Paper / Subject Code: 89321 / Embedded Systems and RTOS

TE. Sem VI (C Scheme - R-2019) May 2023.
ECS.

(3 Hours) Total Marks: 80

N.B: (1) Question No. 1 is compulsory.
(2) Attempt any three questions from remaining questions.
(3) All questions carry equal marks

Q. 1 Solve **any 4:**

a. List the design metrics of Embedded systems.

b. Compare black box and white box testing.

c. Compare RS -232 and RS-485 (any four points).

d. Explain the structure of the Process/Task control block with a neat diagram.

e. Describe the deadlock condition in Embedded systems and how it can be avoided.

Q. 2 a. Explain the following terms w.r.t Embedded systems: Code Density, Memory protection, Wake-up Interrupt controller.

b. Explain the following FreeRTOS API functions:

vTaskDelete(),xSemaphoreCreateBinary(),xTaskCreate(),vTaskPrioritySet()

Q.3 a. Explain the Programmer's model of the ARM- Cortex M3. Describe the general purpose as well as the special purpose registers.

b. What is Interrupt latency? List the causes of Interrupt latency and mention methods to minimize latency.

Q.4 a. "ARM Cortex M3 has low interrupt latency". Justify this statement

b. Explain Bounded and Unbounded Priority inversion in Embedded systems with examples. Show how the Priority Inheritance Protocol (PIP) helps in converting unbounded priority inversion to a bounded one.

Q.5 a. Enumerate on the significance of Inter-process communication in Embedded systems. Highlight the usage of Semaphores in this context.

b. Differentiate between Bluetooth and Zigbee wireless technologies. Mention application areas of both.

Q.6. Write short notes on **(any two):**

a. CAN bus
b. Rate Monotonic Scheduling
c. Waterfall Model
d. Hardware-Software Co-Design

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