DBK-003-1275004 Seat No. _____

M. Sc. (ECI) (Sem. V) (W.E.F. 2016) Examination

June - 2022

Microprocessor & Microcontroller : Paper - 20

(New Syllabus)

Faculty Code : 003
Subject Code : 1275004

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instruction : Attempt any five questions out of ten.

1 Answer the following : **14**

(1) What is microcontroller ?

(2) Why an embedded system is also called a dedicated system?

(3) What is microprocessor?

(4) What are the main differences between ATmega16 and ATmega32 ?

(5) Give the magnitude of unsinged char and signed char datatypes.

(6) Give two factors that can affect the delay size.

(7) What is the register in microprocessor?.

2 Answer the following : **14**

(1) Find the content of PORTB after the following C code in each case :

```
PORTB = 0×37 & 0×CA;
PORTB = 0×37 | 0×CA;
PORTB = 0×37 ^ 0×CA;
```

(2) What is checksum byte?

(3) What are the packed and unpacked BCD?

(4) Write the function of crystal oscillator in AVR chip.

(5) What are fuse bits in AVR?

(6) Write the functions of Timer and Counter in AVR?

(7) What is an interrupt in AVR?

3 Answer the following : **14**

(1) (a) Write an AVR C program to send values 00-FF to Port B. **7**

(b) Write an AVR C program to send hex values for ASCII characters of 0, 1, 2, 3, 4, 5, A, B, C and D to Port B.

(c) Write an AVR C program to toggle all the bits of Port B 200 times..

(2) (a) Write an AVR C program to get a byte of data from Port B, and then send it to Port C. **7**

(b) Write an AVR C program to get a byte of data from Port C, if it is less than 100, send it to Port B; otherwise, send it to Port D.

4 Answer the following : **14**

(1) (a) Write an AVR C program to toggle only bit 4 of Port B continuously without disturbing rest of the pins of Port B. **7**

(b) Write an AVR C program to monitor bit 5 of Port C. If it is HIGH, send 55H to Port B; otherwise, send AAH to Port B.

(2) Write an AVR C program to toggle all the bits of Port B continuously with some delay. Use Timer0, Normal Mode and no prescaler options to generate the delay. **7**

5 Answer the following : **14**

(1) (a) Write an AVR C program to convert ASCII digits of '4' and '7' to packed BCD and display them on Port B. **7**

(b) Write an AVR C program to convert packed BCD 0×29 to ASCII and display the bytes on Port B and Port C.

(2) (a) Write an AVR C program to send out the value 44H serially one bit at a time via Port C, pin 3. The LSB should go out first. **7**

(b) Write an AVR C program to send out the value 44H serially one bit at a time via Port C, pin 3. The MSB should go out first.

6 Answer the following : **14**

(1) Write an AVR C program to toggle only the PORTB.4 bit continuously every $70\,\mu s$. Use Timer0, Normal Mode and 1:8 prescaler to create the delay. Assume XTAL = 8MHz. **7**

(2) Write an AVR C program to toggle only the PORTD.5 bit continuously every 2ms. Use Timer1, Normal Mode and no prescaler to create the delay. Assume XTAL = 8MHz. **7**

7 Answer the following : **14**

(1) Assuming that the 1Hz clock pulse is fed into pin T0, use the T0V0 flag to extend Timer0 to a 16-bit counter and display the counter on Port C and Port D. **7**

(2) Assuming that the 1Hz clock pulse is fed into pin T1 (PB1). Write an AVR C program for Counterl in rising edge mode to count the pulses and display the TCNT1H and TCNT1L registers on Port C and Port D, respectively. **7**

8 Answer the following : **14**

(1) Using Timer0 generate a square wave on pin PORTB.5, while at the same time transferring data from Port C to Port D. **7**

(2) Using Timer0 and Timer1 interrupts, generate square waves on pins PB1 and PB7 respectively, while transferring data from Port C to Port D. **7**

9 Answer the following : **14**

(1) Using Timer0 and Timerl interrupts, write an AVR C program in which: **7**

(i) Port A counts up every time Timer1 overflows. It overflows once per second.

(II) A pulse is fed into Timer0 where Timer0 is used as counter and counts up. Whenever the counter reaches 200, it will toggle the pin PB6.

(2) Assume that the INTO pin is connected to a switch that is normally HIGH. Write an AVR C program to toggle PORTC.3, whenever INTO pin goes LOW. Use the external interrupt in level-triggered mode. **7**

10 Answer the following : **14**

(1) Write a note on interrupt versus polling. Explain interrupt service routine and vectored interrupt in detail. **7**

(2) Explain TIFR register in detail and write the steps to program Timer0 in normal mode. **7**