

CBCS SCHEME

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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)
