Code : 041565

B.Tech 5th Semester Special Exam., 2020

MICROCONTROLLERS

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Choose the correct answer (any *seven*) : 2×7=14

(a) One line definition of microcontroller is

(i) CPU on a single chip

(ii) computer on a single chip

(iii) Both of the above

(iv) None of the above

(b) AT89C2051 has RAM of

(i) 128 bytes

(ii) 256 bytes

(iii) 64 bytes

(iv) 512 bytes

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(c) Device pins XTAL1 and XTAL2 of 8051 are used for connections to

(i) external oscillator

(ii) external power

(iii) external peripheral

(iv) external memory

(d) Which of the following 8051 variant architecture does not have ROM?

(i) 8051

(ii) 8052

(iii) 8031

(iv) None of the above

(e) When the microcontroller executes some arithmetic operations, then the flag bits of which register are affected?

(i) DPTR

(ii) SP

(iii) PC

(iv) PSW

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(f) On power up, the 8051 uses which RAM locations for register R0–R7?

(i) 00–2F

(ii) 00–07

(iii) 00–7F

(iv) 00–0F

(g) Name the architecture and the instruction set for microcontroller.

(i) Van-Neumann architecture with CISC instruction set

(ii) Harvard architecture with CISC instruction set

(iii) Van-Neumann architecture with RISC instruction set

(iv) Harvard architecture with RISC instruction set

(h) Number of I/O ports in the 8051 microcontroller is

(i) 3 ports

(ii) 4 ports

(iii) 5 ports

(iv) None of the above

(i) How are the bits of the register PSW affected if we select Bank2 of 8051?

(i) PSW.5=0 and PSW.4=1

(ii) PSW.2=0 and PSW.3=1

(iii) PSW.3=1 and PSW.4=1

(iv) PSW.3=0 and PSW.4=1

(j) External access pin is used to permit

(i) peripherals

(ii) power supply

(iii) ALE

(iv) memory interfacing

2. (a) Explain the role of microcontrollers in the technology domain. Also write about their typical characteristics. 5

(b) Differentiate between Von-Neumann and Harvard architectures. 4

(c) Discuss about some specifics of 8051 family microcontrollers. 5

3. (a) Explain the functions of pin PSEN and EA of 8051. 5

(b) Elaborate upon the complete address space of RAM of 8051. List Special Function Registers (SFR's) of 8051 with their sizes and address locations. 9

4. *(a)* Which instruction exchanges the nibbles of accumulator register? Does there exits any instructions for exchanging two registers content? Explain. 3

(b) Write secondary functions of Port P3 pins of 8051. 4

(c) Explain in detail about the addressing modes of 8051. Use example instructions for proper explanation. 7

5. *(a)* Differentiate the functions of MOV, MOVC and MOVX instructions. 4

(b) Draw the hardware structure of a pin of Port P1. How '0' and '1' is read from the pin if used in input mode? 6

(c) Explain the operation of PUSH and POP instructions of 8051. 4

6. *(a)* Write 8051 assembly program to copy a block of 10 bytes from RAM location starting at 37h to RAM location starting at 59h. 7

(b) Explain the functions of 'DJNZ', 'CJNE' and 'RETI' instructions. 3

(c) For (freq = 11·0592 MHz) of 8051, calculate the execution time of a program if it takes 15 machine cycles. How many machine cycles does multiplication instruction of 8051 have? 4

7. *(a)* What is difference between interrupt and polling? List 8051 interrupts in order of their decreasing priority. 5

(b) Write a program to generate square wave pulse of 2 ms time period after every 50 ms, using MHz crystal oscillator. Comment on the use of respective timer mode. 9

8. *(a)* What are the merits of serial communications over parallel communication? Explain about the control register and its configuration for serial input operation. 6

(b) Explain the difference between RISC and CISC architectures. Which architecture does PIC microcontrollers more corresponds to? 4

(c) Comment on the program and data memory, and working registers of PIC. 4

9. *(a)* A program that continuously get 8 bit data from Port P0 and send it to Port P1. A simultaneous creation of square wave of 200 μs is to be done at pin P2.1. Write program for this operation and use timer 0 interrupt for creating square wave. 9

(b) Draw a detailed block diagram of PIC microcontroller architecture. 5

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