TED (15)-5041
(Revision- 2015)

A20-00556

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE – APRIL -2020.

EMBEDDED SYSTEMS

(Maximum Marks : 75) [Time : 2.15 hours]

PART–A

Marks

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

1. List the purpose of having EEPROM memory in AVR microcontrollers.
2. List the names of AVR families available in market.
3. What are assembler directives? Write an example.
4. What is ASR instruction? Give syntax.
5. What is Kernel of an embedded operating system? (3x2=6)

PART - B

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

1. What is status register and show the bit position and mention the purpose of any four bits.
2. What do you mean by stack pointer initialization? Illustrate with an example.
3. Show the connection of AVR to RS232.
4. Make note on Raspberry Pi development board.
5. Compare between SRAM and EEPROM in ATmega 32.
6. Each of the following assembly language instructions contains at least one error. Correctly identify the error and correct the error suitably.
   (a) LDI R14, $FA (b)BRNE ADD (c) CP R12, $20
7. What is TIFR register? Show the bit position and indicate the purpose of the bits.

[4x6 =24]

PART - C

(Answer any of the three units from the following. Each full question carries 15 marks)

UNIT I

III (a) Explain the Data memory architecture of ATmega 32 with necessary diagrams. Mention the purpose of each memory. (9)

(b) Draw the simplified block diagram of AVR. (6)

OR

IV (a) Explain different addressing modes of AVR. (9)

(b) Compare between the different families of AVR microcontrollers. (6)

UNIT- II

V (a) Write an assembly language program to count the number of 1s in a given hexadecimal number stored in RAM location $0300. Briefly write the logic of the program and comment each line. (9)

(b) What are assembler directives? Give at least two examples. Comment on the time delay for executing assembler directives. (6)

OR

VI (a) A set of 20 numbers are loaded in the RAM locations starting from $0300. Write an assembly language program to collect all the numbers that are below $80 and store them separately in consecutive locations starting from $400. Briefly write the logic of the program and comment each line. (9)

(b) Explain how the execution delay can be calculated for the following code snippet. The delay for each instruction is given. The system runs at a clock frequency of 2MHz.

		Instruction Cycles
	LD1 R16, $20	1
LOOP1:	NOP	1
	DEC R16	1
	BRNE LOOP1	1/2

(6)

UNIT- III

VII (a) Which are the registers associated with Timer0 in ATmega 32? Explain the Purpose of each bit of the registers. (9)

(b) Write an AVR C program to send the data $FE serially through 4^{th} pin of PORTC. MSB should go first. (6)

OR

VIII (a) Make note on the sources of interrupts and the steps in handling them. (9)

(b) List down the steps to program Timer0 in Normal mode to generate a time delay. (6)

UNIT – IV

IX (a) Explain the terms task scheduling, context switching and mutual exclusion as applied to an embedded operating system. (9)

(b) What are the characteristic features of an embedded system. (6)

OR

X (a) Write in detail, the general architecture of embedded operating systems. (9)

(b) Make a brief note on Arduino development board. (6)

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