BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – M.Tech.(RA)-2024
Course Name – Embedded System Application for Robotics
Course Code - MEC10201B
(Semester I)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Recognize the components of a microcontroller.
   a) RAM, ROM, I/O devices, serial and parallel ports and timers
   b) CPU, RAM, I/O devices, serial and parallel ports and timers
   c) CPU, RAM, ROM, I/O devices, serial and parallel ports and timers
   d) CPU, ROM, I/O devices and timers

(ii) Justify the reason behind the use of batteries in microprocessors, and microcontrollers.
   a) high power dissipation
   b) low power consumption
   c) low voltage consumption
   d) low current consumption

(iii) Classify microcontrollers based on internal bus width.
   a) 8,16,32,64 bits
   b) 4,8,16,32 bits
   c) 32,64 bits
   d) 4,8,32 bits

(iv) Choose which out of the following supports Harvard architecture.
   a) ARM7
   b) Pentium
   c) SHARC
   d) All of the mentioned

(v) Select which of the following supports CISC as well as Harvard architecture.
   a) ARM7
   b) Pentium
   c) SHARC
   d) All of the mentioned

(vi) Classify which of the two architecture saves memory.
   a) Harvard architecture
   b) Von Neumann architecture
   c) None of the mentioned
   d) All of the mentioned

(vii) Cite the number of pins in 8051.
   a) 50
   b) 60
   c) 40
   d) 80

(viii) Mention, which of the following best describes the Von-Neumann architecture.

a) Separate memory for data and instructions
b) Combined memory for data and instructions
c) Uses parallel processing
d) Data and instructions are executed simultaneously

(ix) Define the primary role of the address buffer and data buffer in the 8085 microprocessor.

a) To store program instructions
b) To amplify the signals on the address and data buses
c) To act as temporary storage for data and addresses
d) To execute arithmetic and logic operations

(x) Choose the reason for implementing thermal management in embedded systems.

a) Ensuring the system works at a specific temperature
b) Preventing heat dissipation
c) Cooling the system
d) No option is correct

(xi) Choose a common method for thermal management in embedded systems.

a) Heat sinks
b) Fans
c) Liquid cooling
d) All are correct

(xii) Cite the OS to convert source code into machine code for an embedded system.

a) FreeRTOS
b) Windows
c) Linux
d) MacOS

(xiii) Observe the feature of a real-time operating system that ensures a task is completed within a certain timeframe.

a) Interrupts
b) Preemption
c) Deadlock
d) Multitasking

(xiv) Choose the full form of RTOS.

a) Real-Time Operating System
b) Reliable Time Operating System
c) Rapid Task Operating System
d) Random Task Organization System

(xv) Choose the meaning of RISC & CISC.

a) Complete Instruction Set Computer, Reduced Instruction Set Computer
b) Complex Instruction Set Computer, Reduced Instruction Set Computer
c) Complex Instruction Set Computer, Reliable Instruction Set Computer
d) Complete Instruction Set Computer, Reliable Instruction Set Computer

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Define embedded system. (3)

3. Categorize the different types of embedded memories and infer their functions in an embedded system. (3)
4. Describe the function of message queues in real-time operating systems and their role in inter-task communication. (3)
5. Define real-time programming language with example. (3)
6. Enumerate the advantages of using embedded systems. (3)

OR

Analyze the importance of power consumption in embedded systems and its impact on system performance. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Explain virtual memory. (5)
8. Propose a solution for managing inter-task communication in a complex RTOS using message queues, mailboxes, and pipes, ensuring data integrity and synchronization. (5)
9. Recognize addressing modes in Microcontroller. (5)
10. Evaluate Instruction sets in Microcontroller. (5)
11. Examine Serial and parallel data Communication interfacing. (5)
12. Evaluate the 8051 interface designs. (5)

OR

Explain 8051 architectures. (5)

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