

Seventh Semester B.E. Degree Examination, July/August 2022

Embedded Computing Systems

Time: 3 hrs.

Max. Marks: 100

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

PART – A

- 1
 - a. With neat figure explain the design process involved in an embedded system design. (08 Marks)
 - b. List and explain the requirement chart for the GPS moving map. (04 Marks)
 - c. With neat UML diagram, explain signal, call and time out events. (08 Marks)
- 2
 - a. Draw two different types of computer architectures and list the differences between them. (08 Marks)
 - b. Write the ARM assembly code for $x = (a + b) - c$; (04 Marks)
 - c. With neat diagrams, explain the following:
 - i) Direct mapped cache
 - ii) Set Associative cache. (08 Marks)
- 3
 - a. Briefly explain the major components of a bus protocol. With neat diagram, explain burst read transaction. (08 Marks)
 - b. With neat figure, explain the hardware architecture of a PC. (08 Marks)
 - c. Define DMA controller and explain its functionalities. (04 Marks)
- 4
 - a. With neat figure explain circular buffer for streaming data in Embedded systems. (04 Marks)
 - b. Briefly explain different types of optimization techniques. (08 Marks)
 - c. Write about
 - i) Clear-Box Testing
 - ii) Black-Box Testing. (08 Marks)

PART – B

- 5
 - a. Define RTOS. With neat figure, explain the different RTOS Kernel services. (08 Marks)
 - b. Distinguish between process and threads. (06 Marks)
 - c. Explain various queues involved in task scheduling with a neat diagram. (06 Marks)
- 6
 - a. Explain the working procedure of memory mapped objects. (06 Marks)
 - b. Define RPC. Explain its operation with a neat diagram. (06 Marks)
 - c. Three processes with process IDs P_1, P_2, P_3 with estimated completion time 10, 5, 7 milliseconds respectively. Calculate the waiting time and Turn Around Time (TAT) for each process and the average waiting time and average Turn Around Time. If a new process P_4 with estimated time 2ms enters the ready queue after 2ms of execution of P_2 in SJF algorithm (non-preemptive). Assume all the processes contain only CPU operations and no I/O operations are involved. (08 Marks)
- 7
 - a. With neat diagram, explain I²C Bus and its operations. (06 Marks)
 - b. Briefly explain the functionalities of Ethernet CSMA/CD algorithm. (04 Marks)
 - c. Define Multihop communication with a neat figure. (04 Marks)
 - d. Explain the data frame format of a CAN. (06 Marks)
- 8
 - a. Briefly explain the following:
 - i) Simulator with its advantages and limitations. (12 Marks)
 - ii) In-circuit Emulator. (08 Marks)
 - b. Explain the various hardware debugging tools used in Embedded Product development. (08 Marks)