

B.E. Instrumentation Engineering Seven Semester
IN703 - Embedded Systems Paper-I

Time : Three Hours



GUG/W/18/1827

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Diagrams and Chemical equation should be given wherever necessary.
 5. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) What are the basic hardware and software units required for an embedded system. **8**
- b) Describe the design process of embedded system with example. **8**

OR

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| 2. | a) | Illustrate the characteristics of embedded systems with example. | 8 |
| | b) | Describe the design challenges in embedded system design. | 8 |
| 3. | a) | Draw the block diagram of AVR microcontroller and describe in brief. | 8 |
| | b) | Discuss the various addressing modes of AVR with example. | 8 |

OR

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| 4. | a) | Write AVR ALP for computing the equation $P=2q + q - 2r$, Assume all variable are 8 bit memory location. | 8 |
| | b) | Draw status flag register of AVR microcontroller and explain. | 8 |
| 5. | a) | Describe bit addressability feature of I/O ports of AVR microcontroller with examples of instruction. | 8 |
| | b) | Write AVR ALP to read data from PORT C and send it to PORT B and PORT D. | 8 |

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| 6. | <p>a) An AVR is connected to the 8MHz crystal oscillator. Calculate the ADC frequency for</p> <div style="margin-left: 20px;"> a) ADP 2: 0 = 001 b) ADPS 2:0=100
 c) ADPS 2:0 =111. </div> | 8 |
| | <p>b) Write algorithmic steps for programming ADC of AVR microcontrollers.</p> | 8 |
| 7. | <p>a) Illustrate the various modes of TIMER 0 of AVR microcontrollers.</p> | 7 |
| | <p>b) Write AVR ALP to generate a square wave of 125 Hz frequency on Pin PORT B. 3. use
TIMER 0, Normal mode, with Prescaler of 256 & XTAL = 8MHz.</p> | 9 |

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| 8. | a) | Elaborate the role of RETI instruction in processing interrupts of AVR micro controller with suitable example. | 8 |
| | b) | Discuss the external interrupts of AVR microcontroller with their vector location. How RESET input is interrupt. | 8 |
| 9. | a) | How the concepts of shared data is used in RTOS. | 4 |
| | b) | What are the three states of task in RTOS. | 4 |
| | c) | Differentiate the terms operating system and real time operating system with respect to various features. | 8 |

OR

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| 10. | a) | Illustrate how message queue are used for communication among process. | 8 |
| | b) | Discuss the concept of process management in RTOS. | 8 |
