

GOVT. WOMEN POLYTECHNIC COLLEGE, AJMER
ELECTRONICS DEPTT.
SECOND MID TERM EXAM
EL 302 ADVANCE MICROPROCESSOR

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Dt: 8/1/18 Time: One Hr

M Marks: 15

Note: All question carry 5 marks.

- Q1. Explain 8255 by clear block diagram. Write control word for 8255 to set following in simple input / output mode
1. Port A & C as input port.
 2. Port B as output port.

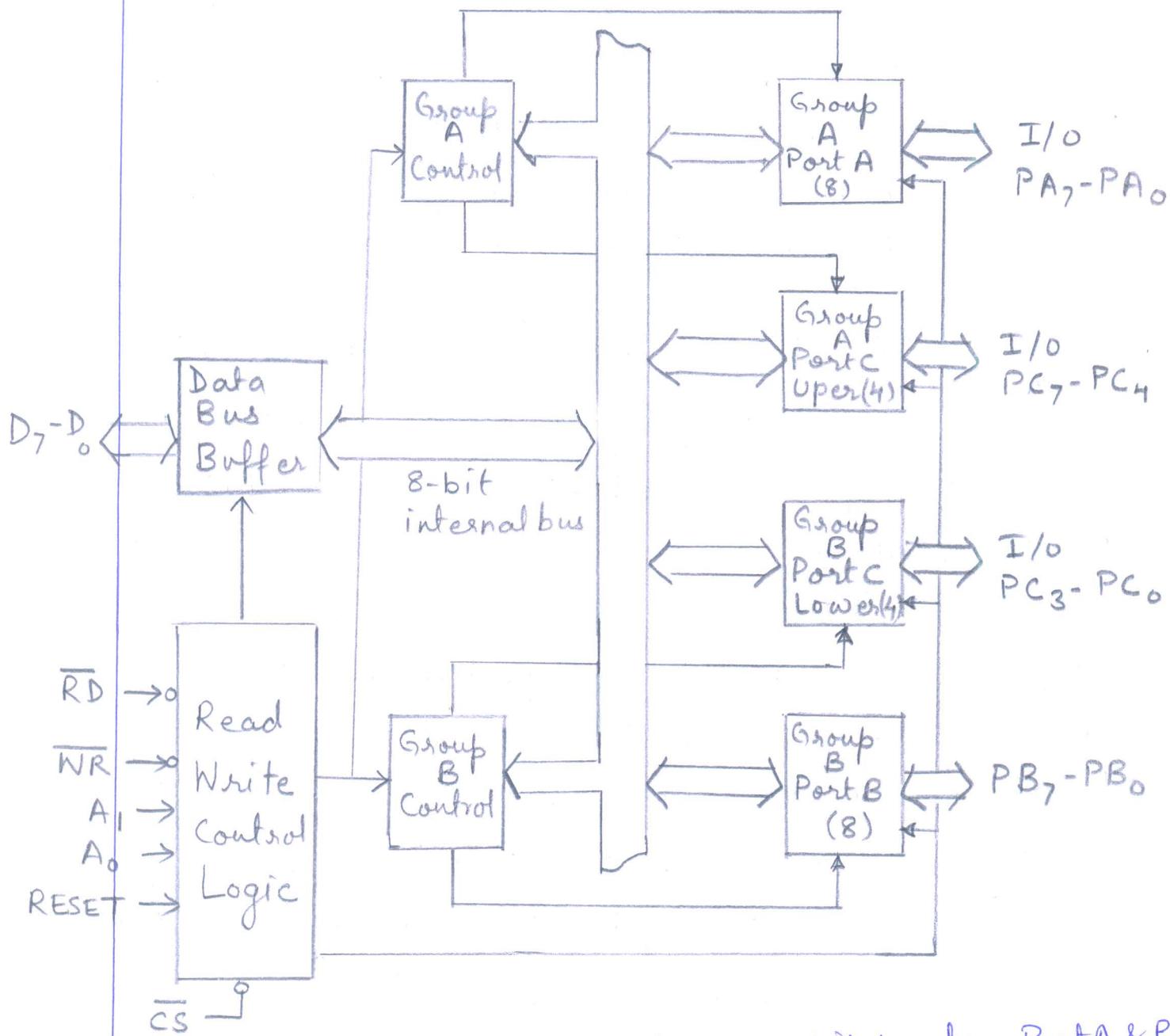
Ans 8255 PPI (programmable, peripheral interface) is widely used programmable, parallel I/O device. It can be programmed to transfer data under various condition - from simple I/O to interrupt I/O. 8255 has 24 I/O pins grouped into three 8-bit ports - port A, port B & port C. The eight bits of port C can be grouped into two 4-bit ports C_{UPPER} (C_U) & C_{LOWER} (C_L)

