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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: III - THEORY EXAMINATION (2021 - 2022)

Subject: Logic Design & Microcontroller

Time: 03:00 Hours

Max. Marks: 100

General Instructions:

1. All questions are compulsory. It comprises of three Sections A, B and C.
 - Section A - Question No- 1 is objective type question carrying 1 mark each & Question No- 2 is very short type questions carrying 2 marks each.
 - Section B - Question No- 3 is Long answer type - I questions carrying 6 marks each.
 - Section C - Question No- 4 to 8 are Long answer type - II questions carrying 10 marks each.
 - No sheet should be left blank. Any written material after a Blank sheet will not be evaluated/checked.

SECTION A

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1. Attempt all parts:-

- | | | |
|------|---|---|
| 1-a. | One that is not the outcome of magnitude comparator is _____ (CO1) | 1 |
| | 1. $a > b$ | |
| | 2. $a - b$ | |
| | 3. $a < b$ | |
| | 4. $a = b$ | |
| 1-b. | A Karnaugh map (K-map) is an abstract form of _____ diagram organized as a matrix of squares. (CO1) | 1 |
| | 1. Venn Diagram | |
| | 2. Cycle Diagram | |
| | 3. Triangular Diagram | |
| | 4. Block diagram | |
| 1-c. | D flip-flop is a circuit having _____. (CO2) | 1 |
| | 1. 2 NAND gates | |
| | 2. 3 NAND gates | |
| | 3. 4 NAND gates | |
| | 4. 5 NAND gates | |
| 1-d. | A gated S-R flip-flop goes into the SET condition when S is HIGH, R is LOW, and EN is HIGH. (CO2) | 1 |
| | 1. TRUE | |
| | 2. FALSE | |
| 1-e. | Which of the following is used for storing flag registers? (CO3) | 1 |

1. Status register
2. Control register
3. Buffer register
4. None of the mentioned

- 1-f. After "XRA A" instruction is executed, what will be the status of Zero Flag? (CO3) 1
1. 1
 2. 0
 3. No change
- 1 Upon reset all the registers except PC will reset to _____ Value and PC register will reset to _____ value. (CO4) 1
1. 0000 & 0007
 2. 0000 & 0000
 3. 0007 & 0000
 4. 0007 & 0007
- 1 After RETI instruction is executed then the pointer will move to which location in the program? (CO4) 1
1. Next interrupt of the interrupt vector table
 2. Immediate next instruction where interrupt is occurred
 3. Next instruction after the RETI in the memory
 4. None of the mentioned
- 1-i. Vector address for Timer 1 Interrupt is (CO5) 1
1. 0003H
 2. 000BH
 3. 0013H
 4. 001BH
- 1-j. If RS=0, then which register in LCD will be selected? (CO5) 1
1. Command
 2. Data
 3. Internal
 4. Initialization

2. Attempt all parts:-

- 2-a. Implement 4:1 multiplexer using 2:1 multiplexer. (CO1) 2
- 2-b. Define race around condition. (CO2) 2
- 2-c. What are the hardware interrupts available in 8085? (CO3) 2
- 2-d. Why does Port 0 needs pull-up resistors? (CO4) 2
- 2-e. Define resolution and step size. (CO5) 2

SECTION B

30

3. Answer any five of the following:-

- 3-a. $F(w,x,y,z) = \sum m(4,5,7,8,10,14)$ minimize the given using K-MAP in POS 6

form. (CO1)

- 3-b. Draw the logic diagram for 4:1 Multiplexer and explain the 16:1 multiplexer. (CO1) 6
- 3-c. Explain briefly about serial in serial out shift registers with neat sketch. (CO2) 6
- 3-d. Design a synchronous counter that counts the sequence 000,001,010,011,100,101,110,111,000 using D flipflop. (CO2) 6
- 3-e. (a) Explain the following instructions in detail:- 6
(i) ADC (ii) LHLD (iii) RLC (iv) DI
(b) Define & explain the term addressing modes. (CO3)
- 3-f. Add the unsigned number found in 8051 microcontroller internal RAM locations 25h, 26h and 27h together and put the result in RAM locations 30h (MSB) and 31h (LSB). (CO4) 6
- 3-g. Explain TCON register of 8051 microcontroller with all bit representation. (CO5) 6

SECTION C

50

4. Answer any one of the following:-
- 4-a. Minimize the following function by Quine McClusky method and also perform the NAND implementation of the simplified function. $F(w,x,y,z) = \sum m(1,4,8,9,13,14,15) + d(2,3,11,12)$. (CO1) 10
- 4-b. Implement Gray to Binary code converter. (CO1) 10
5. Answer any one of the following:-
- 5-a. Realize a SR flip flop using NAND gates and explain its operation. (CO2) 10
- 5-b. What is the function of shift register? Explain its working with the help of simple diagram. Also draw and explain the timing diagram for the serial transfer of information from register A to register B. (CO2) 10
6. Answer any one of the following:-
- 6-a. With the help of neat diagram explain the architecture of 8085 microprocessor in detail. Discuss its flag register. (CO3) 10
- 6-b. Explain the timing diagram of OUT instruction in 8085 microprocessor. (CO3) 10
7. Answer any one of the following:-
- 7-a. Explain the architecture of 8051 microcontroller with a neat block diagram. (CO4) 10
- 7-b. (i) Explain the different methods of memory address decoding in 8051. 10
(ii) Explain the operation of stack in 8051. (CO4)
8. Answer any one of the following:-
- 8-a. Explain the LCD interfacing with 8051 microcontroller with suitable diagram. (CO5) 10
- 8-b. Discuss programming steps to generate time delay in 8051 and also write a program to generate delay of 10 second using timer 0 in mode 1. (CO5) 10