USN | | | | | | | | | | |

10CS72

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021
Embedded Computing Systems

Time: 3 hrs. Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

1 a. Define Embedded System. What are the characteristic and constraints of an Embedded System? **(06 Marks)**

b. What are the challenges faced in design an Embedded System? **(06 Marks)**

c. Explain the major steps in the embedded System Design Process. **(08 Marks)**

2 a. List and explain the Data Operations in ARM Processor. **(08 Marks)**

b. Explain the implementations of direct-mapped cache and set associative cache with a neat diagram. **(08 Marks)**

c. Assume that a system has a two level cache. The Level 1 cache has a hit rate of 90% and the Level 2 cache has a hit rate of 97%. The Level 1 cache access time is 4 ns, the level 2 cache access time is 15 ns, and the main memory access time is 80 ns. What is the average memory access time? **(04 Marks)**

3 a. Define Bus. Explain the structure of a Typical Bus that supports read and write. Discuss the timing diagram for Bus. **(07 Marks)**

b. Explain the different types of Memories used in Embedded System with their functions. **(05 Marks)**

c. List the Hardware and Software tools used for Debugging Embedded Systems. Explain the internal architecture of a logic analyzer with a neat diagram. **(08 Marks)**

4 a. Briefly discuss three components that are commonly used in Embedded Software. **(10 Marks)**

b. What are Loops? List and explain three important techniques in optimizing loops. **(10 Marks)**

PART – B

5 a. What is RTOS? Explain the different services provided by RTOS. **(06 Marks)**

b. Explain the different Message Passing techniques used for IPC. **(07 Marks)**

c. Three processes with process IDs P1, P2, P3 with estimated completion time 12, 10, 6 milliseconds respectively enters the ready queue together. Process P4 with estimated execution completion time 2 milliseconds enters the ready queue after 3 milliseconds. Calculate the waiting time and Turn Around Time (TAT) for each process and the Average Waiting and Turn Around Time in the SRT scheduling. **(07 Marks)**

6 a. Explain the Functional and Nonfunctional requirements in the selection of an RTOS for an Embedded System Design. **(10 Marks)**

b. Explain the following briefly: (i) Shared Memory Communication
(ii) Advanced Configuration and Power Interface (ACPI) **(10 Marks)**

7 a. Briefly discuss the different types of Interconnection networks. **(05 Marks)**

b. Describe the features of: (i) I^2C Bus (ii) CAN Bus **(10 Marks)**

c. Explain the Ethernet Packet format. **(05 Marks)**

8 a. Explain the following: (i) Magnifying glass (ii) Multimeter (iii) Digital CRO (iv) Function Generator **(08 Marks)**

b. What is a Simulator? Explain the advantages and limitations of Simulator based Debugging. **(07 Marks)**

c. Write a short note on Disassembler/Decompiler. **(05 Marks)**

* * * * *