All functions of 8255 can be grouped into two modes - Bit Set/Reset (BSR) mode & I/O mode. The BSR mode is used to set or reset the bits in port C. The I/O mode is further divided into Mode 0, Mode 1 and Mode 2. In mode 0, all ports are bidirectional. The 1st & 2nd

handshake mode where port A & port B use bits from port C as handshake signals.

Two types of data transfer can be implemented using handshake mode - status check I/O & interrupt I/O. In Mode 2, port A can be set up for bi-directional data transfer using handshake signals from port C. & port B can be used in Mode 0 or Mode 1.

Block diagram



Block Diagram shows two 8-bit ports - Port A & Port B, two 4-bit ports - Port C_U & Port C_L, databus buffer and read write control logic.

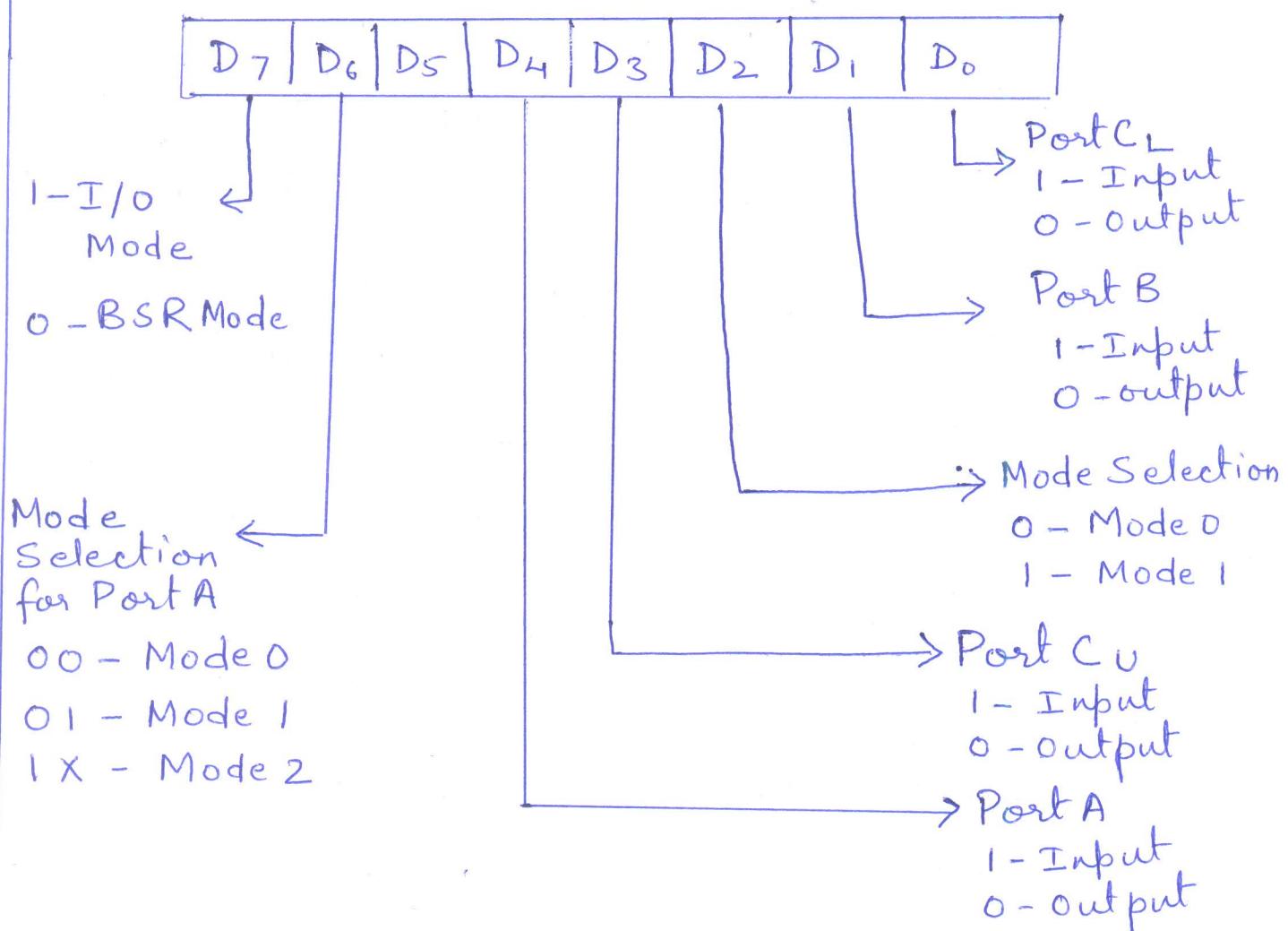
Address line A_1, A_0 are used to select one of I/O ports or the control register as given below.

