TED (15) – 6132 Reg. No. .....

(REVISION — 2015) Signature .....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2018

MICROCONTROLLERS

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Write the on-chip program memory size of ATMega32.
2. Write the name of family groups of AVR microcontroller.
3. List the I/O registers associated with a PORT of AVR microcontroller.
4. State the importance of TCCR register in timer module of AVR microcontroller.
5. State the function of RS pin of LCD module.

(5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. List any six features of AVR microcontroller.
2. Compare microprocessor and microcontroller.
3. Describe any three data types and any three bitwise logic operators in embedded C.
4. Describe various registers associated with timer 0.
5. Explain the sequence of operations upon getting an interrupt to AVR microcontroller.
6. Briefly explain asynchronous serial communication in AVR microcontroller.
7. List the features of ADC module in AVR ATMega32.

(5×6 = 30)

Marks

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

III (a) Describe data memory organization in AVR. Give any four instructions for data transfer. 8

(b) Write the functions of (i) Program counter, (ii) Stack, (iii) Stack Pointer, (iv) Status register in a microcontroller. 7

OR

IV (a) Describe Harvard memory architecture. Mention the techniques adopted in AVR to optimize the speed of execution. 8

(b) Write an assembly language program to add five 8-bit numbers stored in memory. 7

UNIT — II

V (a) Write assembly language instructions to perform the following actions.

(i) Make PORTA output (ii) Make PORTB input with pull up (iii) Make PA0 pin O/P and send logic 1 to the pin (iv) Make PB0 pin I/P with internal pull up. 8

(b) Write an AVR C program to toggle all the bits of PORTA with a delay. 7

OR

VI (a) Describe various bit manipulation instructions for I/O port programming with example. 8

(b) Write comments for the following AVR embedded C commands.

(i) DDRA = DDRA&0XF0 (ii) DDRB = DDRB|0XF0

(iii) DDRC&=0X01 (iv) DDRD|= (1<<7) 7

UNIT — III

VII (a) List the four applications of timer module in AVR. Write an AVR assembly language program to generate a time delay using timer0 in polling method. 8

(b) Differentiate between internal interrupt and external interrupt. Describe TIMSK register. 7

OR

VIII (a) Differentiate between Normal mode and Compare match mode operations of timers. Write the steps to program timer0 in normal mode. 8

(b) Briefly explain interrupts in AVR. 7

UNIT — IV

IX (a) With an interfacing diagram, write the steps for programming 16 × 2 character LCD module with ATMega32. 8

(b) Write the programming steps to transfer data serially using the serial port (USART) in AVR. 7

OR

X (a) Describe with diagram how a 4 × 4 matrix keyboard is interfaced with AVR. 8

(b) A temperature sensor is connected at the AD0 pin of ATMega32. Write the steps to program the ADC in polling method. 7