with neat diagram.   **(10 Marks)**
   b. With a neat diagram, discuss implementation of interrupt priority using individual request and acknowledge lines.   **(06 Marks)**
   c. Illustrate with a neat diagram, a computer using different interface standards. **(04 Marks)**

Module-2

3 a. With a neat diagram, explain the internal organization of 16×8 memory chip. **(10 Marks)**
   b. State and explain the types of read only memory and memory hierarchy.   **(10 Marks)**

OR

4 a. With a neat diagram, explain the three bus organization of a datapath.   **(10 Marks)**
   b. Explain basic idea of pipelining and 4-stage pipeline structure.   **(10 Marks)**

Module-3

5 a. With a neat diagram, explain the four main hardware components of an ARM based embedded device.   **(08 Marks)**
   b. Discuss ARM design philosophy.   **(06 Marks)**
   c. Explain the factors that make ARM instruction set suitable for embedded applications.
                                                                                  (06 Marks)

OR

6 a. Explain ARM core data flow model with a neat diagram.   **(08 Marks)**
   b. Explain the different processor modes provided by ARM7.   **(06 Marks)**
   c. Discuss with a neat diagram:
      i)   Von Neumann architecture with cache
      ii) Harvard architecture with TCM.   **(06 Marks)**

Module-4

7 a. Explain with neat diagram, barrel shifter operation in ARM processor.   **(08 Marks)**
   b. Explain with an example the concept of semaphore using swap instruction.   **(06 Marks)**
   c. Develop an assembly language program to multiply two 16-bit numbers.   **(06 Marks)**

OR

8 a. Explain the following with example:
   i) MSR   ii) MVN   iii) TST   iv) BIC. (08 Marks)
   b. Explain with an example forward and backward branch. (06 Marks)
   c. Develop an assembly language program to find GCD of two numbers using conditional execution. (06 Marks)

Module-5

9 a. Discuss with an example code density in thumb instruction set over ARM. . (08 Marks)
   b. Explain ARM-thumb interworking. (06 Marks)
   c. Explain with example thumb stack operations. (06 Marks)

OR

10 a. Explain with an example the effect of using 'char' and 'short' as local variable types in ARM processor. (08 Marks)
   b. List the C compiler data type mapping for an ARM target with their implementation. (05 Marks)
   c. With an example, compare the efficiencies of signed int and unsigned int with an example. (07 Marks)

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