\bar{CS}	A_1	A_0	Selected
0	0	0	Port A
0	0	1	Port B
0	1	0	Port C
0	1	1	Control Register
1	X	X	8255 not selected

Control Word

Contents of control Register are called control word.

Control Word



BSR Mode - used to set or reset bits of port c

D ₇	D ₆	D ₅	D ₄	D ₃	D ₂	D ₁	D ₀
0	X	X	X				S/R

↑ ↓ ←
 BSR Mode Not used Bit selected I - Set
 0 - Reset

000 Bit 0
 001 Bit 1
 010 Bit 2
 011 Bit 3
 100 Bit 4
 101 Bit 5
 110 Bit 6
 111 Bit 7

Control word to set Port A & C as simple input port & port B as simple output port.

$$\begin{array}{cccccccc} D_7 & D_6 & D_5 & D_4 & D_3 & D_2 & D_1 & D_0 \\ \boxed{1} & 0 & 0 & 1 & 1 & 0 & 0 & 1 \end{array} = 99H$$

Soa Control word = 99 H

Q2. Explain the meaning of following commands.

a) ADD AX, [BX] b) SUB AX, BX c) MUL CL

Ans a) ADD AX, [BX] - This command add the contents of AX register with the contents of memory location whose offset is specified by register BX. and result is stored into AX register.

$$\begin{array}{r} \text{---} \\ \text{---} \end{array} \begin{array}{l} (\text{A}x) \\ + (\text{D}\text{S};\text{B}x) \\ \hline (\text{A}x) \end{array}$$

- b) SUB AX, BX - This command subtracts the contents of BX register from the contents of AX register and stores the result into AX register. Flags are modified according to the result. $(AX) \leftarrow (AX) - (BX)$
- c) MUL CL - This command multiplies content of AL register ^{i.e. unsigned byte in AL} with the unsigned byte stored in CL register and stores the unsigned word into AX register. This command performs unsigned multiplication. The most significant byte of result is stored into AH & least significant byte of result is stored into AL. AF, PF, SF & ZF flag are undefined after MUL instruction.

$$(AX) \leftarrow (AL) * (CL)$$

Q3 Explain flag manipulation instruction of 8086?

