

**Anekant Education Society's**  
**Tuljaram Chaturchand College of Arts, Science and**  
**Commerce, Baramati**  
**M.Sc. I. Electronic Science**

Class : M. Sc. I (Semester- II)

Paper Code: ELE4203

Paper : III **Title of Paper:** Advanced Embedded System Design

**2 Mark Question**

1. What is I2C?
2. What is SPI?
3. Write the difference between I2C and SPI communication protocol.
4. What is voltage Levels in CAN Protocol?
5. Write features of CAN Protocol?
6. What is the Basic Principle of CAN Protocol?
7. Describe any two software tools used for development of embedded system.
8. How many Types of CAN frame exist?
9. What is the application of the CAN Protocol?
10. What is the Basic Principle of CAN Protocol?
11. Define Real Time, Real Time operating System (RTOS).
12. Explain Concept of Real Time, Real Time operating System,
13. State Characteristics of Real- Time operation system,
14. Why CAN Bus Topology use terminator resistor at the end?
15. Explain SPI master-slave topology.
16. What is CPAL and CPOL in SPI?
17. What is an embedded system?
18. What are the characteristics of embedded system?
19. What are the types of embedded system?
20. What are the components of embedded system?
21. Why we use embedded systems?
22. What is kernel?
23. What do you mean by a real-time system?
24. Define Hard and Soft real-time system.
25. List any six standard features of PIC18F4550.
26. Describe any two software tools used for development of embedded system.
27. Explain the meaning of the following instructions in AVR.
  - i) LD Rd, Z
  - ii) BRCS k
  - iii) OUT A, Rr
  - iv) SWAP Rd
  - v) SUB Rd, Rr
  - vi) LDI Rd, k

#### 4 and 6 Mark Question

28. What is an Embedded system? Differentiate between embedded system and real-time system.
29. Draw structure or block diagram of Real time system OR the components of the RTS.
30. Explain development cycle of embedded system
31. Write a note on IDE, ICE
32. Write a note on address mechanism of I2C.
33. Compare 8-bit AVR and PIC microcontroller.
34. Explain frame types, bus signals, error handling and addressing of CAN
35. Write the steps used in programming ADC in PIC18F4550 microcontroller using polling method.
36. Explain the types of CAN error? Which concept is used behind bit error detection?
37. Write an AVR C program to monitor port C. If it is high send AAH to port B; otherwise send AAH to port B.
38. Explain in detail Concept of semaphore.
39. Write Notes on Scheduling Algorithm.
40. Write Notes on Priority based preemptive scheduling
41. Write Notes on types of task and Task management.
42. Explain in detail round robin and FIFO scheduling
43. Write note on RTOS kernel object and Messages.
44. Write note on Counting semaphore.
45. Explain Services of Scheduler.
46. Write note on concept of Synchronization of Task.
47. Write an AVR 'C' program to monitor bit5 of port C. If it is high, send 55H to port B; otherwise send AAH to port B.
48. What are the criteria, the designer should consider in choosing a microcontroller for embedded system development.
49. Write any three addressing modes of AVR microcontroller with suitable example.
50. Describe the controller area network (CAN) frame format in short.
51. With the help of block diagram, explain 8-bit Timer/counter in AVR. Explain the wave form generator in Timer0.
52. Write AVR C program to toggle only the PORT B.4 bit continuously after every 40 $\mu$ s. Use timer 0, Normal mode and 1.8 prescalar to create the delay (XTAL = 8MHz)
53. Draw the block diagram of LCD interfacing to AVR microcontroller. Write an algorithm to display message ELECTRONICS on first line of 16 x 2 LCD.
54. What is I2C? With the help of timing diagram explain data transfer using I2C.
55. Draw architecture of PIC18f4550 microcontroller and explain each block in detail.
56. Draw interfacing diagram of SSD to AVR microcontroller and write C program.
57. Draw the interfacing diagram of DAC 0808 to AVR microcontroller. Write C program to generate triangular wave using DAC.
58. With the help of block diagram, explain 8-bit Timer / counter in AVR . Explain the wave form generator in Timer 0.
59. List the standard features of PIC 18F4550.
60. Explain the role of DDRX and PORTX in I/O operation.
61. Write a assembly program to subtract 18H from 29H and store the result in R21.

62. Write C program for AVR microcontroller to read data from PORTD.5 and control the fan connected to PortB.4. Fan ON, if PORTD.5 is high and turn OFF when it is low.
63. Explain in detail logical instruction for AVR microcontroller.
64. Compare reduced instruction set computer and complex instruction set computer.
65. Generate a square wave of 50% duty cycle on port C of AVR 16 microcontroller.
66. Draw the architecture of PIC microcontroller
67. Draw the architecture of AVR microcontroller
68. Explain any three arithmetic instruction of AVR with suitable example.
69. Explain AVR 16 microcontroller status register
70. Explain the interfacing LCD with AVR 16. Write algorithm to display message on first line of 16 X 2 LCD.
71. Explain clock circuit of AVR microcontroller.
72. Explain the interfacing of keyboard with AVR. Write algorithm for it.
73. Explain the interfacing of RTC, EEPROM for AVR.
74. Write the features of AVR atmega 16 microcontroller.
75. Explain Status register of PIC microcontroller.
76. Draw the interfacing diagram of seven segment display to AVR microcontroller. Write a c program to display 0 to 9.
77. Write note on instruction set of AVR
78. Write note on memory organization of PIC.
79. Write note on addressing modes of AVR.
80. Write note on memory organization, timers, I/O, ADC for AVR.
81. Draw data memory map of Atmega16 microcontroller. Explain with example addressing modes of Atmega16 microcontroller.
82. Draw the circuit diagram of Target board for Atmega16. show
  - I. USART connection to computer
  - II. Reset and oscillator circuit. Write different clock sources of Atmega16.
83. Draw interface of two TWS (Thumb Wheel Switches) to PORTB and two common cathode seven segment displays (SSDs) to PORTC and PORTD of PIC18F458 or PIC18F4550. Write C program to read TWS and display it on SSDs.
84. What is cross compiler? Compare assembly language and C programming for microcontroller.
85. Write features of ADC module in Atmega16 microcontroller. Write C program to read data from channel 10 of ADC and displays the result on PORTC and PORTD continuously.

