



B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Sixth Semester

MECHATRONICS ENGINEERING

U18MCI6203: Microcontroller and Embedded Systems

COURSE OUTCOMES

- CO1: Compare various cores of embedded systems
 CO2: Brief the architecture, instruction set and interrupts of microcontroller
 CO3: Describe the features of ARM Cortex-M4 controller
 CO4: Interface the peripherals of ARM Cortex-M4 controller
 CO5: Develop embedded systems through hardware and software integration
 CO6: Explain the concepts of real time operating systems

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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| 1. Differentiate between Hard Real time and Soft Real time system. | CO1 | [K ₂] |
| 2. What is a DSP processor? | CO1 | [K ₂] |
| 3. Indicate which mode and which timer are selected in 8051 microcontroller while using the instruction MOV TMOD, #01H | CO2 | [K ₃] |
| 4. What are the interrupts available in 8051? | CO2 | [K ₂] |
| 5. Differentiate ARM and Thumb instruction set features. | CO3 | [K ₂] |
| 6. List the peripherals of TIVA ARM CORTEX for Analog interfacing and data acquisition. | CO4 | [K ₂] |
| 7. What is the difference between RTC and timer? | CO4 | [K ₂] |
| 8. Define Host system and Target system. | CO5 | [K ₂] |
| 9. Mention the significance of Mailbox in RTOS. | CO6 | [K ₂] |
| 10. What is interrupt latency? | CO6 | [K ₂] |

Answer any FIVE Questions:-

PART B (5 x 4 = 20 Marks)

(Answer not more than 80 words)

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| 11. Define embedded system and discuss about the design constraints of embedded systems. | CO1 | [K ₂] |
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| 12. Compare RISC and CISC architectures. | CO1 | [K ₂] |
| 13. Explain functions of all 8 pins of Port 3 in 8051. | CO2 | [K ₂] |
| 14. Describe about Watchdog timer in ARM Cortex M4. | CO3 | [K ₂] |
| 15. Discuss about Getting Embedded Software into Target System. | CO5 | [K ₂] |
| 16. Explain about RTOS architecture. | CO6 | [K ₂] |

Answer any FIVE Questions:-
PART C (5 x 12 = 60 Marks)
(Answer not more than 300 words)

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| 17. a) Distinguish counting and timing requirements, explain the modes of operation of timer/counter of 8051 with diagram. | CO2 | [K ₂] |
| 18. a) Explain the addressing modes of 8051 microcontroller with an example each. | CO2 | [K ₂] |
| 19. a) Draw the functional block diagram of TIVA ARM Cortex-M4 microcontroller and explain the special features of it. | CO3 | [K ₂] |
| 20. a) Discuss about Motion Control Peripherals in ARM Cortex M4 microcontroller. | CO4 | [K ₂] |
| 21. a) Write an embedded c program to Interface the stepper motor to the TIVA ARM Cortex-M4 and obtain the stepping sequence. | CO5 | [K ₃] |
| 22. a) Discuss with suitable examples about priority inversion and dead lock situations. | CO6 | [K ₃] |