- Ans. Different flag manipulation instruction are
- a) CLC - This instruction reset the carry flag too. No other flags are affected.
- b) CLD - This instruction reset the direction flag too. No other flags are affected. If DF=0, SI & DI will automatically be incremented

- c) CMC - Complement the carry flag. If $CF=0$, before this instruction, $CF=1$ after the instruction. If $CF=1$, before this instruction, $CF=0$, after the instruction. Other flags are not affected.
- d) CLI - Clear Interrupt flag.
This instruction reset the interrupt flag to 0.
No other flags are affected.
- e) STC - This instruction set the carry flag to 1.
No other flags are affected.
- f) STD - This instruction set the direction flag to one.
No other flags are affected. If $DF=1$, SI & DI will be automatically decremented during the execution of string instruction.
- g) STI - This instruction set the interrupt flag.
Setting the interrupt flag to one enables the INTR input of 8086.

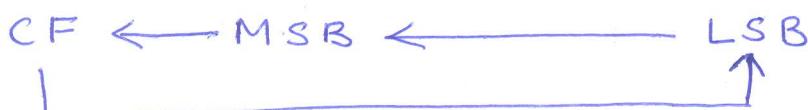
Also flags are affected by the outcome of arithmetic & logical instruction.

OR

Explain different rotate instruction of 8086?

- Ans - a) RCL - This instruction rotates all the bits of a byte some number of

bit positions to the left. The operation is circular as shown in figure



Syntax - RCL Destination, Count

The destination operand can be a register or memory location specified by any one of 24 addressing modes. If the operand can be rotated by one bit position, by writing one in count position. To rotate more than one bit position the count is loaded into CL register. RCL affects only CF & OF flag.

For eg

MOV DX, 1234 = DX = 0001001000110100 & CF =
MOV CL, 03

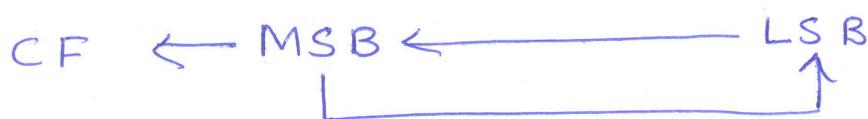
RCL DX, CL

After rotation

DX = 1001000110100000 = 91AOH

CF = 0

b) ROL - This instruction rotates all the bits in a specified word or byte to the left some number of bit position. The data bit rotated out of MSB is circled back into LSB & copied into CF



Syntax - ROL Destination, Count

The destination operand can be a register or memory location specified in any one of 24 addressing modes. To rotate by one bit position

1 is written in count position. To rotate by more than one bit position, the count must be loaded into CL register. ROL affects only CF & OF flag.

for eg

MOV BL, 45

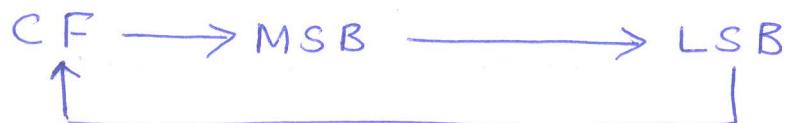
MOV CL, 04

ROL BL, CL

Before rotation BL = 45H

After rotation BL = 54H & CF = 0

c) RCR - This instruction rotates all the bits in a specified word or byte some no. of bit position to the right.



Syntax - RCR Destination, count
The operation is circular. The destination operand can be register or memory location specified in any one of 24 diff. addressing modes. To rotate by one bit position, #1 is written in count position. To rotate by more than one bit position, the count must be loaded into CL register. ROL affects only CF & OF flag.

For example

CLC

MOV BL, 45

MOV CL, 04

Before rotation BL = 45H = 01000101 , CF = 0

After rotation BL = 10100100 = A4 , CF = 0

- d) ROR - This instruction rotates all the bits in a specified word or byte to the right by some number of bit position. The data bit rotated out of LSB is circled back into MSB and copied into CF



Syntax ROR Destination, Count

The destination operand can be a register or memory location specified in any one of 24 addressing modes. To rotate by one bit position, 1 is written in count position. To rotate by more than one bit position, the count must be loaded into CL. ROL affects only CF and OF flag.

for eg.

CLC

MOV BL,45

MOV CL,04

ROR BL,CL

Before rotation BL = 45H = 01000101 , CF = 0

After rotation BL = 54H , CF = 0