ADMUX:

REFS1	REFS0	ADLAR	MUX4	MUX3	MUX2	MUX1	MUX0
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ADCSRA

ADEN	ADSC	ADATE	ADIF	ADIE	ADPS2	ADPS1	ADPS0
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86. Identify addressing mode of following instructions of PIC18F458/ PIC18F4550
  - 1) MOVWFOX20
  - 2) MOVWFINDF0
  - 3) ANDLWB'01000000
87. Draw the architecture of PIC(PIC18F4550/18F458) microcontroller and explain it in short.
88. A microcontroller based weather monitor system is to be designed to measure and display temperature, wind speed, humidity, wind direction, time of the day using RTC. There should be provision of buttons and LCD as user interface.

Draw the scheme in detail covering following points.

- i) Selection of microcontroller
  - i) Block diagram
  - iii) PORT pin assignments
  - iv) Buttons and LCD interfacing
  - v) Flowchart/Algorithm for above system.
89. Write 'C' program for AVR microcontroller to read temperature from LM35 and control the heater connected to PORTD.5 through relay. Turn heater ON, if temperature falls below 30 °C and turn heater OFF, when temperature rises above 50 °C.
  90. A switch is connected to INT0 CRB01 and LED is connected to RB7 pin. Write 'C' program for PIC microcontroller to transfer data from PORTC to PORTD continuously; it toggles LED every time when INT0 is activated.
  91. Draw interfacing of stepper motor and two switches to PIC18F4550 microcontroller.
  92. Describe any three addressing modes of AVR microcontroller with suitable example.
  93. Write an assembly or 'C' program to toggle only the PORTB.4 bit continuously with delay of 2ms. Use Timer1, Normal mode, and no prescaler to create the delay. Assume XTAL=8MHz.
  94. List the features of on chip ADC of Atmega16 microcontroller. Write C program to read ADC and display most significant 8-bits of data read on PORTD.
  95. Write an assembly/'C' language program for the AVR microcontroller to send the string "Electronic Science" to the serial port continuously at 9600 baud. Use 8 bit data and 1 stop bit. Assume XTAL= 8 MHz.
  96. The LEDs are connected to pins of portD of AT megal6 microcontroller. Draw the interfacing diagram. Write an assembly language program to turn ON each LED from pinD0 to pin D7. Call a delay subroutine before turning ON the next LED.
  97. Find the value for T0CON to program Timer0 of PIC18 microcontroller as 16-bit with no prescaler. Write no prescaler. Write function to generate delay of 100µs. Use: timer 0 in 16-bit mode.
  98. Draw interfacing of 8-bit DAC 0808 to PORTB of PIC microcontroller. Write C program to generate square wave of amplitude 3V and 60 % duty cycle. Given Vref=5V.
  99. List serial communication peripheral systems in Atmega16 microcontroller. Explain any one in short.
  100. Draw interfacing diagram of Stepper Motor(SM) to PIC18F458 or PIC18F4550. Write C program to rotate stepper motor clockwise for one revolution and then stop-step angle of SM=1.8°.
  101. With the help of block diagram, explain the PWM operation of CCP module in PIC microcontroller.
  102. Design of General Purpose Target Board for AVR microcontroller.
  103. Draw flow-chart to clear WREG and add 3 to WREG ten times of PIC microcontroller. Write an assembly language program for the same task using PIC microcontroller instructions.
  104. With the help of diagram, explain the working of Von-Neumann architecture in detail.
  105. Explain status register of PIC microcontroller show the status of all the Flags of status register after execution of following instructions:  
MOV LW 88H

SUBL W 93H

106. Write an assembly language program for PIC microcontroller to clear WREG and add five to WREG register ten times and write result to PORTB.
107. Design AVR ATmega8L microcontroller based embedded systems for Measurement of Humidity.
108. Design AVR ATmega8L microcontroller based embedded systems for Measurement of wind velocity.
109. Write C program for Atmega16 to toggle LED connected at PORTD bit 0, continuously with delay of 1 sec. Use timer1, normal mode, no prescaler, Assume XTAL=8mHz.

TCCR1A:

COM1A1	COM1A0	COM1B1	COM1B0	FOC1A	FOC1B	WGM11	WGM10
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TCCR1B :

ICNC1	ICES1	-	WGM13	WGM12	CS12	CS11	CS10
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TIFR :

OCF2	T0V2	ICF1	OCF1A	OCF1B	T0V1	OCF0	T0V0
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110. Explain with neat diagram frame format of I2C protocol. Draw timing diagram for I2C write operation.
111. Draw inter face of single 5×7 dot matrix LED display to PIC18F458/ PIC 18F4550. Write C program to display 'A' continuously.