

Total No. of Questions : 8]

SEAT No. :

**P2689**

[Total No. of Pages : 4

[5034]-203

**M.Sc.-I**

**ELECTRONIC SCIENCE**

**EL2 UT07 : Embedded System Design**

**(2013 Pattern) (Semester-II) (Credit System)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt any five questions.*
- 2) *All questions carry equal marks.*
- 3) *Figures to the indicate full marks.*
- 4) *Draw neat diagram wherever necessary.*
- 5) *Use of non-programmable calculator is allowed.*

**Q1)** Attempt the following:

- a) Write C program for AVR to generate non-inverted PWM output of frequency 31.250 kHz and 75% duty cycle on pin PORTB.3. Use FAST PWM mode of TIMERO. **[4]**

Given XTAL = 8MHz

TCCRO:

7	6	5	4	3	2	1	0
FOC0	WGM00	COM01	COM00	WGM01	CS02	CS01	CS00

- b) List different SFRS associated with PORTS of PIC18 F4550 microcontroller.

Write C program for PIC microcontroller to get byte of data from PORTC and if it is less than 100, send it to PORTB other wise send it to PORTD. **[3]**

- c) With suitable diagram compare Von Neumann and Harvard architecture. **[3]**

**P.T.O.**

**Q2)** Attempt the following:

- a) Find the value for T0CON to program Timer 0 of PIC18 microcontroller as 16-bit timer with no prescaler. **[4]**

Write no prescaler.

Write function to generate delay of 100  $\mu$ s.

Use: timer 0 in 16-bit mode.

T0CON:

7	6	5	4	3	2	1	0
TMROON	TO8BIT	TOCS	TOSE	PSA	TOPS2	TOPS1	TOPS0

INTCON:

7	6	5	4	3	2	1	0
GIE	PEIE	TMROIE	INTOIE	RBIE	TMROIF	INTOIF	RBIF

- b) List serial communication peripheral systems in Atmega 16 microcontroller. Explain any one in short. **[3]**
- c) Explain development cycle of Embedded system. **[3]**

**Q3)** Attempt the following:

- a) Explain stack and stack pointer in PIC 18f4550 microcontroller. **[4]**
- b) What is zigbee protocol? State its specifications. **[3]**
- c) Compare RISC and CISC architecture. **[3]**

**Q4)** Attempt the following:

- a) List the features of on chip ADC of Atmega 16 microcontroller. Write C program to read ADC and display most significant 8-bits of data read on PORTD. **[4]**

ADMUX:

7	6	5	4	3	2	1	0
REFS1	REFS0	ADLAR	MUX4	MUX3	MUX2	MUX1	MUX0

ADCSRA:

7	6	5	4	3	2	1	0
ADEN	ADSC	ADATE	ADIF	ADIE	ADPS2	ADPS1	ADPS0

- b) Draw and explain address map of data memory of PIC 18F 4550 microcontroller. [3]
- c) Explain software development tools used in embedded system development. [3]

**Q5)** Attempt the following:

- a) Write C program for PIC 18F 4550 microcontroller to generate PWM output of 10kHz with 50% duty cycle. Show calculations for PR2 and CCP1L value. [4]

Use  $F_{osc} = 8 \text{ MHz}$

CCP1CON:

7	6	5	4	3	2	1	0
-	-	DC1B1	DC1B0	CCP1M3	CCP1M2	CCP1M1	CCP1M0

T2CON:

7	6	5	4	3	2	1	0
-	T2OUTPS3	T2OUTPS2	T2OUTPS1	T2OUTPS0	TM20N	T2CKPS1	T2CKPS0

- b) Write a note on CAN protocol. [3]
- c) Write ALP for Atmega 16, to copy 10 bytes of data memory from 60h-69h to 70h-79h. [3]

**Q6)** Attempt the following:

- a) Draw interfacing diagram of  $16 \times 2$  LCD to Atmega 16 microcontroller. Write C program to display 2-digit BCD counter on LCD. [4]
  - b) What is embedded system? List features of embedded system. [3]
  - c) Draw interfacing of 8-bit DAC 0808 to PORTB of PIC microcontroller. Write C program to generate squarewave of amplitude 3V and 60% duty cycle. [3]
- Given  $V_{ref} = 5V$ .

**Q7)** Attempt the following:

- a) Explain with neat diagram frame format of I2C protocol. Draw timing diagram for I2C write operation. [5]
- b) List sources of interrupt in Atmega 16. Write C program, using timer0, that toggles PORTB.5 every 40 microsecond while at same time transferring data from PORTC to PORTD. [5]

**Q8)** Attempt the following:

- a) Draw interfacing of stepper motor and two switches to PIC18F4550 microcontroller. Write C program to monitor the switches and do the action as per given table. [5]

SW1	SW0	Action
0	0	Stop motor
0	1	Rotate motor clockwise continuously
1	0	Rotate motor anticlockwise continuously
1	1	Stop motor

- b) Explain and compare RS232 and RS485. [5]

